

Aurizon Network's WACC for the 2017 DAU

Queensland Competition Authority

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1. Executive Summary

1.1 Summary of findings

Aurizon Network Pty Ltd (Aurizon Network) has submitted a draft access undertaking to the Queensland Competition Authority (QCA) for the regulatory period commencing 1 July 2017 (2017 DAU).¹ The draft access proposal sets out non-price and price-related terms and conditions for access to Aurizon Network's below-rail network. To assist its review of Aurizon Network's submission, the QCA engaged Incenta Economic Consulting (Incenta) to review Aurizon Network's submission, and to estimate a number of Weighted Average Cost of Capital (WACC) parameters. Our report is divided into three parts, addressing capital structure / equity beta (chapters 3 and 4), credit rating / cost of debt parameters respectively (chapter 5), and stakeholder submissions on Aurizon Network's proposal (chapter 6). With respect to our own estimates of the WACC parameters we have been asked to review, our conclusions are as follows:

Capital structure, asset beta and equity beta parameters

For the benchmark capital structure, asset beta and equity beta parameters, we consider that the evidence supports the following benchmark levels:

- An asset beta of 0.42, based on evidence relating to regulated energy and water businesses, which we consider to be the best available comparator industry reflecting Aurizon Network's systematic risk (using the QCA's preferred Conine formula with a debt beta assumption of 0.12 in the de-levering process);
- A benchmark gearing level of 55 per cent; and
- An equity beta of 0.73 (again using the QCA's preferred Conine formula with a debt beta assumption of 0.12 in the re-levering process).

Credit rating and cost of debt parameters

Our conclusions on the benchmark credit rating and cost of debt parameters for the 20 business days to 30 June, 2017, are:

- A 4 year risk free rate of 1.90 per cent;
- A benchmark BBB+ credit rating;
- A 10 year benchmark BBB+ debt risk premium of 2 per cent; and
- A benchmark interest rate swap transaction cost allowance of 12.5 basis points.²

¹ Aurizon Network (30 November, 2016), *Aurizon Network Submission 2017 Draft Access Undertaking*.

² The benchmark swap cost has been estimated as at 30 June, 2017.

1.2 Capital structure and beta

1.2.1 Aurizon Network's submission on asset beta

Aurizon Network's submission accepted the asset beta range proposed by its consultant, The Brattle Group (0.55 to 0.65), and it adopted the bottom of this range, 0.55, as its point estimate. The Brattle Group's estimate was based on its view that North American pipelines (i.e. gas and liquids transmission pipelines) are the best available comparators for Aurizon Network. Aurizon Network's submission on cost of equity issues was informed by reports that it commissioned from The Brattle Group and Frontier Economics (Frontier).³ The three key issues raised in Aurizon Network's submission on asset beta are set out below.

1. The QCA / Incenta over-emphasised regulation and chose the wrong comparator group

Aurizon Network submitted that the QCA and Incenta have over-emphasised the influence that regulation has on beta, as Frontier had cited numerous studies showing that the form of regulation does not impact the level of systematic risk.⁴ Therefore, regulation could not have a material impact on the asset beta of Aurizon Network, and as a result, the QCA and Incenta have previously chosen the wrong comparator group (i.e. regulated energy and water networks rather than transport infrastructure, including railroads).

The Brattle Group's report considered North American pipelines to be a superior asset beta comparator for Aurizon Network than regulated energy and water businesses, since Aurizon Network and North American pipelines share the physical characteristic of⁵

... transporting a commodity along a fixed route up-stream from the end-use market.

The Brattle Group proposed that the following additional "common characteristics" support the use of North American pipelines as a superior comparator for Aurizon Network:

- *Servicing a limited number of customers* – Both North American pipelines and Aurizon Network have a small number of customers relative to the large numbers of customers of regulated energy and water networks.
- *Elasticity of demand* – Price elasticity of demand would be higher for Queensland coal than for energy and water, and while Aurizon Network's exposure to demand risk can be reduced through contracting and regulation, in the short term, such risks are not entirely avoided.
- *Cost of service regulation* – North American pipelines are subject to similar cost-based regulation as Aurizon Network.

³ The Brattle Group (30 November, 2016), *Aurizon Network 2016 Access Undertaking, Aspects of the WACC*; and Frontier Economics (November, 2016), *Equity beta*, Report prepared for Aurizon Network.

⁴ Aurizon Network (2016), p.273.

⁵ The Brattle Group (30 November, 2016), p.46.

- *Long-term contract cover* – Both Aurizon Network and North American pipelines have significant long-term contract cover (and regulated energy and water businesses do not), although there is a risk of declining revenue from Aurizon Network's contracts rolling off.

2. Weight should be given to railroad industry comparators

Aurizon Network's submission noted that its advisers had recommended providing weight to other rail networks as asset beta comparators. The Brattle Group wrote that:⁶

It is our view that certain aspects of operating a rail network dedicated to freight transportation are best captured by consideration of comparators that operate in that line of business. Patterns of cash flows related to operating expenses, maintenance and expansion capital expenditures, and working capital balances for freight rail companies are, put simply, likely to be most comparable to those of other freight rail companies.

Section 3.1 of Frontier's report emphasised that the QCA's and Incenta's approach of rejecting all rail infrastructure was unique, not well reasoned, not justified by the evidence, and conflicted with the views of:

- *Regulators* – Frontier's report stated that while other regulators have had regard to other rail infrastructure, the QCA has not.
- *Independent experts* – Frontier considered that the QCA erroneously concluded that independent expert Grant Samuel had supported its approach simply because the QCA had chosen to define Aurizon Network's assets as a utility.
- *Credit rating agencies* – Frontier's report appeared to imply that there is a relationship between credit risk and systematic risk, contradicting the QCA's view that "credit risk does not necessarily translate to greater beta risk."

Frontier considered that if any weight is provided to Class 1 railroads, the estimated asset beta of Aurizon Network must lie between the asset beta of Class 1 railroads and regulated energy and water businesses.

3. Aurizon Network is subject to a range of risks

Aurizon Network's submission also referred to a number of risks that it faces in what it termed an uncertain environment. It was noted that coal prices had recently rebounded, which it considered illustrates the "volatile nature of the industry". It submitted that its users are price takers, whose demand depends on "the relative competitiveness of CQCN [Central Queensland Coal Network] producers in that market, which can also be influenced by government policy actions domestically and globally."⁷ Aurizon Network also noted that it is subject to asset stranding risks that distinguish it from regulated energy and water businesses:

- There is a temporal decline in thermal coal demand due to environmental concerns;

⁶ The Brattle Group (30 November, 2016), p. 46.

⁷ Aurizon Network (30 November, 2016), p. 258.

- There is “no mechanism for Aurizon Network to recover revenue shortfalls between systems” so the impact of mine closures in one of the four zones cannot be recovered from others;
- Aurizon Network faces stranding risk from \$250 million in revenue deferrals the QCA applied to the Wiggins Island Rail Project (WIRP), because the full amount won't be recovered if railings don't reach levels anticipated in the investment; and
- Aurizon Network faces stranding risk from RAB fragmentation in the smaller Moura and Newlands systems because it is dependent on only two mines in each system, and there “is no mechanism for Aurizon Network to recover revenue shortfalls between systems.”⁸

Finally, we note Frontier's submission that in previous reports Incenta has relied wholly on “conceptual discussion”, and that Aurizon Network and its advisers have considered the same factors but reached alternative conclusions. This implies that alternative approaches are equally valid because they are based on opinions.

1.2.2 Our response to Aurizon Network's submission

First Principles Analysis

In chapter 3 we present our first principles analysis of Aurizon Network's systematic risk by assessing this risk with respect to a standard set of factors potentially affecting beta drawn from the economics and finance literature (summarised by Dr Martin Lally), with the scope of this analysis being informed by the material presented by Aurizon Network.⁹ We examine a number of characteristics that are expected to affect systematic risk, and consider how each potential comparator firm or industry compares on that characteristic relative to the target firm, which in this case is Aurizon Network. Our key finding is that on balance, among the range of potential comparator industries, regulated energy and water businesses provide the best available comparator group for Aurizon Network, based on the following (as summarised in Table ES.1):

- Regulated energy and water – Both Aurizon Network and regulated energy and water businesses are monopoly service providers, have a ‘captured’ customer base with resilient demand for the service, and are subject to cost-based regulation for pre-set periods, which largely insulates their cash flows.¹⁰ Combined, this results in low sensitivity of demand / revenue to GDP shocks for these firms. We would therefore expect Aurizon Network and regulated energy and water businesses to have similar levels of exposure to systematic risk.
- Tollroads – Unlike Aurizon Network, these businesses do not possess a high degree of market power, and while traffic can be sensitive to GDP shocks, there is no cost-based regulatory mechanism to cushion such shocks, which leads us to expect higher systematic risk for tollroads relative to Aurizon Network.

⁸ Aurizon Network (2016), p.272.

⁹ Lally, M. (26 February, 2004), *The cost of capital for regulated entities*, Report prepared for the Queensland Competition Authority, pp.80-84.

¹⁰ By ‘cost-based regulation’ we are not referring to a specific form of price control or incentive regime, but to the fact that regulation is undertaken at specified points in time when revenues or prices are re- set relative to costs in order to provide an expected return on investment that, given the level of risk, is consistent with returns that would be earned in competitive markets. Under alternative forms of price control, ‘cost-based regulation’ includes rate of return, price-cap and revenue-cap regulation.

- North American pipelines – Oil and gas transmission pipelines compete against parallel pipelines and alternative transport modes and are therefore subject to competitive pressure. North American pipelines lack market power and their customers are not ‘captured’ like the customers of Aurizon Network. This means that apart from the protection afforded by firm contracts, their revenues are exposed to market forces. Their regulatory framework is different from those applying to Aurizon Network and regulated energy and water. The light handed regulatory regime for United State oil and natural gas pipelines relies on the existence of varying degrees of competition within the markets. In competitive markets, North American pipeline rates are constrained by competition, not regulation. While cost-based regulation is adopted in the regulatory regimes to mitigate the pipeline carriers’ market power where it exists, regulatory tariffs are influenced by fluctuations in the market with no pre-determined regulatory period. Therefore, the regulatory buffering of the cash flows of North American pipelines is limited in comparison to that of Aurizon Network, where the revenue cap of the latter is re-set every 4 years so that revenue will be recovered irrespective of usage. Uncontracted pipeline capacity is vulnerable to changing market conditions and contract roll-off is likely to be a significant issue for North American pipelines. Accordingly, North American pipelines are expected to have higher systematic risk than Aurizon Network.
- Class 1 railroads – Class 1 railroads are expected to have materially higher systematic risk than Aurizon Network. Class 1 railroads are subject to competitive pressure from parallel railroads and alternative transport modes; carry loads that are highly sensitivity to GDP shocks; have relatively higher operating leverage; and their cash flows are neither constrained nor buffered by regulation, which merely monitors the rate of return being earned.

Table ES-1: Summary of first principles characteristics of potential comparator industries

Characteristic	Aurizon Network	Regulated energy & water	Tollroads	Pipelines	Class 1 railroads
Market power and resulting Regulatory Framework	High Pre-determined reg. periods Cost based revenue cap set so revenue will be recovered irrespective of usage	High Pre-determined reg. periods Cost based, via revenue cap, price cap or rate of return constraint / protection	Compete for traffic flow No set regulatory period Tolls often capped at CPI & potential to regulate	Competitive pressure Light-handed regulatory regime relying on competitive pressure. No set regulatory period	Competitive pressure No set regulatory period Rate of return monitoring but does not constrain or protect revenue
Income Elasticity of Demand & Nature of the customer	Low Metallurgical coal pro-cyclical Regulation buffers cash flow	Low Captive customers in an area Regulation buffers cash flow	Medium Traffic sensitive to GDP No buffering mechanism	High for material load Non-contracted load exposed No buffering mechanism	High for material load ETM traffic sensitive to GDP No buffering mechanism
Nature of the Customer	Mines incentive to maximise output (coking & thermal)	Both industrial & residential customers	Both industrial & residential customers	Customers are industrial / utilities	Customers are industrial / commercial
Contract duration	Long-term contracts backed-up by regulatory framework	Contracts are not a key feature most customers are captive	No contracting	5-15 year contracts	Contracts of 1-3 years 5 years for coal traffic only
Real Options	Not relevant due to regulatory constraint	Not relevant due to regulatory constraint	Real options to expand	Real options to expand, e.g. current oil / gas expansion phase	Real options to expand, e.g. e.g. oil & LNG by rail
Operating leverage	Medium / not relevant	Medium / not relevant	Medium	Medium	Relatively high
Market weight	Not an issue	Not an issue	Not an issue	Not an issue	Not an issue
Stranding risk	Low Customers occupy strong positions on global cost curve Growth outlook for export coal is positive	Low Particularly for services to large urban networks	Low to medium Generally low but can be vulnerable to alternative roads / transport modes	Ranging from low to high Fracking revolution has changed flows of gas in North America	Low to medium Generally low stranding risk but some risk for thermal coal rail operations

Source: Incenta based on various sources

The analysis in chapter 3 supports our conclusion that neither North American pipelines nor Class 1 railroads are appropriate comparator industries for Aurizon Network. On the other hand, by sharing the key similarities of: market power, resilient demand from a ‘captured’ customer base, and regulatory buffering of cash flows, regulated energy / water business are shown to be the best available industry comparator group to reflect Aurizon Network’s systematic risk. Based on the

evidence, we would expect tollroads, North American pipelines and Class 1 railroads all to have materially higher systematic risk than Aurizon Network.

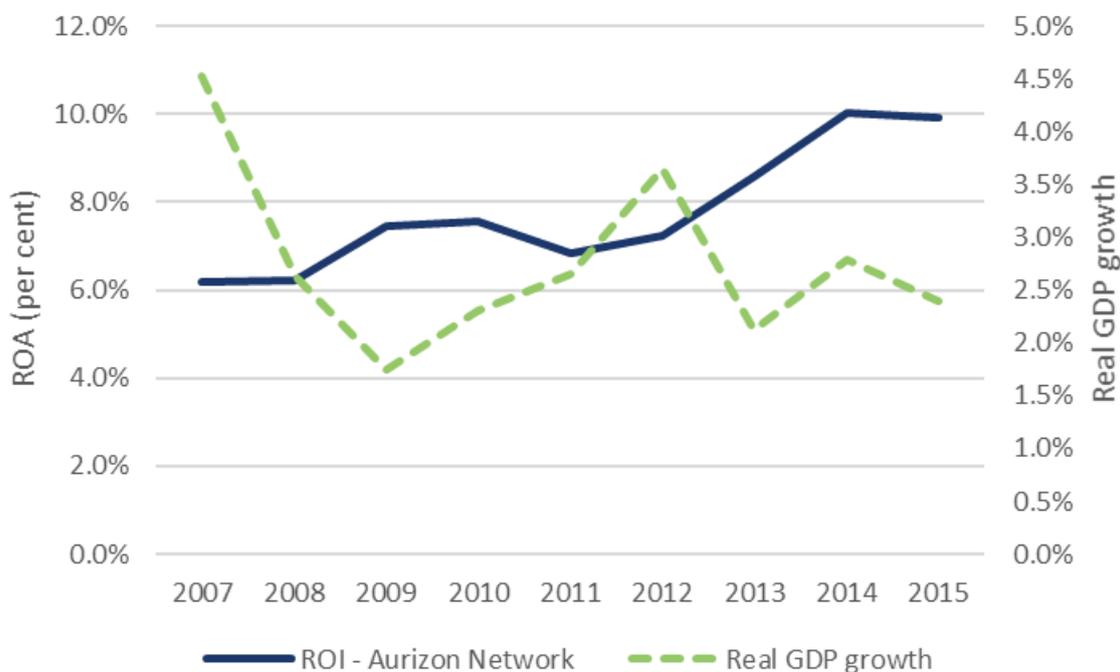
Emphasis on regulation and choice of the comparator group

The Brattle Group's "common characteristics"

We do not consider any of the "common characteristics" emphasised by The Brattle Group provide good reasons to adopt North American pipelines as a close comparator group for Aurizon Network:

- *Servicing a limited number of customers* - what matters for beta is resilience of revenues through the economic cycle. The reason that energy and water revenue is resilient to economic cycles is not due to customer numbers, but due to the fact that much of the demand is for residential purposes rather than industrial / commercial uses, and that these firms are subject to cost-based regulation. Aurizon Network's revenue is similarly resilient to economic cycles, given its market power, the positions occupied by its 'captured' customers on the international coal export curve, and its regulatory framework. North American pipelines do not have the same level of resilience, as they are subject to competitive pressure from parallel pipelines and alternative modes of transport.
- *Elasticity of demand* - Income elasticity of revenues is likely to be more relevant to systematic risk than price elasticity of demand, and The Brattle Group provided no data on either. Firms that have a low income elasticity of demand will have lower sensitivity to GNP shocks, and therefore a lower asset beta. Since demand for metallurgical coal in particular is expected to have a relatively high elasticity of demand (which is "industrial") Aurizon Network's cash flows could be expected to have a systematic (i.e. pro-cyclical) relationship to the economy—if it were not for the fact that it has a position of market power, it has a customer base with sustained demand for the service, and is subject to cost-based regulation. Cost-based regulation buffers Aurizon Network's cash flows and results in an economic income stream that is independent of the economic cycle. Figure ES.1 shows that since 2007 Aurizon Network's ROA has shown no evidence of pro-cyclical behaviour, even during the global financial crisis of 2008-09.

Figure ES.1: ROA vs GDP growth for Aurizon Network, 2007-2015



Source: Bloomberg, QCA, Aurizon Network and Incenta analysis

Hence, while the underlying demand for metallurgical coal may have a higher income elasticity of demand than the demand for energy or water, the income elasticity of demand for the CQCN services is, to a large extent, decoupled from the elasticity of the demand for coal from the CQCN (see below). Aurizon Network’s regulatory arrangements (and to a lesser extent, its contracting) have made its cash flows, like those of regulated energy and water businesses, vary with changes in the RAB, rather than with the state of the economy. As a result, the cash flows and returns of both are relatively non-systematic. By contrast, rail freight demand is industrial / commercial, and a material component of this demand has very high income elasticity (e.g. automobiles), and is not buffered by regulation. As a result the systematic risk of Class 1 railroads is expected to be higher than for Aurizon Network.

- *Cost of service regulation* – We do not agree with Frontier’s submission that regulation cannot be an important indicator of asset beta. The studies referred to by Frontier did not test whether the presence of cost-based regulation results in materially different asset betas, which is the relevant issue here. Rather, these studies typically looked at the effect of variations in the forms of cost-based regulation, but mostly in cases where the final customers of a utility were dominated by residential demand. Since the revenue volatility of these customers is largely non-systematic in any case, there was a low likelihood of finding material differentials in beta estimates.¹¹ However,

¹¹ Several recent empirical studies that have not been able to find material differences in beta based on differences in the form of regulation in utility businesses include: ACG (17 September, 2008), *Beta for regulated electricity transmission and distribution*; CEG (June, 2013), *Information on equity beta from US companies*; Gaggero, A. (2012) “Regulation and Risk: A Cross-Country Survey of Regulated

there are studies that have found evidence that the nature of the “regulatory environment” influences beta risk of rate of return regulated electric utilities in the US.¹² Other studies have concluded that, other things being equal, the presence of cost-based regulation reduces beta.¹³

While The Brattle Group’s report proposes that the regulatory approach applied to North American pipelines is similar to that applying to Aurizon Network, it is actually substantially different in nature. The regulatory regime for North American pipelines relies on the potential for a degree of competition within the markets. When competitive markets are demonstrated, North American pipeline rates are largely constrained by competition, and not by regulation. Where pipeline transportation tariffs are set at competitive rates, cost-based regulation does not buffer North American pipelines’ cash flows. However, where applied, cost based tariffs:

- provide a ceiling level for oil pipeline transportation rates, which are indexed tracking economy-wide costs rather than pipeline-specific costs
- expose the gas pipeline transportation rates to the volume risk of the uncontracted portion of their capacity.

By contrast, Aurizon Network’s regulatory framework shields the whole of its capacity from demand risk. The regulatory approach applied to Aurizon is forward looking and cost-based. The revenue cap is set so that the revenue will be recovered irrespective of the volume of actual usage. In this regard, the regulatory framework of Aurizon Network is very similar to that of the regulated energy and water businesses. Both Aurizon Network and regulated energy and water businesses are subject to pre-determined regulatory periods (in Aurizon Network’s case it is 4 years). Less regular reviews by regulators are expected, other things being equal, to result in a higher beta, all else equal, as there is less scope for buffering or adaption of regulatory settings to changing economic conditions.

Despite some pro-cyclical fluctuations in the demand for Australia’s metallurgical coal, Aurizon Network’s regulatory framework has resulted in Aurizon Network’s cash flows being linked to its RAB (and regulatory resets), which are therefore less likely to be linked to the state of the economy. In NPV terms, Aurizon Network’s regulatory framework is more likely to achieve similar “cash flow buffering” to that of regulated energy and water businesses.¹⁴

- *Long-term contract cover* - We agree that contract cover is a feature that is common to both North American pipelines and Aurizon Network. However, the impact of long term contracts on North

Companies,” *Bulletin of Economic Research*, Vol. 64 (2); and Incenta (9 December, 2013), *Review of Regulatory Capital Structure and Asset / Equity Beta for Aurizon Network*, pp.17-18.

¹² There are empirical studies finding that, other things being equal, beta risk declines as the intensity of cost based regulation increases. See John J. Binder and Seth W. Norton (1999), ‘Regulation, Profit Variability and Beta’, *Journal of Regulatory Economics*, Vol. 15, Issue 3, p. 250; and Davidson, W., N. Rangan, and S. Rostenstein (1997), “Regulation and Systematic Risk in the Electric Utility Industry: A Test of the Buffering Hypothesis”, *The Financial Review*, Vol. 32, No.1, pp.163-184.

¹³ See Rosenberg, B. and J. Guy (1976), ‘Beta and Investment Fundamentals – II,’ *Financial Analysts Journal*, Vol. 32, No. 4, pp.62-76; and Riddick, L.A. (1992) ‘The effects of regulation on stochastic systematic risk’, *Journal of Regulatory Economics*, Vol. 4, Issue 2, pp.139-157.

¹⁴ While Aurizon Network’s absolute cash flows are likely to be more volatile than those of regulated energy and water businesses, often due to disruptions caused by weather (which is not a systematic risk), the regulatory framework smooths cash flows in NPV terms because over a period of two years there is true-up of revenue (holding Aurizon Network neutral in NPV terms).

American pipelines is different from the impact of long term contracts on Aurizon Network. In the former it is the last line of defence in the event of a downturn in demand. In the latter it is the first line of defence, before the regulatory framework engages to protect the revenue cap in NPV terms. Hence, for North American pipelines long term contracts are of vital importance, because any uncontracted capacity is exposed to non-recovery. For Aurizon Network, the regulatory framework provides a buffer, through system reference tariffs and the revenue cap, that ensures recovery of revenues regardless of long term contracts unless there is a complete collapse in demand resulting in defaults by a material proportion of the customer group.

Providing weight to rail comparators

Aurizon Network and both of its advisers considered material weight should be given to railroad businesses, although The Brattle Group ultimately appeared to give no weight to them, since it defined its asset beta range by reference only to North American gas pipelines (low) and liquid pipelines (high). As noted above, we disagree with The Brattle Group's analysis of these comparators and note that it provided no supporting evidence for its position. In response to Frontier's submission that in rejecting all reliance on rail infrastructure Incenta's approach conflicted with the views of regulators, independent experts and credit rating agencies:

- *Regulators* - Our view is that if a regulator has regard to inappropriate comparators it will not result in a reasonable estimate of systematic risk. When estimating the asset beta for the Public Transport Authority (PTA) suburban railroad business, the Western Australian Economic Regulation Authority (ERAWA) did not reference other rail businesses that carry freight, but rather toll roads, and chose an asset beta below the level of the tollroads operator with the lowest asset beta based on its own judgement.¹⁵ The logic behind ERAWA's approach was similar to that adopted by Incenta. When the ERAWA considered Brookfield Rail, it was noted that US Class 1 railroad comparators were not appropriate comparators, since the mix of freight was different to Brookfield Rail, which has a large component of bulk grain and mineral products. It did not apply the much higher asset beta that was indicated by evidence for US Class 1 railroads.¹⁶ In short, when assessing systematic risk for a rail network, regulators do take account of the nature of its traffic mix, and the systematic risk of each component of that mix.
- *Independent experts* – Independent expert, Grant Samuel, did in fact act in a way that supports the approach applied by Incenta (i.e. not considering Class 1 railroads to be suitable comparators for Aurizon Network). Moreover, when assessing the systematic risk of the Dalrymple Bay Coal Terminal (DBCT) – which raises the very similar question of whether typical (container/cargo) ports are appropriate comparators for a regulated, bulk coal port – Grant Samuel avoided using general UK cargo port comparators, and instead applied the asset beta of an energy network business. Grant Samuel did this because DBCT was regulated and expected to provide cash flow certainty, which Grant Samuel considered to be characteristics DBCT shared with the regulated network business.¹⁷

¹⁵ ERAWA (18 September, 2015), *Review of the method for estimating the Weighted Average Cost of Capital for the Regulated Railroad Networks – Final Decision*, p. 148.

¹⁶ ERAWA (18 September, 2015), p. 163.

¹⁷ Grant Samuel (24 September, 2010), *Proposal from Brookfield Infrastructure Partners L.P.*, Appendix 1 – Selection of Discount Rates, p. 10.

- *Credit rating agencies* – While credit rating agencies may use a range of comparators for Aurizon Network, including a general cargo railroad business, there is no reason to expect a fixed relationship between credit risk and asset beta risk, and we find no empirical evidence to support such a relationship. Firms with the same credit risk have a wide range of asset betas.

Aurizon Network's risk environment

We do not agree with Frontier's submission that our analysis of 'first principles' in the previous review for Aurizon Network was "wholly conceptual". Our theoretical analysis was, and is, supported by empirical evidence, while Aurizon Network's and The Brattle Group's submissions have not been supported in the same way. In the current report we provide evidence that Aurizon Network's counterparties:

- Occupy relatively favourable positions on the relevant international cost curves;
- That the future outlook for Queensland coal exports is positive (in both volume and price terms); and
- Like regulated energy and water businesses, Aurizon Network's cash flows are not pro-cyclical, while those of North American pipelines are, and the US Class 1 railroads are even more so.

On the basis of a first principles analysis that applies both theory and empirical evidence, we consider that regulated energy and water businesses are the best available comparators at this time to estimate Aurizon Network's systematic risk.

While Aurizon Network and The Brattle Group suggested that the physical act of "transporting a commodity along a fixed route up-stream from the end-use market" is a significant characteristic in common with North American pipelines, beta risk is dependent on there being a systematic relationship between the returns of the business and those of the market / economy, which cannot be eliminated through diversification. Therefore, the fact that two types of firms share similar physical characteristics does not necessarily mean that they share similar systematic relationships between their returns and those of the market. Without providing supporting evidence, The Brattle Group's report stated that:¹⁸

*The cost-based regulation and long-term contract features of the North American pipeline industry serve to **buffer revenue variability** in the manner identified by the QCA and Incenta with respect to Aurizon Network. [emphasis added]*

In Figure ES.1 above we showed that Aurizon Network's returns to investors (ROA) are not systematically related to real GDP growth, which implies a lower asset beta. At the conclusion of our first principles analysis, for the period 2007 to 2016 we look at the extent of cash flow buffering in each of our potential comparator industries and find that, while the regulated energy and water industries also show a low systematic variability in ROA, this is not the case for North American pipelines, and even less so for Class 1 railroads.

These empirical findings are a test of hypotheses developed through our first principles analysis, which posited that among the potential comparator industries, regulated energy and water are the

¹⁸ The Brattle Group (30 November, 2016), p.46.

industries likely to provide the best indicator of Aurizon Network's systematic risk. The Brattle Group provided no evidence that the cash flows of the North American pipeline industry are buffered like Aurizon Network's cash flows. On the contrary, our data show that the earnings of North American pipelines are more likely to be materially and systematically related to the economic cycle.

We agree with Aurizon Network that its profitability in the long term will depend "on regional and global demand for Queensland coal supplies, as well as the price of those supplies." However, neither Aurizon Network nor its advisers have provided evidence that the demand for Queensland's metallurgical or thermal coal export industries is expected to be subject to material temporal decline. By contrast, we show that the long-term outlook for the Queensland coal industry is positive since:

- Queensland-based suppliers occupy favourable positions on the respective seaborne export coal cost curves; and
- The US Energy Information Administration (EIA) has forecast that total Australian exports of coal will rise from 394.3 million short tons in 2013 to 479.8 million tons by 2040.¹⁹

Regarding RAB fragmentation, we agree that there could be a greater risk of asset stranding if the non-economic capacity in a smaller region cannot be "socialised" across a broader group of mines. However, we do not consider that the number of coal mines in a region is the critical issue. Rather, it is the positions that those mines occupy on the international cost curve. Aurizon Network has provided no data on this matter. While Aurizon Network's submission refers to sell-downs of equity and closure of mines as the outcome of recent coal price instability, we show that the rise in Aurizon Network's EBIT has borne no relation to changes in the price of coal. Furthermore, both the Australian Chief Economist and JP Morgan have forecast future coal prices that are above the all-in cash costs of all currently producing Queensland metallurgical coal mines and thermal coal mines.²⁰

In summary, after considering the systematic risk characteristics of several alternative comparator industries, including North American pipelines, tollroads, Class 1 railroads and regulated energy and water businesses, we consider that both theory and empirical evidence support the use of regulated energy and water businesses as the best available comparator group for Aurizon Network's regulated operations.

1.2.3 Our estimate of the benchmark asset beta

Our approach

The sample

Our sample of firms for beta estimation was developed as follows:

¹⁹ US Energy Information Administration (May 2016), *International Energy Outlook 2016*, p. 74.

²⁰ Office of the Chief Economist (December, 2016), *Resources and Energy Quarterly*, p.36-37; and JP Morgan (13 December, 2016), *Aurizon Holdings Limited: Clouds on the Aurizon; Initiate at Underweight*, p.11.

- Class 1 railroads (10 businesses including the North American Class 1 railroads as well as Aurizon Holdings Limited, Asciano Limited, and Daqin Railway Co Ltd,²¹ which were proposed as comparators by The Brattle Group);
- Gas and oil transmission pipelines (15 North American businesses including the 13 businesses identified by The Brattle Group and two businesses that are routinely included as comparators by the Federal Energy Regulatory Commission (FERC));²²
- Tollroads (6 businesses);
- Regulated energy (67 businesses based on Bloomberg classifications); and
- Regulated water distribution (which includes the 9 businesses included in this industry by The Brattle Group and two additional UK water businesses).²³

Monthly vs weekly return intervals

While The Brattle Group rejected the application of monthly interval returns to estimate asset beta and has concentrated on the last 5 years of data, we have obtained both weekly and monthly return betas from Bloomberg over estimation periods of 5 and 10 years (January 2007 to December 2016). While the application of weekly return estimates has the logic that more observations are available (reducing standard errors), and they have been used in regulatory applications, recent empirical evidence has questioned whether higher frequency return estimates provide the most accurate estimates of systematic risk.²⁴ Our results are displayed in Table ES.2 below.²⁵ We have placed reliance on both weekly and monthly estimates in reaching our preferred estimate of beta.

²¹ Daqin Railway Co Ltd is a listed Chinese coal railroad that we would previously have excluded from consideration due to its location outside the English speaking countries that have more similar institutional and regulatory arrangements.

²² These two businesses are Williams Partners LP and Kinder Morgan Inc /DE.

²³ These two businesses are Pennon Group PLC and Severn Trent PLC.

²⁴ Gilbert, T., Hrdlicka, C., Kalodimos, J. and Siegel, S. (2014), 'Daily Data is Bad for Beta: Opacity and Frequency-Dependent Betas,' *Review of Asset Pricing Studies*, Vol. 4 (1), pp.78-117; and Gregory, A., Hua, S. and Tharyan, R. (March 2016), *In Search of Beta*, Xfi Centre, University of Exeter Business School.

²⁵ The Brattle Group applied statutory tax rates in all cases. We applied effective tax rates (estimated based on 15 years of data) for all but the North American pipeline businesses, which are limited partnerships that provide pass-through of pre-tax cash flow to investors.

Table ES.2 Conine asset beta estimates by industry to December, 2016

Industry	No.	Return period	Average			Median		
			2007 to 2011	2012 to 2016	2007 to 2016	2007 to 2011	2012 to 2016	2007 to 2016
US Class 1 railways	4	Weekly	0.97	0.90	0.98	1.00	1.00	1.00
		Monthly	1.24	0.74	0.99	1.06	0.76	1.02
		Average	1.10	0.82	0.98	1.03	0.88	1.01
Non-US Class 1 railways	6	Weekly	0.85	1.00	0.88	0.78	0.94	0.82
		Monthly	0.74	0.89	0.77	0.68	0.90	0.74
		Average	0.80	0.94	0.83	0.73	0.92	0.78
Liquids pipelines	6	Weekly	0.71	0.81	0.74	0.73	0.79	0.76
		Monthly	0.35	0.80	0.44	0.34	0.80	0.42
		Average	0.53	0.81	0.59	0.53	0.80	0.59
Gas pipelines	6	Weekly	0.58	0.76	0.69	0.56	0.70	0.60
		Monthly	0.39	0.68	0.50	0.30	0.64	0.49
		Average	0.48	0.72	0.59	0.43	0.67	0.54
Gas & liquids pipelines	15	Weekly	0.62	0.77	0.68	0.63	0.74	0.67
		Monthly	0.40	0.70	0.48	0.38	0.73	0.48
		Average	0.51	0.74	0.58	0.51	0.74	0.58
Tollroads	6	Weekly	0.45	0.43	0.46	0.44	0.46	0.47
		Monthly	0.49	0.46	0.48	0.50	0.49	0.52
		Average	0.47	0.44	0.47	0.47	0.47	0.50
Regulated Energy and Water	78	Weekly	0.46	0.41	0.46	0.46	0.41	0.46
		Monthly	0.36	0.30	0.37	0.36	0.28	0.36
		Average	0.41	0.36	0.42	0.41	0.34	0.41

Source: Bloomberg and Incenta analysis. Note: There were three businesses that The Brattle Group classified as engaged in both liquids and gas pipelines (therefore a total of 15 firms).

Our results

Our findings can be summarised as follows:

- Class 1 railroads - had the highest asset betas (approximately 0.8 for non-US and approximately 1.0 for US taking an average of weekly and monthly data) for the 10 year period to December, 2016;
- North American pipelines - the results for the last 10 years to December, 2016, differ materially depending on whether monthly or weekly data are applied, with:

- 0.68 / 0.67 (average / median) using weekly interval data; and
- 0.48 (average and median) using monthly interval data.

However, there has been less variation in asset beta estimates based on the return interval for the most recent 5 year period ending 31 December, 2016 with:

- The weekly estimates (preferred by The Brattle Group) being 0.77 / 0.74 (average / median); and
- The monthly data estimates being 0.70 / 0.73 (average / median).

The previous 5 year period (2007–2011) saw materially lower asset beta estimates, with:

- The weekly estimates (preferred by The Brattle Group) being 0.62 / 0.63 (average / median); and
- The monthly data estimates being 0.40 / 0.38 (average / median).

It is likely that the material increase in the asset beta of North American pipelines over the past 10 years (i.e. between the first and second 5 year periods) has been due to the fracking revolution.

- Tollroads - our findings for toll roads are not as dependent on period and return interval, with:
 - Estimates indicating an asset beta in the range of 0.43 to 0.52, and
 - An estimated 10 year asset beta of **0.47/0.50** (average / median) relying on both monthly and weekly return interval estimates.

We find that tollroads, which our first principles analysis indicates as likely to have a higher systematic risk than Aurizon Network, have the next highest asset beta after regulated energy and water businesses (discussed below). Accordingly, we consider that tollroads will set an upper bound to our estimate of the asset beta for Aurizon Network

- Regulated energy and water - the asset beta estimates for energy / water are also sensitive to whether weekly or monthly data are applied, with:
 - 10 year monthly interval data indicating an asset beta of 0.37/0.36 (average / median); 10-year weekly interval data indicating an asset beta of 0.46 (average and median); and
 - Reliance on both monthly and weekly data indicating 10 year asset beta of **0.42/0.41** (average / median).

In contrast to North American pipelines, the 5 year asset beta estimates for energy and water reduced between 2007-2011 and 2012-2016:

- weekly interval data indicate a fall in asset beta from 0.46 to 0.41 (both average and median); and

- monthly interval data indicate a fall in asset beta from 0.36/0.36 to 0.30/0.28 (average / median).

Comparison with The Brattle Group's results

For North American pipelines, using weekly data for the 5 years to August 2016, The Brattle Group reported an average asset beta estimate of 0.55 for gas, 0.66 for liquids and 0.61 for all pipelines. We found that Bloomberg weekly 5-year term equity beta estimates ending 4 months later (as at 31 December, 2016) increased the equity beta by 0.22 for the 6 liquids pipelines and 0.08 for the 4 natural gas pipelines in The Brattle Group's sample. In our view this level of sensitivity, especially for liquids pipelines, reinforces our preference for longer term (10 year) beta estimates that cover several different periods. The Brattle Group's weighted average weekly beta estimates for the 5 years to August 2016 for 42 regulated energy and water businesses were 0.41 (both average and median), which is approximately the same as the estimates we obtained for our 78-firm regulated energy and water business sample for the 10 years to 31 December, 2016.

Conclusions

Taking account of the estimates for the whole estimation period (2007 to 2016), which we prefer, we consider Aurizon Network's asset beta has:

- *A best estimate* – of **0.42**, based on regulated energy and water businesses using 10-year monthly and weekly data; and,
- *An upper bound estimate* – of **0.50**, based on the higher of the average / median estimates using 10-year monthly and weekly data for tollroads (as discussed above).

We note that if emphasis were to be placed on more recent data using 5 years of observations, a lower beta estimate would be obtained, however we consider that the identification of a lower bound would entail considerable imprecision. While identifying an upper bound is also subject to imprecision, we have identified an industry (tollroads), that on the basis of first principles analysis we consider to have greater systematic risk than Aurizon Network.

1.2.4 Benchmark capital structure and equity beta estimate

Aurizon Network has submitted a 55 per cent benchmark gearing assumption. Within two years of its privatisation, Aurizon Network announced that it would be adopting a long-term capital structure policy that targeted “gearing levels consistent with the regulator's assumption of 55% debt/RAB”.²⁶ Committed debt lines of \$3 billion were established, and \$2.2 billion was drawn down at a time when the RAB value was approximately \$4.8 billion (i.e. 45 per cent of RAB). More recently, Aurizon has informed the market that Aurizon Network's gearing level was 62.6 per cent as at 30 June, 2016, which was based on the ratio of Net Debt / Net Debt plus Total Equity.²⁷

Australian regulators have applied a benchmark gearing level of 60 per cent to energy and water businesses, which has been underpinned by several recent investigations by the Australian Energy

²⁶ Aurizon (May, 2013), *Further Information on Aurizon Network*, p.8.

²⁷ Aurizon (December, 2016), *Aurizon Investor Roadshow: “Aurizon – Australia's largest rail freight operator”*, p. 7.

Regulator (AER).²⁸ We expect that Aurizon Network will exhibit greater (non-systematic) cash flow variability than regulated energy and water businesses owing to such factors as weather (e.g. floods causing mine stoppages), and the regulatory revenue cap adjustment (which operates with a 2-year lag). Therefore, we consider that a benchmark gearing level of 55 per cent, which is slightly lower than for regulated energy and water, is appropriate for Aurizon Network.

Based on an asset beta of 0.42, and applying the QCA's preferred Conine formula with a debt beta of 0.12, we obtain an equity beta estimate of 0.73.

1.3 Credit rating and cost of debt

1.3.1 Benchmark credit rating

Aurizon Network's submission assumed a benchmark credit rating of BBB+ in conjunction with a benchmark gearing level of 55 per cent. We agree with this assessment. In February 2017, following six months of rising coal prices, Moody's revised its BBB+ (negative outlook) credit rating for Aurizon Network to BBB+ (stable outlook).²⁹ The Moody's report found that even with a 'low' UT5 regulatory outcome, its forecast of the FFO/Debt ratio metric remains above its critical value of 16 per cent. A subsequent report by Standard & Poor's has retained its BBB+ (stable outlook) for Aurizon Network, its view that a BBB+ rating would be maintained unless the FFO/Debt ratio "were to sustainably deteriorate to less than 13%."³⁰

We have adopted a benchmark credit rating of BBB+ for Aurizon Network. Our simulation of implied credit metrics based on the QCA's draft decision indicates that a BBB credit rating would be implied, as the FFO/Debt ratio is slightly lower than 13 per cent. However, a BBB+ rating was proposed by Aurizon Network, and was supported by QRC. Furthermore, if the material deferred component of Aurizon Network's RAB were to be isolated from the calculation, it is likely that metrics consistent with a BBB+ credit rating would be achieved.³¹

1.3.2 Debt risk premium - overview

Our approach was to first review Aurizon Network's submission on the debt risk premium, and then to provide our responses to the matters raised. Next, in accordance with the QCA's preferred cost of debt approach, we applied the PwC (2013) method to estimate the debt risk premium of a benchmark BBB+ bond at a term to maturity of 10 years.³²

²⁸ AER (December, 2013), *Better Regulation: Explanatory Statement – Rate of Return Guidelines (Appendices)*, p. 126; AER (1 May, 2009), *Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, p. 124.

²⁹ Moody's Investor Services (16 February, 2017), *Aurizon Network Pty Ltd, Update Following FY17 Half Year Results Announcement and Outlook Revision to Stable*.

³⁰ Standard & Poor's (17 May, 2017), *Aurizon Network Pty Ltd, RatingsDirect, S&P Global Ratings*, p. 3.

³¹ This is because the inclusion of RAB that is subject to NPV-neutral deferral for the UT5 regulatory period does not have associated revenue during that period.

³² PwC (June, 2013), *A cost of debt estimation methodology for businesses regulated by the Queensland Competition Authority*.

Aurizon Network's submission

Based on the work of its adviser, CEG, Aurizon Network's submission proposed a 10-year BBB+ debt risk premium of 2.47 per cent for an indicative averaging period of 1–30 June, 2016. This estimate was derived by applying a single credit rating regression using a sample of 6 AUD denominated BBB+ bonds that complied with the PwC (2013) selection criteria. However, we do not agree with the method applied by Aurizon Network / CEG, since an analysis employing only 6 observations is likely to be highly sensitive to individual observations. Our concerns are discussed further below.

Our findings

Our findings for the 20-business-day averaging period ending 30 June, 2017, are as follows:³³

- *Estimating the debt risk premium using the PwC (2013) methodology* - The debt risk premium estimate is based on a sample of 55 Australian bonds (using a modified PwC (2013) approach):
 - *The pooled regression approach* – in which bonds from the target rating and those from one rating either side are included and the whole sample is simply pooled, obtains a base estimate of 1.80 per cent.
 - *The dummy variables approach* – in which bonds from the target rating and those from one rating either side are included but dummy variables are used to allow for differences between credit ratings, gives a base estimate of 2 per cent.

In this instance, we consider the estimate of 2 per cent, derived by the dummy variables approach, to be the better estimate of the BBB+ debt risk premium, rather than the 1.80 per cent obtained through the pooled regression approach.

The pooled regression approach requires a number of restrictive assumptions to be satisfied.³⁴ In the current averaging period we have found an imbalance in the relative number of A- bond observations, which implies that a pooled regression will tend to under- estimate the BBB+ debt risk premium.

A rationale in PwC (2013) for adopting a pooled regression instead of using dummy variables was because, around the time of the report, the predicted BBB+ debt risk premium using dummy variables was higher than the BBB debt risk premium and inconsistent with the other evidence (such as the estimated debt risk premium for A- bonds and the output of the Bloomberg fair value curve).

The predicted BBB+ debt risk premium using the dummy variables approach now sits between the A- and BBB curves, and so this issue is no longer present. In the current circumstances, we

³³ As noted above, the single credit rating approach – using only seven BBB+ bonds - obtains an estimate of 2.50 per cent. We do not favour this approach because it is based on a very small sample, and ignores information that may be obtained from bonds in the other ratings bands.

think the dummy variable approach to be most robust, because the concerns that PwC (2013) identified have dissipated.

Furthermore, the cross-checks that we have undertaken, as discussed below, indicate that a BBB+ debt risk premium in the vicinity of 2 per cent is likely to be appropriate, rather than an estimate close to 1.80 per cent.

- *Cross-checks of estimates* – We applied two approaches to cross-check our estimate of 2 per cent:
 - *Comparison with third party providers* - the average of the BBB+ debt risk premium that we derived from the Bloomberg and RBA fair value curves for the sample period is 2.02 per cent (the Bloomberg estimate – which is based only on AUD denominated bonds – is 2.06 per cent, and the RBA - which is based on domestic AUD and foreign issued bonds – is 1.99 per cent).³⁵ Both of these estimates are derived by interpolating the respective fair value curves (both of which reflect bonds within the broad BBB rating band, rather than a BBB+ rating) with the neighbouring curve (i.e., the broad A curve), although we note there is unavoidably some imprecision with interpolating in this manner.
 - *Comparison with an expanded sample of bonds* – As noted below, Aurizon Network submitted that an expanded sample of bonds should be applied if the PwC (2013) approach is used. Including Australian bonds with options, and corporate bonds issued with Australian country risk in international bond markets (i.e. in AUD, USD, GBP or EUR) increases the sample size to 146 bonds.³⁶ The estimates that we derived from this expanded sample are as follows:³⁷
 - *Dummy variable approach* – delivers an estimate of the 10-year BBB+ debt risk premium of 1.99 per cent.
 - *Single credit rating approach* – delivers an estimate of the 10-year BBB+ debt risk premium of 2.05 per cent.

Furthermore, there are 38 BBB+ bonds in the expanded sample, which makes the single credit rating method more viable, at this time, than it was for the domestic-only sample. The estimates provided by the methods are reasonably close.³⁸

In our view, it is appropriate to consider the larger dataset as a cross-check (i.e., to include the bonds with embedded options and bonds with Australia as the country of risk that are issued in other currencies). The principal reason in PwC (2013) for focussing on Australian bonds alone was due to the additional effort required to convert the yields on these bonds to AUD equivalents. Since that

³⁵ We note, however, that the RBA estimate of the 10 year BBB yield for May, 2017 (which contributes to the interpolated average for the last 20 days of June, 2017) was unusually low given its previous and subsequent positions. The RBA yield estimates are generally consistently higher than the Bloomberg estimates.

³⁶ CEG also advocated including financial services firms in the sample, although the justification for doing so was not set out fully (other than noting the fact that Bloomberg and Reuters include them). In our view, true financial services bonds should be excluded.

³⁷ We have not provided pooled regression estimates for the expanded sample case (i.e. including bonds with options and foreign denominated bonds), as the number of observations is large and in the dummy variables regression the relativity between BBB and BBB+ bonds is as expected.

³⁸ The NSS and NS estimates for the dummy variable approach were 1.97 per cent and 1.98 per cent, respectively, and for the single credit rating approach were 2 per cent and 2 per cent, respectively.

time, Bloomberg has added functionality to make the conversion straightforward (as the West Australian Economic Regulation Authority (ERAWA) has noted). Further, since 2013 the size of the domestic sample of BBB and BBB+ bonds has decreased, which increases the relevance of using the international data as a cross-check. Accordingly, applying this to the averaging period employed for the purpose of this report would imply a debt risk premium of 1.99 per cent if the dummy variables regression were to be relied on, and 2.05 per cent based on the single credit rating approach.

The considerations in reaching this advice, including our assessment of the Aurizon Network submission, are further summarised below.

Aurizon Network's submission on the debt risk premium

Aurizon Network's submission on the debt risk premium places heavy reliance on a report prepared by Competition Economists Group (CEG).³⁹ Aurizon Network adopted the main recommendations of CEG's report, and its estimated debt risk premium of 2.47 per cent at a term of 10 years for the averaging period ending 31 July, 2016. A number of issues were raised by Aurizon Network and / or CEG.

The PwC (2013) method is sensitive to estimation error – a single rating regression is preferred

Aurizon Network / CEG submitted that the PwC method, as applied by Incenta, is subject to estimation error due to sensitivity to certain bond observations and asymmetry in adjacent credit rating bands. For example, CEG considered that, in its sample, two Melbourne Airport (MELAIR) A-rated bonds were influential. CEG ran sensitivities, including financial bonds, bonds with options attached, and international bonds issued with Australian country risk. It also ran a single credit rating regression for its six BBB+ bond sample (in the way that Incenta had estimated the BBB debt risk premium for DBCT using only BBB bonds), and regressions including bonds from several credit rating bands using dummy variables. CEG considered that there was asymmetry between the neighbouring credit rating bands, which led it to recommend that a single rating regression be undertaken, as Incenta had previously done in relation to DBCT.⁴⁰ This resulted in a 2.47 per cent BBB+ estimate using only BBB+ bonds, which was applied in Aurizon Network's build-up of the benchmark cost of debt.

We agree with CEG in a number of areas, but disagree in others. First, we agree with CEG that one of the assumptions behind using a "pooled regression" is that there is approximate symmetry in the debt risk premium either side of the target credit rating, and that a bias may result if this is not the case. The pooled regression approach has been adopted in situations where these assumptions have been met, and where there are too few BBB+ bond observations to provide a rigorous estimate and application of the dummy variables approach provides counter-intuitive results. However, we disagree that using a small sample of just the BBB+ AUD bonds would be an improvement (and also disagree that doing so would be consistent with the QCA's approach (on our advice) for DBCT). For the proposed averaging period, there are only seven BBB+ AUD bonds, which is too small a sample size to provide for a reliable and robust empirical estimate of the debt risk premium. This is different to the case of DBCT where there were 25 AUD bond observations in the sample (DBCT had a target credit

³⁹ CEG (November, 2016), *Debt risk premium of coal transporters, A report for Aurizon Network*.

⁴⁰ CEG claimed asymmetry based on casual observation of the scatter of debt risk premium observations without formally measuring it. As noted further below, the level of asymmetry depends on whether the AUD denominated Aurizon Network bond is included in the sample.

rating of BBB rather than BBB+).⁴¹ Rather, if specific circumstances require moving away from the use of pooled estimates, our preference would be to retain all domestic bonds in the sample and use statistical methods to allow for differences in yields between credit ratings (i.e., to insert dummy variables and not assume symmetry).⁴² This has the advantage of maximising the use of the information that is available, while also reducing the dependence of the estimate on the assumptions inherent in pooled estimates.

Including foreign bonds and bonds with special features (call / put options)

CEG submitted, and Aurizon Network agreed, that if the PwC method is to be applied, the sample of bonds should be supplemented with Australian-issued, foreign-denominated bonds, whose yields can be estimated as AUD yield equivalents, and Australian-denominated bonds with call / put options.

We agree with the suggestion that there is merit in considering the results obtained with an expanded sample as a cross-check of the results that are obtained with the PwC (2013) approach. The PwC (2013) report, which formed the basis of QCA's preferred cost of debt approach, considered whether bonds with special features and foreign-denominated bonds (USD, GBP and EUR) with Australian country risk should be included in the sample. With respect to the former category, PwC (2013) was open to considering such data, but at the time considered that making adjustments to the yields of bonds with call / put options attached could introduce analyst error, and was time-consuming to perform. It was noted that using information on foreign-currency issued bonds was also complex, and that the debt risk premium estimate obtained was very similar to that obtained with only AUD-denominated bonds.⁴³

However, given developments in Bloomberg's service offerings, it is now possible to readily apply the standard Bloomberg OAS (Option Adjusted Spread) procedure, and we have found that the average yield differential based on the option value is relatively small.⁴⁴ Hence, the degree of potential error introduced by including these bonds is likely to be immaterial. In addition, since the PwC (2013) report, the number of "vanilla" AUD issued bonds has reduced considerably, and the administrative ease of converting bonds to an equivalent yield for a vanilla AUD bond (and for this not to be a source of material dispute) has also improved significantly (functionality added by Bloomberg makes this a straightforward task). Our view is that the expanded sample can be used to provide a cross-check of the debt risk premium estimate that is based on the PwC (2013) cost of debt approach.

⁴¹ In the case of DBCT, the pooled regression would have comprised BBB-, BBB and BBB+ bonds, and a very large difference was observed between the yield on the BBB- and BBB bonds (which was substantially greater than the difference in yield observed between BBB and BBB+ bonds).

⁴² As noted above, the motivation in PwC (2013) for using a pooled regression rather than a system of dummy variables was because the latter at that time produced implausible results (see, PwC (2013), p.55, Table 5.8).

⁴³ For the BBB+ credit rating band at a term of 10 years it found a difference of only 2 basis points if international bonds were included (see PwC (2013), p.55).

⁴⁴ For the Australian denominated bonds in the sample the average value of the attached option was valued at approximately 14 basis points of yield.

Use of third-party fair value yield estimates

Aurizon Network submitted that consideration should be given to the use of third party fair value yield / debt risk premium estimates from Bloomberg, the Reserve Bank of Australia (RBA) or Reuters. CEG submitted that PwC / Incenta estimates of the debt risk premium are systematically lower than those of third party providers.

First, we do not disagree with referring to third party curves, and note that this is already part of the QCA's preferred cost of debt approach. We note, however, that the third party estimates have been subject to difficulties in the past and so we would caution against any mechanistic application of them. For example, during the global financial crisis, the yields from the previously applied third party service of CBA Spectrum spiked because it was mechanistically applied, while the former Bloomberg series under-estimated fair value yields due to unwarranted analyst intervention. Indeed, CEG has itself been critical at times of third party provider estimates.⁴⁵

Secondly, we disagree with CEG's suggestion (see CEG's Figure 1.1) that the PwC / Incenta estimates of debt risk premiums are always materially lower than those of third party providers. CEG has assumed in this analysis that the broad BBB curve (comprised of BBB-, BBB and BBB+ bands) reflects a BBB+ estimate, when the average credit rating of the sample used by the respective curves is typically BBB. Indeed, in the two cases where Incenta was targeting the BBB band (rather than the BBB+ band) the estimated debt risk premium was relatively close to the average of the Bloomberg and RBA estimates.

Since third party providers do not publish yield estimates for the BBB+ band, in our view, the third-party curves need to be adjusted in order to provide a meaningful comparison to a BBB+ yield. We consider the most practical means of doing this is to interpolate between neighbouring curves (i.e., to interpolate between the broad BBB and broad A curves); however, this itself requires a series of assumptions to be made, which therefore reduces the degree of reliance that can be placed on the third party curves.

Aurizon Network's debt risk premium is influenced by a 'coal premium'

CEG's report also discussed the existence of a 'coal premium', submitting that Aurizon Network's debt risk premium, and those of other coal railing businesses around the world, are affected by the 'coal premium' due to specific industry risks. While Aurizon Network did not apply a 'coal premium', but rather a benchmark BBB+ estimate based on a regression using six BBB+ bonds, we have provided a comprehensive response to CEG's analysis relating to a coal premium, as this provides insights into the impact of recent (2015-2016) disruptions to the seaborne export coal market, which underpins Aurizon Network's business. In the body of this report and in the detailed case studies presented in Appendix C, we show that there is no evidence to support CEG's view that there exists a permanent 'coal premium' in the yields / debt risk premiums of businesses that incorporate coal railing operations.

⁴⁵ CEG noted its concerns with third party data in the past. See CEG (September, 2009) *Estimating the cost of 10 year BBB+ debt during the period 17 November to 5 December 2008*; and more recently in CEG (September 2016), *Criteria for assessing fair value curves: an update*.

Figure ES.1: Aurizon bonds – Debt risk premium differential from BBB+ benchmark vs metallurgical coal contract price



Source: Bloomberg, and Incenta analysis

As shown in Figure ES1 above, while the debt risk premium of Aurizon Network’s AUD denominated bond did spike during the period that coal prices were depressed, that differential vanished when coal prices rebounded to levels that comfortably support Queensland export coal production.⁴⁶ Over time, Aurizon Network’s AUD denominated bond has traded below, at, and above the BBB+ benchmark,⁴⁷ as do other businesses. While Moody’s placed the Aurizon Network bond on negative watch when coal prices were depressed, in February 2017 it reverted to a stable outlook based on the positive outlook for coal prices and railings.

⁴⁶ We might also note that Aurizon Network’s AUD bond has recently traded close to the BBB+ benchmark implied by the Bloomberg interpolated fair value yields for BBB and A-rated bonds.

⁴⁷ The benchmark against which performance is measured is the relevant BBB+ debt risk premium. In Australia’s case, we have used the interpolated Bloomberg BBB+ debt risk premium using the Bloomberg BBB and A benchmarks, and also interpolated for term (using the interpolated Bloomberg fair value yields for the terms closest to the term to maturity).

1.3.3 Our estimate of the 10 year benchmark BBB+ debt risk premium

The bond sample

Applying the PwC (2013) method's recommended bond screening criteria gave a sample of 55 BBB, BBB+ and A- bonds that were Australian, non-financial business bullet bonds issued in AUD.⁴⁸ The largest group was in the A- credit rating band (32 bonds), followed by BBB (16 bonds), and BBB+ (7 bonds). This raises the question of potential bias towards A-, since the average credit rating of the sample is 1.71 (where BBB is 3, BBB+ is 2 and A- is 1), which is likely to cause a bias in the "pooled credit rating" estimates.

Empirical estimates of the BBB+ debt risk premium at 10 years

Table ES3 summarises our estimates using the 55-bond sample following the PwC (2013) approach. Undertaking a pooled regression with the PwC (2013) bond sample gives a 10 year BBB+ debt risk premium estimate of 1.80 per cent. CEG had expressed a concern that during its averaging period, in June 2016, the debt risk premium estimates were under-estimated due to two A- rated bonds issued by Melbourne Airport (Australia Pacific Melbourne Pty Ltd (MELAIR)) bonds which CEG considered to have lower yields than might be expected for A- bonds with the same term to maturity.⁴⁹ Only one of the MELAIR bonds identified by CEG was likely to have a material effect on the estimates, due to the fact that it was the only A- bond at close to a 10 year term to maturity. Since then, a number of longer A- bonds have been issued, and the current sample includes four long A- bonds. In these circumstances, we consider there is little justification to remove any of these bonds from the sample. The single credit rating estimate is 2.50 per cent, but since this is based on only seven observations, we do not think this estimate is reliable. Our preferred estimate is **2 per cent**, which is obtained using the dummy variables approach.

Table ES3: Summary of estimates of the BBB+ debt risk premium for 20 business days to 30 June, 2017

Econometric method	Sample (no. of bonds)	BBB+ debt risk premium estimate
Pooled sample	55	1.80
Dummy variables	55	2.00
Single credit rating	7	2.50

Source: Bloomberg, and Incenta analysis.

1.3.4 Cross-checks of estimates

The QCA's preferred cost of debt approach suggests reviewing findings against those of third party providers Bloomberg and the RBA. We found that for the same 20 day averaging period to 30 June 2017 the average interpolated Bloomberg / RBA BBB+ equivalent debt risk premium was 2.02 per cent, which is slightly higher than the debt risk premium that we have recommended.

⁴⁸ We note that the PwC (2013) selection criteria excluded bonds classified as "Financial" by Bloomberg, but included bonds classified as "Real Estate", as these have never been excluded from samples that have applied the PwC (2013) approach.

⁴⁹ CEG (November, 2016), p. 23.

We also found that using an expanded sample that includes bonds with options and issued in foreign markets also supports our estimate of 2 per cent.⁵⁰

1.3.5 Interest rate swap costs

We assume a benchmark regulated entity with Aurizon Network's characteristics would fund itself with an average of 10-year fixed rate bonds in order to manage refinancing risk. Since the regulatory period is four years, the QCA's cost of debt policy assumes that an efficient regulated firm would have the incentive to align its debt with the term of the regulatory period, in order to match the regulatory benchmark. While a regulated firm could potentially employ both interest rate swap (IRS) and credit default swap (CDS) contracts to achieve this objective, the market for CDS contracts is illiquid. Based on market sounding as at 30 June 2017, we found the transaction cost, i.e. the IRS margins, for implementing interest rate swap contracts to be **12.5 basis points**.

1.3.6 Stakeholder submissions

A number of stakeholder submissions were received by the QCA in relation to Aurizon Network's submission. We considered the Queensland Resources Council's (QRC) submission in detail as it contained the most comprehensive discussion of WACC issues.⁵¹ While we agree with much of what the QRC submission proposes regarding beta risk and the cost of debt, on some issues we disagree. We note that while the QRC recommends cross-checking the cost of debt estimate against Bloomberg, the QCA's preferred methodology already requires this. However, the QRC has not specified how it considers such a cross-check should be applied in the case of a BBB+ benchmark credit rating. We also agree with the QRC's view that Aurizon Network's reliance on a single credit rating band regression is not appropriate when there are too few bond observations. However, we disagree with QRC's view that it is appropriate to apply a 5 year debt term to Aurizon Network, and consider the evidence supports a 10 year benchmark term for the debt risk premium.

⁵⁰ The PwC (2013) approach is supported, since the 10-year BBB+ debt risk premium estimate using the expanded sample is not materially different from that obtained using only AUD-denominated bonds without options attached.

⁵¹ Queensland Resources Council (17 February, 2017), *Aurizon Network's 2017 DAU – QRC Submission, Volume 2: Pricing Submission*.

2. Background, Terms of Reference and outline of report

2.1 Background

On 30 November 2016, Aurizon Network Pty Ltd (Aurizon Network) submitted a draft access undertaking for the regulatory period commencing 1 July 2017 (2017 DAU), which the QCA is considering under Part 5 of the QCA Act. The 2017 DAU sets out non-price and price-related terms and conditions for access to the declared network, which in this case is Aurizon Network's below-rail network comprising the Central Queensland Coal Network (CQCN). On 2 December, 2016, the QCA commenced its review so that it may decide whether to approve, or refuse to approve, Aurizon Network's 2017 DAU. The QCA's assessment includes a consideration of whether the indicative post-tax vanilla Weighted Average Cost of Capital (WACC) and associated values for key parameters proposed by Aurizon Network are appropriate for the period of the 2017 DAU.

To assist it in undertaking its regulatory tasks, the QCA engaged Incenta Economic Consulting (Incenta) to estimate a number of Weighted Average Cost of Capital (WACC) parameters, and provided us with a Draft Terms of Reference.

2.2 Terms of Reference

The Draft Terms of Reference that the QCA provided to us set out the following key tasks for the consultancy:

1. Asset beta – assess Aurizon Network's submission and supporting documentation and provide an estimate of Aurizon Network's asset beta for the regulatory period based on first principles and empirical analysis.
2. Benchmark capital structure – recommend a benchmark capital structure taking account of Aurizon Network's total risk (systematic and non-systematic) in comparison to the risks of other relevant businesses in Australia and other jurisdictions (as appropriate), and the extent to which the regulatory arrangements affect Aurizon Network's total risk.
3. Equity beta – recommend a benchmark equity beta based on the recommended benchmark asset beta and capital structure (using the QCA's standard re-levering approach).
4. Benchmark credit rating – advise on the benchmark credit rating that is consistent with the benchmark capital structure, taking account of the impact of regulatory arrangements and other relevant factors.
5. Efficient term of debt – determine an efficient term for estimating the regulatory cost of debt based on empirical evidence, with reference to relevant comparator firms, and appropriate adjustment for the impact of the regulatory arrangements.
6. Benchmark debt risk premium – assess Aurizon Network's submission and documentation and provide an estimate of a benchmark debt risk premium for Aurizon Network for the regulatory period that is obtained using a method consistent with the current QCA methodology.

7. Benchmark interest rate swap costs – determine appropriate benchmark interest rate swap costs, having regard to the efficient term of debt and the term of the regulatory period.

2.3 Outline of report

The remainder of the report is structured as follows:

- In chapter 3 we undertake a first principles analysis, which examines the key systematic risk characteristics of a number of potential comparator industries.
- Drawing on the first principles analysis in chapter 3, chapter 4 provides estimated WACC parameters in response to tasks 1 to 3, that is:
 - Asset beta
 - Benchmark capital structure
 - Equity beta.
- In chapter 5 we address the following tasks:
 - Benchmark credit rating
 - Efficient term of debt
 - Benchmark debt risk premium
 - Benchmark interest rate swap costs.
- In chapter 6 we review and respond to stakeholder submissions.

At the conclusion of each chapter we provide a short summary of our analysis and findings.

3. First principles analysis

3.1 Introduction

On advice from The Brattle Group, and Frontier, Aurizon Network submitted that North American pipelines are the best available comparator industry for Aurizon Network's systematic risk. In this chapter we present our first principles analysis of Aurizon Network's systematic risk by assessing this risk with respect to a standard set of factors drawn from the economics and finance literature, with the scope of this analysis being informed by the material presented by Aurizon Network.⁵² This consists of examining a number of characteristics that are expected to affect systematic risk, and considering how each potential comparator firm or industry compares on that characteristic relative to the target firm, which in this case is Aurizon Network. We consider that the most important influences on Aurizon Network's systematic risk are due to its market power, its 'captured' and resilient customer base, and its regulatory framework. We also consider a number of other potential influences on systematic risk, although some have limited impacts, and others are likely to have varying degrees of influence on the systematic risks of the potential comparator industries.

In chapter 4 we then respond to the specific arguments put by Aurizon Network and its advisers, The Brattle Group and Frontier Economics.

3.2 Potential comparator industries

In the current report, we evaluate the following potential industry comparator groups against these factors, based on our consideration of potentially comparable firms, and on consideration of the proposals of Aurizon Network and its advisers:

- Class 1 railroads (10 businesses including the North American Class 1 railroads, and including Aurizon Holdings Limited, Asciano Limited, and Daqin Railway Co Ltd,⁵³ which were proposed as comparators by The Brattle Group);
- Gas and Oil transmission pipelines (15 North American businesses including the 13 businesses identified by The Brattle Group and two businesses that are routinely included as comparators by the FERC);⁵⁴
- Toll roads (6 businesses); and
- Regulated energy and water (78 businesses) – where the regulated water distribution members include the 9 businesses included in this industry by The Brattle Group and two additional UK water businesses.⁵⁵

⁵² The literature in this area is extensive so the factors examined broadly follow the ones summarised by Dr Martin Lally in a previous report for the QCA. See Lally, M. (26 February, 2004), pp.79-84.

⁵³ Daqin Railway Co Ltd is a listed Chinese coal railroad that we would previously have excluded from consideration due to its location outside the English-speaking countries that have more similar institutional and regulatory arrangements.

⁵⁴ These two businesses are Williams Partners LP and Kinder Morgan Inc /DE.

⁵⁵ These two businesses are Pennon Group PLC and Severn Trent PLC.

A full listing of the potential comparators is provided in Appendix A. The Brattle Group considered North American gas and oil pipelines to be the closest comparators for Aurizon Network's operations, and in its submission Aurizon Network agreed with that assessment.

3.3 Aurizon Network's relative systematic risk - First Principles Analysis

3.3.1 Market power and regulation

The reason that we are considering market power and regulation together is that these two characteristics are logically linked: only businesses with a material degree of market power should be regulated. Given the fact that market power and regulation go hand in hand means it is difficult to separate out their individual effects. The degree of market power is associated with the price elasticity of demand for its product or service. Lally noted that the theory is ambiguous on the relationship of this characteristic to systematic risk, as is the empirical evidence. Regulation is applied to constrain the effects of market power, which if exercised results in inefficiencies and welfare losses. However, in constraining the exercise of market power, cost-based regulation has the effect of buffering the firm's cash flows.⁵⁶ Professor Sam Peltzman's seminal 1976 paper⁵⁷ hypothesised that regulatory buffering of the firm's cash flows will decrease the firm's asset beta. When testing Peltzman's hypothesis, Binder and Norton (1999) noted that:⁵⁸

However, in response to a shock today, the firm's profits may not be buffered until some future period because of frictions in the regulatory process, i.e., 'regulatory lag.' Regulatory lag should not pose a problem for tests with security price data, because if the regulator makes the change in security holder wealth smaller, in an efficient capital market investors will rationally use the information about the future action of the regulator in adjusting the security price today.

Empirically, Rosenberg and Guy (1976) found that regulated industries have amongst the lowest betas after allowing for various firm specific variables.⁵⁹ For the electric utility industry in the US, Davidson, Rangan and Rostenstein (1997),⁶⁰ and Binder and Norton (1999) showed that systematic risk was inversely related to the "comprehensiveness" and "intensity" of regulation.

Aurizon Network

Aurizon Network has a high degree of market power in relation to its customer base. Aurizon Network is the monopoly provider of the CQCN, with its services essential to the users, who have no other economic means of transporting coal to the port terminals. As discussed further below, the

⁵⁶ By 'cost-based regulation' we are not referring to a specific form of price control or incentive regime, but to the fact that regulation is undertaken at specified points in time when revenues or prices are re-set relative to costs in order to provide an expected return on investment that, given the level of risk, is consistent with returns that would be earned in competitive markets. Under alternative forms of price control, 'cost-based regulation' includes rate of return, price-cap and revenue-cap regulation.

⁵⁷ Sam Peltzman, (1976), 'Toward a More General Theory of Regulation,' *Journal of Law and Economics*, Vol. 19, pp. 211-240.

⁵⁸ See John J. Binder and Seth W. Norton (1999), 'Regulation, Profit Variability and Beta', *Journal of Regulatory Economics*, Vol. 15, Issue 3, p. 250.

⁵⁹ Rosenberg, B. and J. Guy (1976), 'Beta and Investment Fundamentals – II,' *Financial Analysts Journal*, Vol. 32, No. 4, pp.62-76.

⁶⁰ Davidson, W., N. Rangan, and S. Rostenstein (1997), "Regulation and Systematic Risk: A Test of the Buffering Hypothesis", *The Financial Review*, Vol. 32, No. 1, pp. 163-184.

Queensland mines that use Aurizon Network's services have relatively strong positions on the international export coal cost curve, and it is in the interests of the mines to maximise output as long as the coal price makes it economic to do so.

Aurizon Network's regulatory framework applies a cost-based regulatory regime with pre-determined periodic price reviews using the "building block" approach. Every 4 years the revenue cap is reviewed such that revenues are realigned with costs on a forward-looking basis. Binder and Norton's (1999) observation in relation to capital markets is especially relevant to Aurizon Network's situation, where the revenue cap regulatory approach includes an "unders-and-overs" provision.

In the event that the take-or-pay mechanism does not recover a revenue shortfall in a given year, it will be recovered two years later through an adjusted tariff (with an NPV adjustment to make the firm whole). Since the NPV of revenue will be preserved, the stock market price should not react to changes in revenue. Hence, a reduction in shipments (and temporarily, revenue), even if it were associated with a fall in the general market, should not result in a decline in share price, and therefore not impact beta.

The cost-based regulatory framework applied to Aurizon Network by the QCA will result in cash flows that are essentially independent of the economic cycle, which should result in relatively low systematic risk.

Regulated energy and water

Regulated energy and water businesses have high degrees of monopoly power in their markets. In a given geographic area, the services of regulated energy and water businesses are essential to most of their customers, and there is limited, or no, competition for the provision of these services.

Accordingly, like Aurizon Network, regulated energy and water businesses are also subject to cost-based regulation, that can include rate of return, revenue-cap or price-cap controls that may or may not be subject to incentives. What unites these regulatory approaches is that they are cost-based, set controls for a pre-determined period of time, and ensure recovery of revenues with a high degree of probability.

Tollroads

Tollroads typically face a degree of competition from alternative routes and transport modes that apply competitive pressure on tollroad operators. Tollroads, therefore, would be expected to have less market power than Aurizon Network. Being subject to competitive pressure, tollroads do not have a cost-based regulatory framework with fixed periodic reviews. They are often provided with a CPI-linked price-cap that may endure for many years, which means that revenue can diverge from costs. Under cost-based regulation by contrast, revenue is matched to cost over time. With respect to tollroads, the government will generally retain an option to apply additional regulatory oversight if deemed necessary. As a result, tollroads bear full demand risk, and are not buffered by regulation in the way that Aurizon Network is. We would therefore expect tollroads to have a higher systematic risk than Aurizon Network.

North American pipelines

North American pipelines are subject to competitive pressure from parallel pipelines, and alternative modes of transport (especially in relation to oil). This competitive environment has been accentuated

by the disequilibrium of the past 5 to 10 years, which has been driven by the fracking revolution. This has driven down the price of oil and gas, and caused substitution away from thermal coal. In a previous publication, The Brattle Group (2012) drew attention to these developments, noting that:⁶¹

Recent years have seen fundamental changes in the supply and competitive landscape of the North American natural gas market. In response to high natural gas prices that prevailed during most of the last decade, gas producers in the lower 48 now have developed new sources of supply and technology, particularly to access new shale gas formations. These new supplies have encouraged a substantial expansion of the natural gas pipeline network in North America to allow the producers to reach end-use markets... The result has been a considerable increase in competition and risk, which can have serious consequences for pipelines and their required rates of return.

The light handed regulatory regime for United States oil and natural gas pipelines primarily relies on the existence of competition within the markets. In competitive markets, North American pipeline rates are largely constrained by competition, not regulation. Where pipeline transportation tariffs are set at competitive rates, cost-based regulation does not buffer North American pipelines' cash flows. However, where applied, cost based tariffs:

- a. provide a ceiling level for oil pipeline transportation rates, which are indexed tracking economy-wide costs rather than pipeline-specific costs; and
- b. expose the gas pipeline transportation rates to the volume risk of the uncontracted portion of their capacity.

Since 1992, the Federal Energy Regulatory Commission (FERC) has required US gas pipeline operators to apply the 'straight fixed variable' method (SFV) of tariff design. Under the SFV method, the tariff is comprised of two components, a fixed rate and a variable rate: the fixed capacity component covers investment costs and a variable component covers the marginal costs of transporting gas on a pipeline system. This reflects the fact that most of the costs to obtain firm capacity are fixed, i.e. they do not depend on the amount of gas transported on the pipeline. These fixed costs are apportioned among pipeline users depending on the amount of each user's reserved capacity.

The "fracking revolution" described by The Brattle Group has had the effect of not only increasing oil and gas supplies, and reducing their prices, but changing the direction of flows of oil and gas from what had previously occurred. This has shifted the demand curve for capacity in different regions, leaving some areas with unsubscribed capacity. This exposes the pipeline to the long term risk that it is able to sell its capacity.

This is different to Aurizon Network's regulatory framework, which sets a revenue-cap for a pre-determined period, allowing it to recover its revenue irrespective of usage. Hence, the extent of FERC's regulatory buffering of the cash flows of North American pipelines is substantively different to the buffering of Aurizon Network's cash flows under the QCA's regulatory framework.

⁶¹ Paul R. Carpenter, A. Lawrence Kolbe, Steven H. Levine and Bente Villadsen, (April, 2012), "Shale Gas and Pipeline Risk – Earnings erosion in a more competitive world" *Public Utilities Fortnightly*: <https://www.fortnightly.com/fortnightly/2012/04/shale-gas-and-pipeline-risk?page=0%2C0>.

Class 1 railroads

Class 1 railroads are subject to competitive pressure from parallel railroad lines, and alternative modes of transport. We note that The Brattle Group considered it appropriate to include Daqin Railway as a comparator for Aurizon Network because approximately 80 per cent of the former's revenue is derived from coal transportation by rail in China. However, closer examination of Daqin Railway's business reveals that it faces material competition (which distinguishes it from Aurizon Network), and JP Morgan has noted that, in the context of China's current restructuring / downsizing of its coal industry, Daqin's:⁶²

Management has indicated a potential 5-25% price discount to large clients to defend market share. We believe discounts may increase further in 2017-18, driven by intense competition.

Among North American Class 1 railroads, only Canadian grain traffic is subject to comprehensive revenue cap regulation under the Canadian Transportation Agency (CTA), which in 2011 stated that:⁶³

The Agency calculates cost of capital rates for three main purposes: (1) the transportation of western grain; (2) interswitching; and (3) other specified regulatory purposes... The Agency's prescribed mandate with respect to the cost of capital is narrow when compared to the full spectrum of regulators and their applications of the cost of capital. For the most part, the Agency is regulating, for not more than a year in advance, small, well developed subsets of the operations of two mature companies, which have well established capital bases in a stable industry.

In summary, for the vast majority of traffic, regulation neither protects nor constrains North American Class 1 railroads in relation to the returns they can earn.

Conclusion

Only Aurizon Network and regulated energy / water, which have captive customers and a high degree of market power, are subject to cost-based regulation that buffers cash flows (or the NPV of cash flows) across a pre-determined regulatory period. By contrast, tollroads, North American pipelines and Class 1 railroads are all subject to greater degrees of competitive pressure. As a result, their regulatory frameworks differ from that of Aurizon Network: none of the frameworks have a pre-determined regulatory period, nor protect the recovery of revenues in the way that Aurizon Network's regulatory framework does.

3.3.2 Income elasticity of demand and the nature of the customer

Another characteristic is the nature of the customer, which affects the sensitivity of the businesses' cash flows to GDP shocks, which is proxied by the income elasticity of demand. If the customer is the government, whose demand is, in general, invariant to the state of the economic cycle, cash flows are likely to be stable, and the asset beta will be low. Firms with a low income elasticity of demand are likely to have lower sensitivity to GDP shocks, and therefore will have a lower asset beta. Essential services can be expected to have a lower income elasticity of demand than luxury goods. For

⁶² JP Morgan, (29 April, 2016), *Daqin Railway – A, Delayed down cycle*, p. 1.

⁶³ CTA (December, 2011), Decision No. 425-R-2011m Review of the methodology used by the Canadian Transportation Agency to determine the cost of capital for federally-regulated railroad companies, pp.3-4.

example, we would expect the income elasticity of demand for electricity and water services to be lower than for air travel. However, the higher the industrial component of demand, even for electricity and water services, the greater the expected sensitivity to GDP shocks.

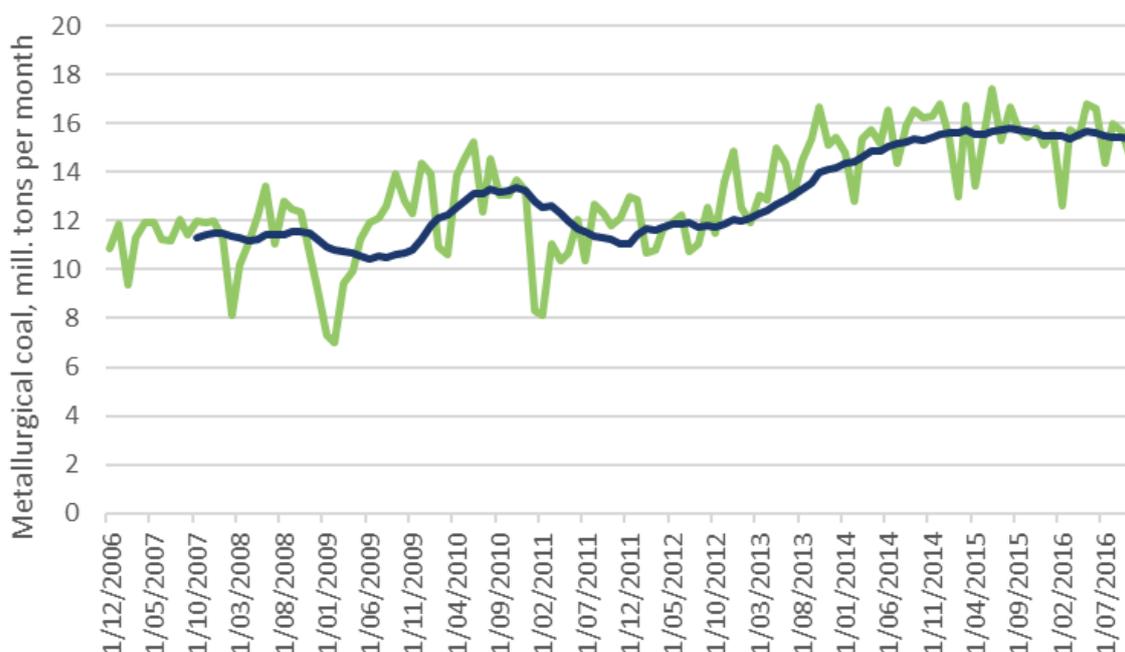
Aurizon Network

The coal mined in Queensland is used for two main purposes: for the production of steel (metallurgical coal); and for the production of electricity (thermal coal), although in the northern hemisphere coal is also used for heating purposes. Electricity demand will ultimately have a significant residential component for heating and lighting, and so thermal coal demand too would be expected to have a material exposure to residential electricity consumption. This demand is likely to be less pro-cyclical than industrial demand. Most of Aurizon Network's traffic is metallurgical coal, which is subject to industrial demand, and should therefore be expected to be more pro-cyclical.

Figures 3.2 and 3.3 below show how Australian thermal and metallurgical coal exports have tracked over time. The differences between metallurgical and thermal coal demand become apparent in these figures:

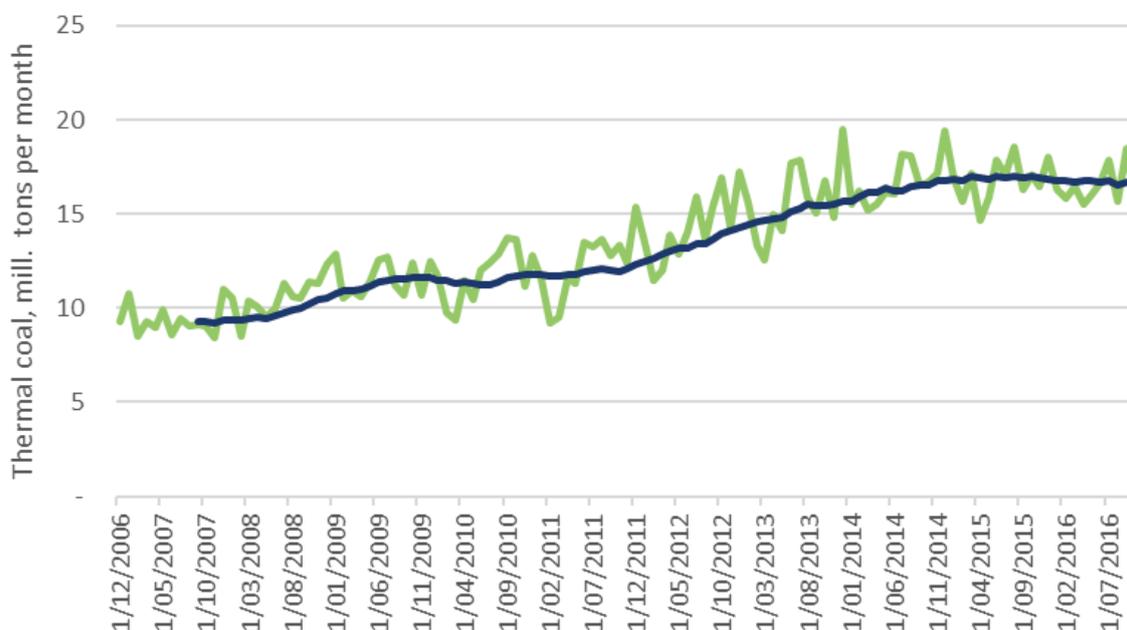
- First, we find that on an annual basis, the 12-month moving average of metallurgical coal export demand is generally more volatile than for thermal coal (although the latter has greater within year volatility).
- Secondly, we can see a material reduction in the 12 month moving average of export demand for metallurgical coal during the period of the global financial crisis (2008-2009), while thermal coal exports were not affected during that period.

Figure 3.2: Australia: Metallurgical coal exports



Source: Bloomberg. Note: Blue line is the 12 month moving average

Figure 3.3: Australia: Thermal coal exports



Source: Bloomberg. Note: Blue line is the 12 month moving average

What matters for systematic risk is whether the firm’s cash flows are (are not) pro-cyclical, in which case systematic risk is higher (lower). Non-cyclical cash flows can occur naturally because the firm’s product / service has a low income elasticity of demand. Even if there is a natural element of cyclicity, if the firm’s earnings are de-coupled from the economic cycle, its systematic risk will be low.

As noted above, ultimate demand for Queensland coal is both industrial and residential. The price of coal fluctuates with demand, and is pro-cyclical. While Aurizon Network’s customer base will be affected by coal price cyclicity in the market, the income elasticity of demand for the CQCN services is, to a large extent, decoupled from the elasticity of the demand for coal from the CQCN. This is due to:

- miners having an incentive to maximise production even at low prices, and even if the price dips below the all-in cash cost of production if the price is expected to rise above that cost in due course⁶⁴
- as outlined above, Aurizon Network’s cost-based revenue-cap regulatory framework with its “unders-and-overs” provisions ensures that in NPV terms, any pro-cyclicity is eliminated.

In any case, as we have noted in section 3.3.8 below, Aurizon Network’s customer base occupies a strong position in the world export coal cost curve, which results in resilient demand for Queensland coal exports.

⁶⁴ This is because of the fixed shut-down and start-up costs at mines.

Regulated energy and water

The ultimate customers of regulated energy and water businesses are a mixture of industrial / commercial concerns and residential customers, although the weighting to residential customers is expected to be much higher for regulated electricity and water businesses. As such, we would expect the revenues (and returns) of regulated energy and water businesses to exhibit relatively little pro-cyclical demand fluctuation. Since they are also subject to cost-based regulation that further buffers cash flow, we should expect very little remaining pro-cyclicality in the revenues of regulated energy and water businesses.

Tollroads

Tollroad traffic is similarly split between industrial / commercial customers, and residential customers. We would expect the demand of both these groups to display some sensitivity to the economic cycle, since there are often alternatives to tollroad services, and there is no regulatory buffer.

North American pipelines

North American gas and liquids transmission pipelines have a high component of industrial / commercial demand. Other things being equal, we would therefore expect the demand of North American pipelines to be pro-cyclical.

Given that North American pipelines are subject to competitive pressure from parallel pipelines and alternative modes of transport, the income elasticity of demand for the pipeline services is not decoupled from that of the commodity being transported, with the exception of the contracted demand for the pipeline. Furthermore, as outlined above, the regulatory framework of North American pipelines does not buffer their cash flows in the same ways that regulation buffers the cash flows of Aurizon Network or regulated energy and water businesses.

Class 1 railroads

The main customers of Class 1 railroads are industrial / commercial businesses, which implies that demand is pro-cyclical, particularly for consumer durables such as automobiles. As we have seen, Class 1 railroads only have a rate of return monitoring regulatory regime that does not buffer cash flows.

3.3.3 Contract duration

If a business has contracts with suppliers and customers that have long duration, it is unlikely that a high proportion would fall due during the course of a cyclical downturn. As a result, the firm's cash flows will be less pro-cyclical, and the asset beta can be expected to be lower, other things being equal.

Aurizon Network

Long-term take-or-pay contracts are a feature of Aurizon Network's regulatory framework. As of March 2017, the average length of access agreement signed was just over 7 years. However, this

average contract length regularly changes as access agreements expire and are renewed on potentially different terms.

For Aurizon Network's long term cash flows, more important than the coverage and scope of its take-or-pay contracts, is the fact that its users are captured and the position that these users occupy in the global seaborne coal cost curve (discussed further below). If the users are positioned at the favourable (lower) end of the cost curve, their export volumes are likely to be maintained and contracts renewed in the event of an economic downturn. Even if the parent business fails and the assets are sold, it would be expected that the volumes would be recontracted to new users. Thus, contract roll-off is not likely to be a significant issue for Aurizon Network.

If the users are at the high end of the cost curve it is possible that a take-or-pay contract would not protect that volume once the contract expires or, particularly, if that business fails and is the parent entity. However, as discussed below (under asset stranding risk), Aurizon Network's users are well positioned on the cost curve, and are therefore likely to renew contracts and are less likely to fail.

Regulated energy and water

Regulated energy and water business that serve a diverse range of residential customers do not have contracts with them, although they could have contracts with some industrial customers.

Tollroads

Tollroads do not have contracting arrangements with customers.

North American pipelines

The Brattle Group cited statistics for the 33 largest US natural gas pipelines showing that in 2016, 68 per cent of capacity was covered by contracts exceeding 5 years, 55 per cent was covered by contracts exceeding 10 years, and 48 per cent was covered by contracts exceeding 15 years.⁶⁵

As we have seen, contracts are much more important to North American pipelines than they are to Aurizon Network. This is because:

- Aurizon Network is a monopoly provider of the CQCN with a captive customer base and the whole of Aurizon Network's revenue is recovered under its regulatory framework; while
- North American pipelines are subject to competitive pressure from parallel pipelines and alternative modes of transport and are exposed to market forces on their uncontracted capacity.

This implies that contract roll-off is likely to be a significant issue for North American pipelines and that a material proportion of pipeline capacity would be vulnerable to changing demand in a given year.

Class 1 railroads

According to North American investment banking analysts we have consulted, Class 1 railroads typically have contracts with 1 to 3 year durations, and only in the case of coal traffic are contracts of

⁶⁵ The Brattle Group (30 November,2016), p.45.

up to 5 years observed. Hence the majority of a Class 1 railroad's capacity would be vulnerable to shifting demand in any year. In recent years, there have been large falls in coal traffic carried by US Class 1 railroads, despite any contracts that may exist.

3.3.4 Pricing structure

Pricing structure can also influence beta. If the pricing formula has a fixed and variable component, this can reduce the revenue impact of a pro-cyclical fall in demand. That is, the fixed component will need to be paid regardless of actual usage. This effect, in turn, will reduce systematic risk.

Aurizon Network

While Aurizon Network's pricing structure does not include fixed and variable components, its revenues are decoupled from performance in a single year through the revenue cap regulatory framework and its 'unders-and-overs' mechanism (discussed further below).

Regulated energy and water

Many electricity and water businesses have a fixed and variable component in their pricing structure. Hence, we would expect that other things being equal, this feature would reduce the cyclicity of demand for regulated energy and water businesses.

Tollroads

Tollroads have a simple pricing structure that is linearly related to traffic volume.

North American pipelines

North American pipelines have a fixed and variable component in their pricing; however, their customers are generally not 'captured' like those of Aurizon Network. Hence, the fixed component of the price will apply only to the contracted component of their capacity. The revenues of these businesses are not buffered by regulation in the way that Aurizon Network's revenues are buffered (see below).

Class 1 railroads

North American Class 1 railroad pricing does not involve two-part tariffs.

3.3.5 Real options

Real options, such as the ability to introduce new products and expand geographic scope, increase the firm's sensitivity to real GNP shocks, and there is empirical support for such a relationship.⁶⁶

Aurizon Network

As a regulated business, Aurizon Network does not possess the growth options that its parent firm, Aurizon Holdings Limited, possesses. Aurizon Holdings Limited is free to open new businesses in

⁶⁶ For example, see Chung, K. and C. Chareonwong (1991), 'Investment Options, Assets in Place and the Risk of Stocks,' *Financial Management*, Vol. 20, pp. 21-33.

related or unrelated fields in any geographic location. By definition, Aurizon Network is the below-rail coal network in Queensland. Growth options are limited to the growth in coal traffic in Queensland, and constrained by cost-based regulation. We would therefore not expect growth options to have a material effect on Aurizon Network's asset beta.

Regulated energy and water

Regulated energy and water businesses are defined by a specific service activity in a given geographic location. Its growth options are constrained to a single geographic area. Furthermore, if the scale of operations increases through demand growth and capital expenditure to satisfy that growth, the larger operation will be subject to the same cost-based regulation that the current operation is subject to. That is, the scope for earnings from the new regulated energy and water assets will be very similar to those of the existing assets, which constrains any impact on beta.

Tollroads

Tollroad businesses have the ability to expand, and will not face the same cost-based rate of return controls that apply to Aurizon Network. Hence, growth options may impact on the beta of tollroads.

North American pipelines

North American pipelines are in the midst of a material expansion and restructuring phase that has accompanied the fracking revolution, which has reduced the price of natural gas and resulted in substitution of natural gas for coal as the fuel for electric power stations. The systematic risk impact of real options will have likely increased over the past decade.

Since North American pipelines are exposed to market forces on their uncontracted capacity, North American pipelines are able to capture more of the upside (and suffer more of the downside) of capacity expansions / contractions. Therefore, we should expect their asset betas to be more impacted by growth options.

Class 1 railroads

Since they are not constrained by regulation, the asset beta of North American Class 1 railroads has also been influenced by growth options. In recent years Class 1 railroads have been affected by the fracking revolution, which has resulted in natural gas and liquids pipeline capacity expansion, and consequent reduction in coal railings. At the same time, the demand for railing of liquids has increased, and railing of LNG is being mooted.

3.3.6 Operating leverage

In his analysis of likely factors affecting beta, Lally proposed that “firms with greater operating leverage (higher fixed operating costs to total operating costs) should have greater sensitivity to real GNP shocks because their cash flows will be more sensitive to own demand, and hence to real GNP shocks.”⁶⁷ The most commonly used formula to represent operating leverage is:

⁶⁷ Lally, M (26 February, 2004), p. 83.

$$\text{Degree of Operating Leverage} = \frac{\% \Delta EBIT}{\% \Delta Q}$$

Where, $\Delta EBIT$ is the change in Operating Income Before Tax, and ΔQ is the change in the number of units sold. Empirical estimation of the relationship shown in the expression above can be achieved through estimating the γ_1 coefficient in a regression of the form:⁶⁸

$$\ln EBIT = \gamma_0 + \gamma_1 \ln Sales + \mu$$

For the period 2000 to 2016, we estimated operating leverage in this way for the group of potential comparator industries, as well as by the ratio of operating costs to assets (opex/assets).⁶⁹ The results in Table 3.3 below show that measured in these ways, Aurizon Network (with a coefficient of 0.98) has a similar level of operating leverage to the average observed for regulated energy and water businesses, toll roads, and North American pipelines, which is approximately 0.90 (i.e. there is close to a 1:1 relationship between Sales and EBIT).⁷⁰ On the other hand, Class 1 railroad industries have a materially higher degree of operating leverage (1.20).⁷¹ Based on these measures of operating leverage, the only potential comparator industry that we could characterise as having relatively high operating leverage is Class 1 railroads.

Table 3.3: Operating leverage – median values, 2000-2016

	Opex / Assets	γ_1 from regression of Ln(Sales) vs Ln(EBIT)
Class 1 railroads	0.24	1.20
North American pipelines	0.04	0.82
Tollroads	0.11	0.87
Aurizon Network	0.10	0.98
Regulated energy and water	0.13	0.87

Source: Bloomberg, QCA, Aurizon Network and Incenta analysis

On these measures of operating leverage, Aurizon Network cannot be considered to be materially different from tollroads, regulated energy and water, or North American pipelines, although the latter is materially lower on the measure of opex/assets. That is, while on the characteristic of operating leverage Class 1 railroads is not a reasonable comparator for Aurizon Network, the other industries are relatively similar. In any case, we do not consider that operating leverage can exert much influence on the systematic risk of Aurizon Network, tollroads or regulated energy and water

⁶⁸ See, for example, Xue Zhang, (15 August, 2012), *The Role of Operating Leverage in Asset Pricing*, Master Thesis in Finance, Tilburg University.

⁶⁹ Bloomberg codes applied to obtain these data were: EBIT (EBIT), Sales (SALES_REV_TURN), Total Assets (BS_TOT_ASSET), Operating expenditure (IS_OPERATING_EXPEN). Years with missing data were removed.

⁷⁰ That is, the percentage change in EBIT is found to be roughly equal to the percentage change in sales revenue.

⁷¹ For Class 1 railroads there is approximately a 1.2 percentage change in EBIT for every percentage change in sales revenue, which indicates greater sensitivity (i.e. higher operating leverage) than for the other industries.

businesses, whose cash flows are not highly systematically volatile. For operating leverage to exert an influence on beta, it must result in disproportionate *systematic* volatility in earnings.

3.3.7 Market weight

When an industry's weight in the market against which the beta is estimated is large, this will draw its beta towards 1. In a previous analysis of this issue, Lally considered that "even for a market weight as low as 5%, the effect can be substantial."⁷² However, this is not an issue in the case of Aurizon Network, which comprises less than half a percent of the ASX200 Index, and for other firms in our potential comparator samples.⁷³ We think it is a non-issue for any of the comparator firms.

3.3.8 Stranding risk

Stranded asset risk was not one of the characteristics considered by Lally (2004). This may be because most sources of stranding risk (e.g. political, competitive or technological changes) are fundamentally non-systematic in nature. However, stranding risk can potentially impact the asset beta since it can magnify the losses in equity value that occur as a result of a fall in real GDP that induces a decline in demand. Such a fall would increase the probability that continued operations may become unprofitable.

Aurizon Network

International competitiveness of Queensland's coal exports

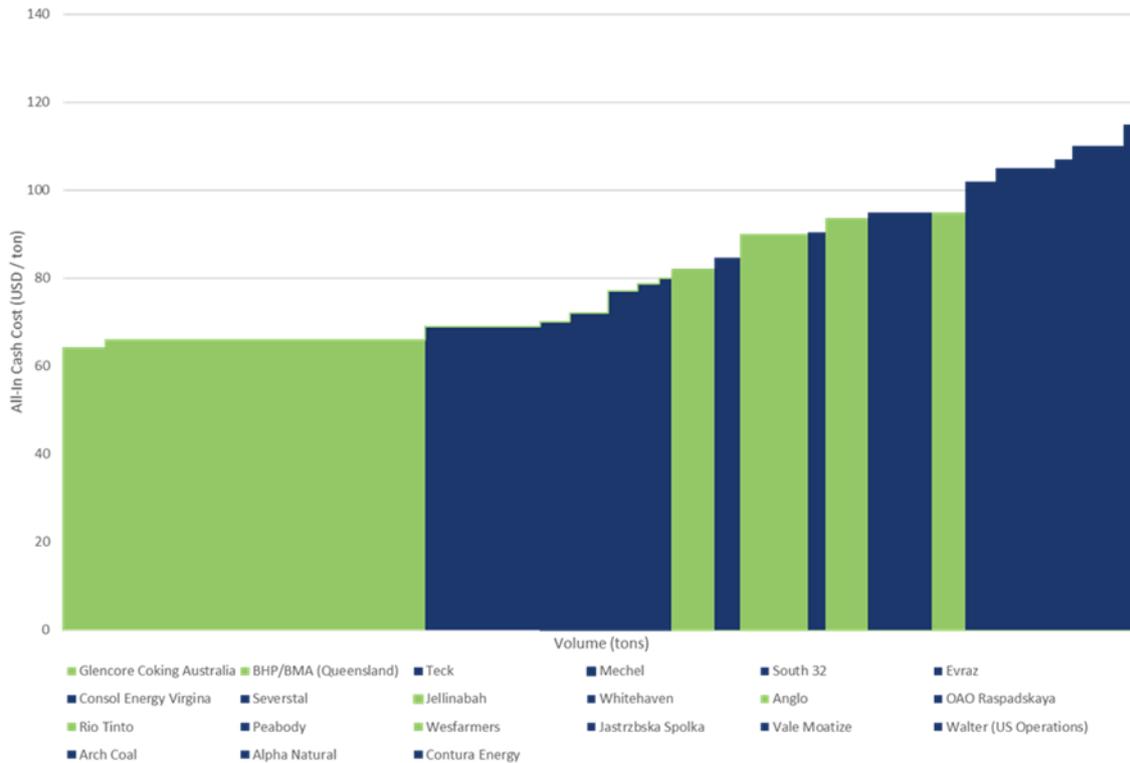
If a material proportion of Queensland's coal supplies were situated at the marginal end of the global cost curve, stranding risk would be an issue. However, this is not the case. In Figure 3.4 below, we display the international seaborne metallurgical coal cost curve, which is most important for Aurizon Network given the dominance of railings of metallurgical coal for its railroad infrastructure. Aurizon Network's submission noted that during FY2016, metallurgical coal accounted for 76 per cent of exports.⁷⁴

⁷² Lally, M (26 February, 2004), p. 84.

⁷³ In January, 2017 the Australian ASX200 market had a market capitalisation of \$1.6 trillion, while the equity value of Aurizon Network is in the region of \$2.7 billion (estimated as 45 per cent of a RAB of approximately \$6 billion) to \$3.2 billion (based on JP Morgan's \$7.1 billion valuation of the below rail assets of Aurizon Network). See, Guy Bunce and Peiting Liang, (13 December, 2016) *Aurizon Holdings Limited – Clouds on the Aurizon, Initiate at Underweight*, JP Morgan, p. 37.

⁷⁴ Aurizon Network (30 November, 2016), p.16.

Figure 3.4: Seaborne metallurgical coal exports all-in cost curve (Queensland vs. Rest-of-world).



Source: Bloomberg. Note: Green signifies Australian coal production, blue is rest of the world.

In Figure 3.4 the Queensland-based exporters (shown in green) dominate the low-cost end of the curve as well as the mid-cost, with relatively little capacity at the higher end. Bloomberg also forecasts increasing coal supply from Australia in 2017:

Seaborne coal supply may increase in 2017 along with the ramp-up in supply from Australia and Indonesia as exporters are lured by rising coal prices, which reached a two-year peak. Australian miners may resume about 15 million tons coal output in 2017, mainly coking coal, according to BI analysis. Indonesian miners, which mainly produce thermal coal, may divert more coal exports to China from India. Yet, the amount is likely to be limited, based on miners' plans. China imported about 204 million tons coal in 2015.

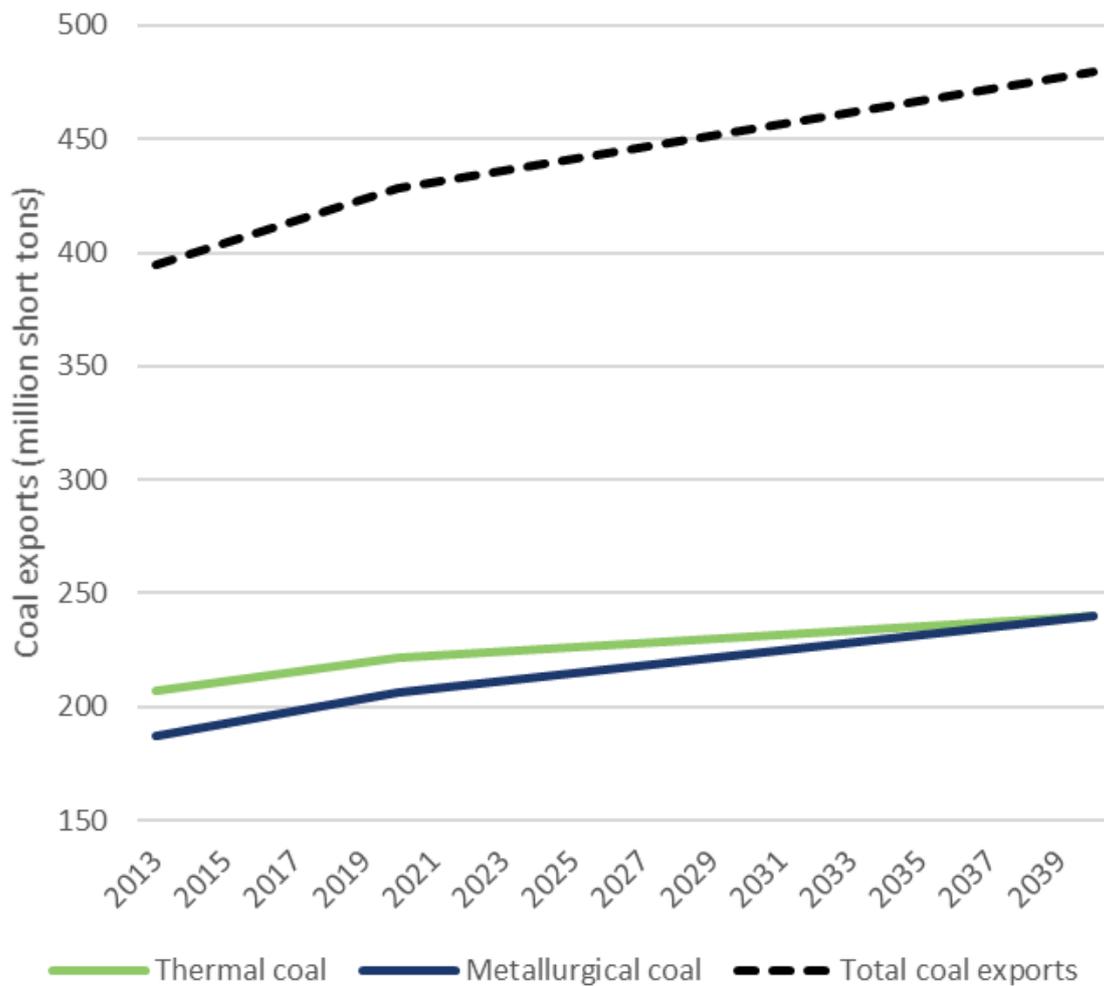
Glencore will restart a shuttered Integra underground coking coal mine in Australia it bought from Vale last year. Whitehaven Coal, the eastern Australia coal miner, has already boosted its coal output, including thermal and coking coal, in July-September by 20% to 5.2 million tons.

Forecasts of Australian coal exports

The recovery of coal prices and the dynamics of growing Asian demand for metallurgical and thermal coal, and Queensland coal mines' positions on the international cost curves are all factors supportive of long-term growth of the industry. Given the factors discussed above, it is not surprising that the US Energy Information Administration (EIA) shares a positive view of the future development of

Australian coal exports. In its *International Energy Outlook 2016*, the US Energy Information Administration has forecast that total Australian exports of coal will rise from 394.3 million short tons in 2013 to 479.8 million by 2040, with metallurgical coal exports rising from 187 million short tons to 239.7 million short tons over the same period.⁷⁵ This forecast growth is shown in Figure 3.5.

Figure 3.5: Australia – exports of metallurgical and thermal coal, 2013-2040



Source: US EIA (2016), p. 74.

Conclusion

The viability of Queensland’s seaborne coal export industry is dependent on the positions that its customers occupy in the global export coal cost curve, and the long term demand outlook for Queensland coal. Queensland coal producers (especially for metallurgical coal) occupy relatively strong positions on the relevant seaborne export coal cost curves. As a result of its own below-rail monopoly position, and the strong market position of its customers in the international export coal cost curve, and the IEA’s forecast of growing long term demand, we consider that Aurizon Network’s

⁷⁵ US Energy Information Administration (May 2016), *International Energy Outlook 2016*, p. 74.

asset stranding risk is very low. This is also implied by the fact that market analysts place a valuation on Aurizon Network that comfortably exceeds its RAB value.⁷⁶ Because the risk is very low, we do not consider stranding risk to have a material impact on the systematic risk of Aurizon Network.

To the extent that Aurizon Network faces any residual stranding risk, we note that its regulatory arrangements enable it to depreciate new capital expenditure over a 20-year period, which mitigates that risk.

Regulated energy and water

Regulated energy and water are generally not subject to any material asset stranding risk, particularly those energy and water utilities serving large residential areas where their services are essential.

Toll roads

New tollroads can be vulnerable to asset stranding if patronage forecasts prove to be materially incorrect, and established tollroads are potentially subject to asset stranding due to various factors including the construction of parallel roads, shifts in residential / industrial location etc. However, we would categorise this risk as being relatively low.

North American pipelines

The North American gas pipelines industry has been experiencing a period of upheaval following the fracking revolution. As noted by The Brattle Group, this has resulted in expanding pipeline capacity along some corridors, but placed pressure on others:⁷⁷

The new supplies and the pipelines constructed to serve them have put substantial competitive pressure on some existing pipelines. The potential for further changes in the gas market has increased the uncertainty facing many others. These competitive pressures have reduced the value of capacity on some pipelines, and in some cases resulted in substantial amounts of unsubscribed capacity.

As discussed above, North American pipelines are subject to competitive pressure from parallel pipelines and alternative modes of transport. Therefore, uncontracted pipeline capacity is vulnerable to changing market conditions and contract roll-off is likely to be a significant issue for North American pipelines.

Consequently, some segments of the North American pipeline industry now have higher stranding risks than previously.

Class 1 railroads

Class 1 railways carry freight between established urban-industrial / agricultural centres and large portions of these networks are likely to have relatively low stranding risk. However, the fracking revolution has in recent years placed pressure on thermal coal, and as a result thermal coal railings

⁷⁶ J P Morgan's valuation of Aurizon Network was approximately \$6.6 billion as at December, 2016, exceeding its RAB by approximately 15 per cent.

⁷⁷ Paul R. Carpenter, A. Lawrence Kolbe, Steven H. Levine and Bente Villadsen (April, 2012).

have reduced. This is one segment of Class 1 railroad assets that may be at some risk of stranding, but generally we would expect stranding risk to be low.

3.4 Summary of First Principles analysis

Based on our first principles analysis of differentiating characteristics, we conclude that among the industries considered, regulated energy and water businesses provide the best comparator industry for Aurizon Network. Table 3.4 below summarises the comparability on each characteristic.

- **Regulated energy and water** – Both Aurizon Network and regulated energy and water businesses are monopoly service providers, have a ‘captured’ customer base with resilient demand for the service, and are subject to cost-based regulation for pre-set periods that cushions cash flows. These factors result in low sensitivity of demand / revenue to GDP shocks. We would therefore expect Aurizon Network and regulated energy and water businesses to have similar levels of exposure to systematic risk.
- **Tollroads** – Unlike Aurizon Network, these businesses do not possess a high degree of market power, and while traffic can be sensitive to GDP shocks, there is no cost-based regulatory mechanism to cushion such shocks, which leads us to expect higher systematic risk for tollroads relative to Aurizon Network.
- **North American pipelines** – Oil and gas transmission pipelines are subject to competitive pressures from parallel pipelines and alternative transport modes. As such, in general North American pipelines lack market power and their customers are not ‘captured’ like the customers of Aurizon Network. Furthermore, their regulatory framework differs from those applying to Aurizon Network and regulated energy and water businesses. The light handed regulatory regime for United State oil and natural gas pipelines relies on the existence of varying degrees of competition within the relevant markets, and it is this competitive pressure, not regulation, that often constrains them. There is no pre-determined regulatory period, and while cost-based regulation is applied to mitigate the pipeline carriers’ market power where it exists, regulatory tariffs are influenced by market conditions. Hence, regulatory buffering of the cash flows of North American pipelines is limited in comparison to that of Aurizon Network. Uncontracted pipeline capacity is vulnerable to changing market conditions, and contract roll-off is likely to be a significant issue for North American pipelines. We therefore expect North American pipelines to have higher systematic risk than Aurizon Network.
- **Class 1 railroads** – Class 1 railroads are expected to have materially higher systematic risk than Aurizon Network. Class 1 railroads are subject to competitive pressure from parallel railroads and alternative transport modes; carry loads that are highly sensitivity to GDP shocks; have relatively higher operating leverage; and their cash flows are neither constrained nor buffered by regulation, which merely monitors the rate of return being earned.

Table 3.4: Summary of first principles characteristics of potential comparator industries

Characteristic	Aurizon Network	Regulated energy & water	Tollroads	Pipelines	Class 1 railroads
Market power and resulting Regulatory Framework	High Pre-determined reg. periods Cost based revenue cap set so revenue will be recovered irrespective of usage	High Pre-determined reg. periods Cost based, via revenue cap, price cap or rate of return constraint / protection	Compete for traffic flow No set regulatory period Tolls often capped at CPI & potential to regulate	Competitive pressure Light-handed regulatory regime relying on competitive pressure. No set regulatory period	Competitive pressure No set regulatory period Rate of return monitoring but does not constrain or protect revenue
Income Elasticity of Demand & Nature of the customer	Low Metallurgical coal pro-cyclical Regulation buffers cash flow	Low Captive customers in an area Regulation buffers cash flow	Medium Traffic sensitive to GDP No buffering mechanism	High for material load Non-contracted load exposed No buffering mechanism	High for material load ETM traffic sensitive to GDP No buffering mechanism
Nature of the Customer	Mines incentive to maximise output (coking & thermal)	Both industrial & residential customers	Both industrial & residential customers	Customers are industrial / utilities	Customers are industrial / commercial
Contract duration	Long-term contracts backed-up by regulatory framework	Contracts are not a key feature most customers are captive	No contracting	5-15 year contracts	Contracts of 1-3 years 5 years for coal traffic only
Real Options	Not relevant due to regulatory constraint	Not relevant due to regulatory constraint	Real options to expand	Real options to expand, e.g. current oil / gas expansion phase	Real options to expand, e.g. e.g. oil & LNG by rail
Operating leverage	Medium / not relevant	Medium / not relevant	Medium	Medium	Relatively high
Market weight	Not an issue	Not an issue	Not an issue	Not an issue	Not an issue
Stranding risk	Low Customers occupy strong positions on global cost curve Growth outlook for export coal is positive	Low Particularly for services to large urban networks	Low to medium Generally low but can be vulnerable to alternative roads / transport modes	Ranging from low to high Fracking revolution has changed flows of gas in North America	Low to medium Generally low stranding risk but some risk for thermal coal rail operations

Source: Incenta based on various sources

As shown in this chapter, both the first principles analysis and empirical evidence support our conclusion that neither North American pipelines nor Class 1 railroads are appropriate comparator industries for Aurizon Network. On the other hand, by sharing the key similarities of market power, strong economics, and regulatory buffering of cash flows, regulated energy / water business have been shown to be the best available industry comparator group to reflect Aurizon Network's systematic risk. Based on the evidence, we would expect tollroads, North American pipelines and Class 1 railroads all to have higher systematic risk than Aurizon Network.

3.4.1 Empirical testing of ROA-GDP relationships

The beta concept is founded on the proposition that it is the responsiveness of returns of the business in question relative to returns in the market that determines systematic risk. In the discussion above we posited that Aurizon Network's economic returns are unlikely to bear a relationship to GDP growth because of its market power, the resilient demand of its customer base, and regulatory buffering of cash flows. On the other hand, first principles analysis indicated that with relative lack of market power, and being regulated in a different way to Aurizon Network, the economic returns of North American pipelines and Class 1 railroads would be likely to bear some relation to GDP growth. To test whether accounting data are consistent with our hypotheses, we calculated the average Return on Assets (ROA) for each calendar year from 2007 to 2015, and compared the change in ROA with movements in the economic cycle, as represented by the real GDP growth rate of the relevant countries.⁷⁸

While the data are aggregated at an annual level for 9 years, and undue weight should not be placed on them, they suggest that Aurizon Network's cash flows show no evidence of being systematically

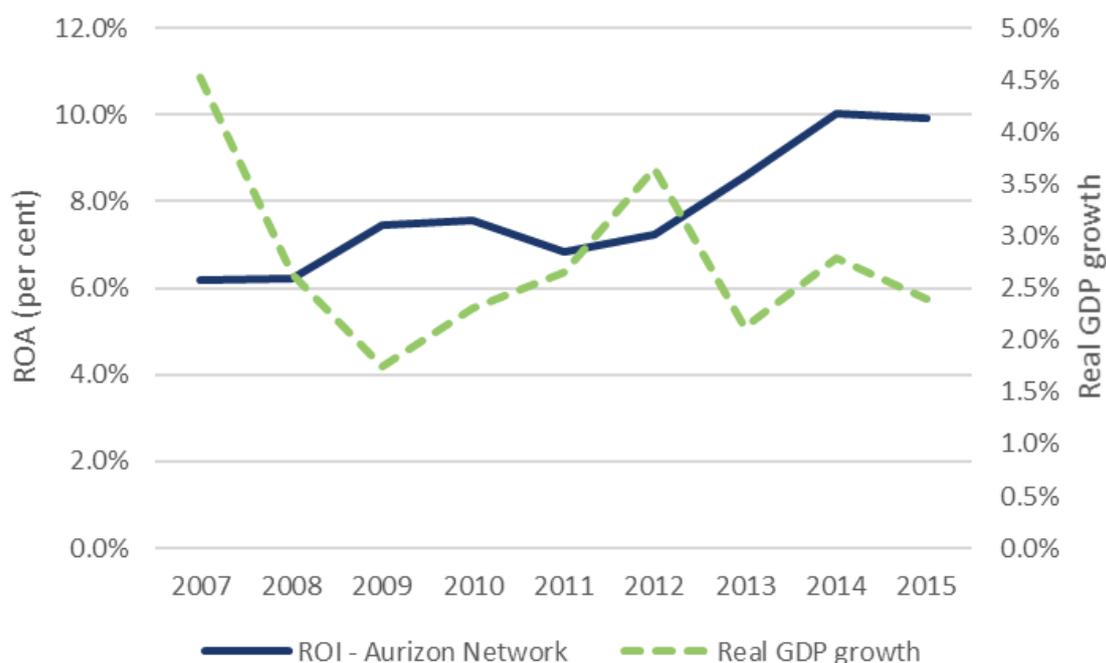
⁷⁸ Specifically, using Bloomberg data for each business, for period 1, we calculated the ratio $EBIT / ((0.5 \times Total\ Assets_0) + (0.5 \times Total\ Assets_1))$. Where businesses belonging to a potential comparator group are from more than one country, we have calculated a weighted average of real GDP based on the real GDPs of the countries that the component businesses operate within.

correlated to the economic cycle, and in this respect, are closer to regulated energy and water businesses. By contrast, both North American pipelines and Class 1 railroads appear to display more pro-cyclical earnings (i.e. ROA vs GDP growth), which indicates higher systematic risk.

Aurizon Network

In Figure 3.2 below we find that while Aurizon Network's ROA fluctuated during the period 2007 to 2015, these movements were independent of the state of the Australian economy, as represented by the real GDP growth rate. The two sharpest declines in revenue growth (2010-11 and 2013-14) were associated with regulatory re-sets (UT3 and UT4 respectively). During 2008 and 2009, a period coinciding with the global financial crisis, there was a material increase in capital expenditure (i.e. capacity expansion) and ROA remained relatively constant. Given Aurizon Network's market power, the protections of the regulatory framework meant Aurizon Network's revenues increased in tandem with the expansion of its asset base. These findings indicate that the systematic cash flow risk of Aurizon Network's operations is likely to be low.

Figure 3.2: ROA vs GDP growth for Aurizon Network, 2007-2015



Source: Bloomberg, QCA, Aurizon Network and Incenta analysis

Regulated energy and water

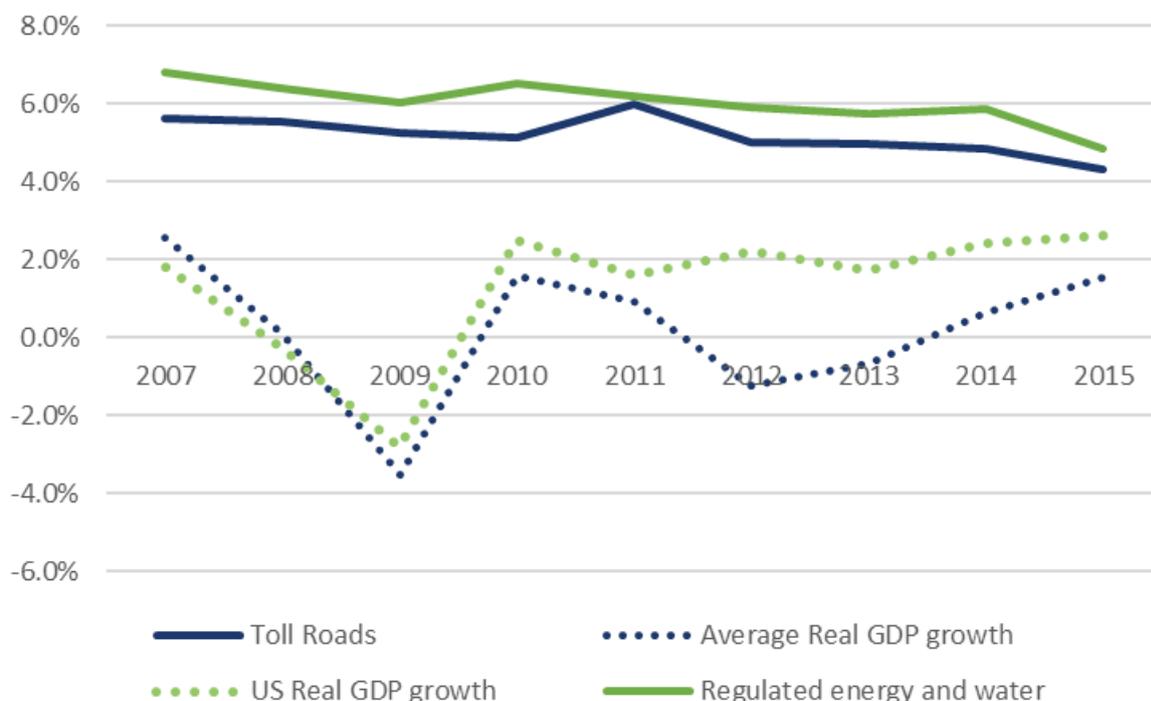
Like Aurizon Network, regulated energy and water businesses generally have a monopoly position in a geographic area, and like Aurizon Network, their customers are captive. For much of their customer base, regulated energy and water businesses are providing essential power and water services. In addition, as for Aurizon Network, regulated energy and water firms are subject to a cost-based regulatory framework (as discussed below), which buffers cash flows, further reducing the scope for any association with real GDP shocks. This relative lack of association of ROA and real GDP growth for regulated energy and water is displayed in Figure 3.3 below.

Toll roads

Tollroads are different from Aurizon Network and regulated energy and water businesses, since tollroads are subject to competitive pressure from alternative road options and alternative modes of transport (e.g. trains, trams, buses and ferries). Tollroads revenue is not cushioned by regulation.

In Figure 3.3 we also display the ROA results for tollroads. Since the energy and water sample is dominated by US businesses, we show the US real GDP over the relevant period, while the “Average Real GDP” is a composite of the countries that the toll roads sample is drawn from. We find that based on the time series of ROA, on average, the returns of regulated energy and water businesses reacted relatively mildly to the global financial crisis of 2008 and 2009, and to subsequent changes in the US and “average” real GDP. The average ROA of the tollroads sample was similarly relatively unresponsive to the global financial crisis, but showed slightly more variability over the subsequent period.

Figure 3.3: ROA vs GDP growth for regulated energy / water, and toll roads, 2007-2015



Source: Bloomberg, and Incenta analysis

We consider the low sensitivity of the regulated energy and water industry’s ROA to real GDP provides further support for regulated energy and water to be a reasonable comparator for Aurizon Network, which also displays revenue movements / ROA that are not associated with real GDP movements. Based on evidence of a slightly greater degree of systematic variability in its ROA over time, other things being equal, we would expect tollroads to have a slightly higher degree of systematic risk relative to Aurizon Network.

North American liquids pipelines

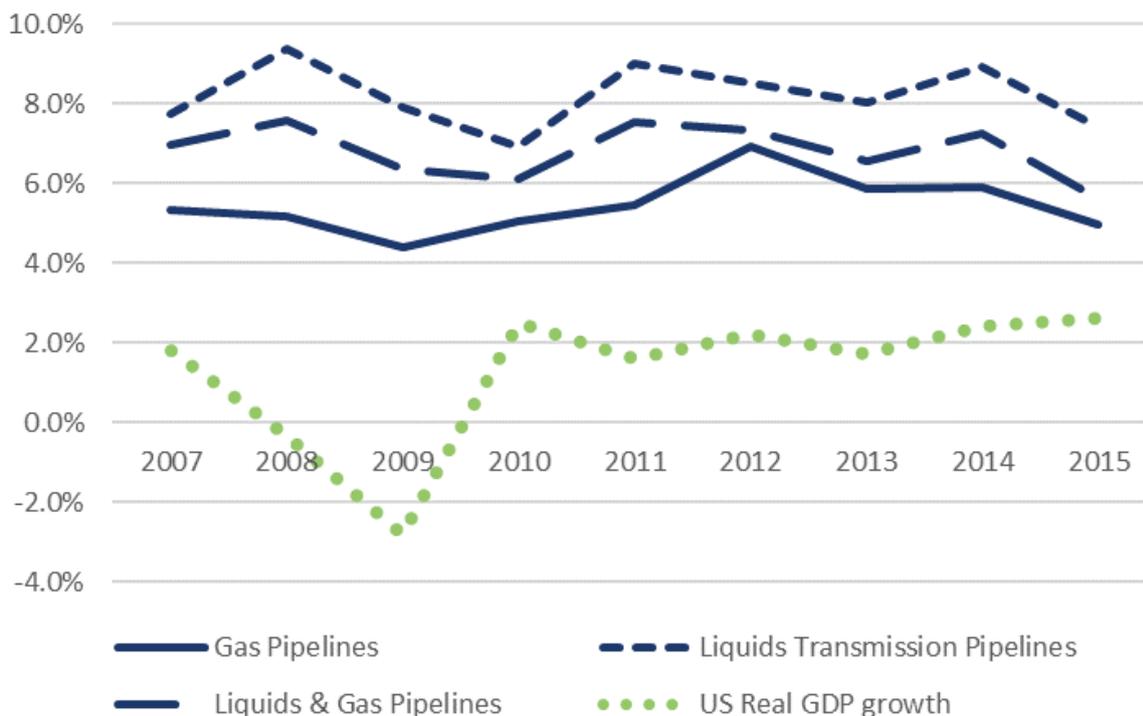
North American pipelines carry gas and liquids across great distances to industrial customers and utilities (which distribute mainly to residential customers and commercial businesses). Industrial customers can be expected to have a higher income elasticity of demand than residential customers, for whom power and heating are necessities. While the pipelines are not subject to price risk, they bear volume risk on uncontracted load, as well as counterparty default risk. The regulatory framework applying to North American pipelines does not insulate them from market vagaries in the way that the regulatory framework applying to Aurizon Network does.

The market environment for North American pipelines has been unstable for some years due to the fracking revolution that has resulted in large expansions in oil and gas supplies, and consequent falls in prices. This has increased the volatility of cash flows in the industry over the past decade. Bloomberg Intelligence's 2017 outlook for the North American midstream oil and gas sector reports that share prices and valuation multiples have been volatile in the past few years, with equity values following the oil price. Recently, "waning valuations have heralded ongoing restructuring and kept M&A prevalent..."⁷⁹

In Figure 3.4 below, we show how the ROAs for North American gas and liquids pipelines changed relative to US real GDP growth. We use the same sample that The Brattle Group has used to estimate the asset beta range that it applied to Aurizon Network (with the 'Liquids and Gas Pipelines' category being comprised of all 13 of the businesses identified by Aurizon Network's adviser, The Brattle Group). That is, these are the industry groups that The Brattle Group considers, based on its qualitative discussion of systematic risk factors (see chapter 4 below), to be more comparable to Aurizon Network than regulated energy and water businesses. The cash flows of these pipeline companies appear to be more systematically volatile than those of Aurizon Network.

⁷⁹ Bloomberg Intelligence (23 November, 2016), BI 2017 Outlook: Midstream Oil and Gas, North America.

Figure 3.4: ROA for North American gas and liquids pipelines, 2007-2015



Source: Bloomberg, and Incenta analysis

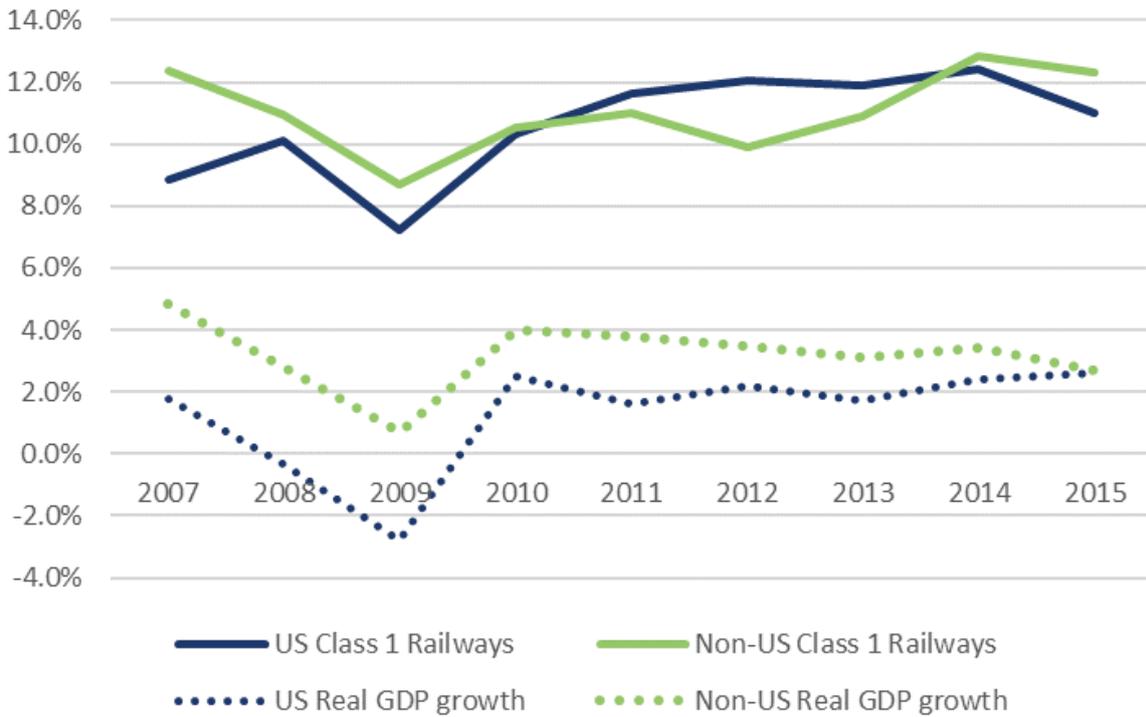
Class 1 railroads

Like North American pipelines, Class 1 railroads often carry their load (i.e. freight) across great distances to industrial and commercial customers. Rather than carrying a single gas or liquid as pipelines do, Class 1 railroads carry a range of goods from industrial products (such as chemicals and metallurgical coal) to consumer luxury goods (e.g. automobiles), both of which may be expected to be sensitive to the state of the economy. Other goods, such as thermal coal for residential power and heating purposes can be expected to have a lower income elasticity of demand, as they are necessities. Class 1 railroads bear volume risk on uncontracted load. As discussed below, most freight traffic is subject to 1 to 3 year contracts, and only coal traffic is subject to 5 year contracts. Unlike the situation facing Aurizon Network and regulated energy and water, the volume risk exposure of Class 1 railroads is not cushioned by regulation.

Figure 3.5 displays how the ROAs of US Class 1 and non-US Class 1 railroads have moved relative to US real GDP growth, with an average of real GDP growth reflecting the countries of operation of the non-US Class 1 railroads.⁸⁰ This shows even more pronounced fluctuations than we observed for North American liquids and gas pipelines. There was a very pronounced fall in ROA during the global financial crisis. Between 2008 and 2009, movements of automotive equipment and coal by rail reduced by 20 per cent to 30 per cent in both the US and Canada.⁸¹ The only commodity sector that was not materially impacted during the global financial crisis was Canadian agriculture.

⁸⁰ Here we have used The Brattle Group's sample of non-US Class 1 railroads.
⁸¹ See Incenta (9 December, 2013), pp. 34-35.

Figure 3.5 ROA for US Class 1 railroads and Non-US Class 1 railroads, 2007-2015



Source: Bloomberg, and Incenta analysis

The highly pro-cyclical nature of a material component of Class 1 railroads' cash flows suggests that these businesses should be observed to have higher systematic risk relative to the other comparator industries considered above. The highly pro-cyclical cash flow / ROA movements observed for Class 1 railroads indicate that this is not a reasonable comparator industry for Aurizon Network.

4. Capital structure and beta

4.1 Introduction

In this chapter, we provide estimates of the benchmark capital structure, asset beta and equity beta of Aurizon Network. As required under the Terms of Reference, we first assess Aurizon Network's submission on beta, and the reports it commissioned from its advisers. We then undertake our own analysis to estimate the asset beta of a business with the benchmark characteristics of Aurizon Network. Once we have estimated the asset beta we assess the benchmark capital structure, which allows us to estimate the equity beta at the benchmark level of gearing. Throughout the analysis we apply the Conine transformation formula and assume a debt beta of 0.12 when de-levering and re-levering beta, in accordance with the QCA's preferred approach. Our findings regarding Aurizon Network's benchmark parameters are as follows:

- An asset beta of 0.42;
- A gearing level of 55 per cent; and
- An equity beta of 0.73.

4.2 Asset beta

Aurizon Network's submission proposed that an asset beta range of 0.55 to 0.65 is appropriate to apply to its operations over the coming regulatory period, and chose the bottom of this range, 0.55 as its point estimate.⁸² Based on a benchmark gearing level of 55 per cent, which maintains the assumption used in previous QCA decisions, and applying regearing assumptions consistent with the QCA's preferred approach (i.e. the Conine formula, a debt beta of 0.12), Aurizon Network derived an equity beta estimate of 1.0. Aurizon Network's submission to the QCA was informed by two key reports:

- Brattle Group (30 November, 2016), *Aurizon Network 2016 Access Undertaking, Aspects of the WACC* (a report that was commissioned and relied upon by Aurizon Network). The asset beta range referred to by Aurizon Network was drawn from the work of The Brattle Group; and
- Frontier Economics (November, 2016), *Equity beta, Report prepared for Aurizon Network* (another report that was commissioned and relied upon by Aurizon Network).

After summarising the key points in Aurizon Network's submission, we review and respond to the key elements contained in the two advisors' reports, which support Aurizon Network's submission. In doing so, we draw on the findings of the first principles analysis we undertook in chapter 3.

⁸² Aurizon Network (30 November, 2016), Aurizon Network Submission 2017 Draft Access Undertaking.

4.3 Aurizon Network's submission

4.3.1 Aurizon Network's submission proposed an asset beta of 0.55

A key component of Aurizon Network's submission was its view that a general 'cookie cutter' approach cannot be applied to assess its level of systematic risk:⁸³

The rate of return must be tailored to the specific regulatory and commercial risks to which Aurizon Network is subject and any benchmarking must be aligned to those specific risks faced by Aurizon Network.

Aurizon Network's submission proposed that an asset beta range of 0.55 to 0.65 is appropriate to apply to its operations over the coming regulatory period, and chose the bottom of this range, 0.55 as its point estimate. The asset beta range referred to by Aurizon Network was drawn from the work of The Brattle Group, which examined a number of industry groups as potential comparators for Aurizon Network's business and concluded that US oil and gas transmission pipelines (referred to as the "North American pipeline industry") provided the closest match to Aurizon Network's circumstances due to:

- Being subject to regulation;
- Having long term contract cover;
- Servicing a limited number of customers; and
- Transporting 'a commodity along a fixed route that is generally up-stream of the retail end-use market.'

4.3.2 The QCA / Incenta over-emphasised regulation and chose the wrong comparator group

Aurizon Network's submission

Informed by The Brattle Group's report, Aurizon Network's submission rejected the previous conclusion reached by the QCA, which was to consider regulated energy and water businesses to be the closest available comparators. According to Aurizon Network's adviser, Frontier Economics, the QCA has placed too much emphasis on regulation when choosing appropriate comparators for its operations. Frontier noted that numerous studies have shown that the form of regulation does not impact on the level of systematic risk.⁸⁴ If the form of regulation is not important in determining asset beta, regulation could not have a material impact on the asset beta of Aurizon Network.

Aurizon Network's submission listed a number of "industry characteristics" that it believes drives its "core systematic risk profile":

- Assets with long economic life with no alternative use;

⁸³ Aurizon Network (30 November, 2016), p.247.

⁸⁴ Aurizon Network (2016), p.273.

- Capital intensive assets with high operating leverage;
- A complex integrated supply chain serving multiple coal export ports and coal systems;
- Domestic operations that require both domestic and international financing;
- Users that are price takers, and demand that depends on the “relative competitiveness of CQCN producers in that market, which can also be influenced by government policy actions domestically and globally”,⁸⁵ and,
- A user base that is highly concentrated compared to regulated water and energy infrastructure.

Aurizon Network agreed that regulation and take-or-pay contracting will “mitigate Aurizon Network’s exposure to systematic risk”, but these operate for only short periods relative to the economic life of its assets, and therefore material systematic risk exposure remains.

The Brattle Group’s assessment of relative systematic risk factors

The Brattle Group considered that, in its previous decisions, the QCA had placed too much emphasis on revenue risk and regulation:⁸⁶

We agree with the QCA that revenue risk (manifested in the expected adequacy and volatility of revenue) is a relevant consideration for comparability, and that it is influenced by business characteristics including regulatory framework and contracting. However, we believe that additional characteristics – such as supply risk, demand risk, operating risk, and stranding risk – represent important considerations when evaluating the systematic business risk of commodity transportation infrastructure networks. Consequently, we draw somewhat different conclusions about the most relevant comparable industries for estimating Aurizon Network’s asset beta.

Listed below are the key features of the North American pipeline businesses that The Brattle Group viewed as having similar systematic risk to Aurizon Network, and the reasons it considered regulated energy and water businesses are not appropriate comparators for Aurizon Network.

Transporting ‘a commodity along a fixed route that is generally up-stream of the retail end-use market’

The Brattle Group considered that the “market structure and operational characteristics” of North American pipelines are closer to those of Aurizon Network than to regulated energy distribution businesses, which makes North American pipelines a much better comparator than energy distribution businesses.⁸⁷

Importantly, as described above, pipelines are more like Aurizon Network than are distribution utilities in terms of market structure and operational characteristics. Ultimately, unlike regulation of distribution utilities, pipeline transmission rate regulation and contract cover operate on a business construct that is analogous to Aurizon Network’s operation of the

⁸⁵ Aurizon Network (30 November, 2016), p.258.

⁸⁶ The Brattle Group (30 November,2016), p. 38.

⁸⁷ The Brattle Group (30 November,2016), p.46.

CQCN: commercial customers pay for network access to transport a commodity along a fixed route that is generally up-stream of the retail end-use market. Consequently, we consider the North American pipeline industry the most relevant point of comparison for determining Aurizon Network's asset beta.

Servicing a limited number of customers

The Brattle Group noted that both North American pipelines transporting gas and liquids, and Aurizon Network, have a relatively small number of customers, while electricity, gas and water utilities have a large number of diffuse customers. The Brattle Group submitted that this customer diversity will act to “mitigate demand risk” for energy and water utilities, but North American pipelines and Aurizon Network are in a different position, with higher customer risk:⁸⁸

And while Aurizon Network's take or pay contract arrangements does help reduce its own demand risk, the potential for declining revenue from the gradual roll-off of contracts is likely to be high relative to the potential for similar usage declines among distribution utility customer bases numbering in the hundreds of thousands or millions.

Price elasticity of demand

In The Brattle Group's opinion, “distribution utilities benefit from inelastic demand for their service”, while price elasticity of demand is expected to be higher for Aurizon Network relative to utilities' demand, because it is dependent on the “regional and global demand for Queensland coal supplies, as well as the price of those supplies.” Hence:⁸⁹

Given the recent and ongoing shifts in global energy markets, demand for Queensland coal is likely more price-elastic and variable than demand for electric, natural gas, and water distribution services provided by energy networks.

Cost of service regulation

In view of the QCA's emphasis on regulation as a factor of comparability among different industry groups, The Brattle Group's report provided a discussion of how FERC and NEB regulate gas and liquids pipelines in the US and Canada respectively. They do this on a cost of service basis to provide a return that is “just and reasonable”. However, The Brattle Group noted there are differences to the regulatory approach that is applied to liquids pipelines by FERC:⁹⁰

Liquids pipeline rates are capped at a ceiling established by application of an annual index designed to track changes in pipeline industry costs. The index is determined by periodic FERC reviews comparing changes in oil pipeline companies' per-unit cost of service over time, and is held in fixed differential to a general measure of inflation (the Producer Price Index or PPI) in between reviews.

⁸⁸ The Brattle Group (30 November,2016), p. 39.

⁸⁹ See The Brattle Group (30 November,2016), p. 39. “Demand for Queensland coal is likely more price-elastic and variable than demand for electric, natural gas, and water distribution services provided by energy networks.”

⁹⁰ The Brattle Group (30 November,2016), p. 42.

The Brattle Group dismissed alternative transportation approaches as not being effective, but recognised that there is inter-pipeline competition:⁹¹

However, if dynamics shift in supply markets or downstream demand centres, over time a given pipeline's customers may shift their demand to alternative routes.

Long term contract cover

In its Figure 12, The Brattle Group's report listed the contract cover and terms of contracting for the 33 largest US natural gas pipelines. This showed that as at 2016, 68 per cent of these businesses' operations were covered by contracts exceeding 5 years, 55 per cent were covered by contracts exceeding 10 years, and 48 per cent were covered by contracts exceeding 15 years.⁹² A parallel was drawn between the North American pipelines and Aurizon Network, which was considered to show the suitability of the former as a comparator for the latter:⁹³

In light of this evidence, we feel comfortable that the pipelines operated by the companies in our North American Pipeline sample have substantial contract cover over relatively long time horizons, suggesting a high degree of comparability to Aurizon Network.

4.3.3 Weight should be given to railroad industry comparators

The Brattle Group on railroad industry comparators

The Brattle Group began its discussion of "Freight Rail Transportation" with a statement implying that, due to physical similarities and cash flow patterns, when considering the systematic risk of Aurizon Network it is necessary to consider listed rail businesses as comparators:⁹⁴

It is our view that certain aspects of operating a rail network dedicated to freight transportation are best captured by consideration of comparators that operate in that line of business. Patterns of cash flows related to operating expenses, maintenance and expansion capital expenditures, and working capital balances for freight rail companies are, put simply, likely to be most comparable to those of other freight rail companies.

Aurizon Network's submission went further in stating that:⁹⁵

In addition to this sample of gas and liquid pipelines, Brattle considers that some weight should be given to railroad companies as they share similar industry characteristics with

⁹¹ The Brattle Group (30 November,2016), Footnote 100, p. 40.

⁹² The SNL Energy contract data referenced by The Brattle Group (2016), at page 45, explains the measurement of pipeline contract cover as follows: "Ratios calculated as discounted contracted capacity divided by discounted maximum capacity. Period terms begin on January 1, 2017. Maximum capacity is calculated as the maximum daily contracted capacity on the pipeline, from the beginning of the quarter (July 1, 2016) onward, multiplied by 365.25 days per year. A discount rate of ten percent is used." Individual pipeline contract coverage measured in this way ranged from 20 per cent to 30 per cent for some pipeline companies, up to 100 per cent in the case of one company.

⁹³ The Brattle Group (30 November,2016), p.45.

⁹⁴ The Brattle Group (30 November,2016), p. 46.

⁹⁵ Aurizon Network (30 November, 2016), pp.273-274.

Aurizon Network. In particular, it has selected a group of companies that are exposed to bulk commodity shipping, a characteristic similar to Aurizon Network.

While recognising that none of the US Class 1 and Non-US Class 1 railroads comparator sample selected by The Brattle Group is "... directly comparable to Aurizon Network in every aspect... [The Brattle Group] ... view them as broadly reflecting the operating characteristics of the bulk commodity freight rail business..."⁹⁶

Frontier Economics on railroad industry comparators

Apart from its reliance on The Brattle Group's report, Aurizon Network's submission also drew on the analysis of Frontier to challenge the sample composition that the QCA had previously applied to assess the asset beta of Aurizon Network, and to question what it considered to be the QCA's over-emphasis on regulation as a factor. Aurizon Network concluded that as a result of the QCA choosing the wrong comparators (i.e. regulated energy and water businesses), it under-estimated Aurizon Network's benchmark asset beta. Frontier's report considered that:⁹⁷

The best equity beta estimate would lie somewhere between the equity beta estimate for energy and water networks, and the equity beta estimate for rail and transport firms.

The key points made by Frontier on the issues of emphasis on regulation and composition of comparators are outlined below.⁹⁸

Regulation is not a differentiating factor in relation to beta

Aurizon Network submitted that the QCA's emphasis on regulation as a determinant of the comparator group is incorrect, since its adviser Frontier reported that in the economics literature the form of regulation has not been found to be a statistically significant determinant of beta. That is, beta is invariant to whether a firm is regulated through revenue cap, price cap, or rate of return regulation, or by means of high-powered incentive regulation (e.g. CPI-X) or low-powered regulation (e.g. rate of return regulation). Frontier considered that, as a result, the QCA's emphasis on the fact that Aurizon Network is regulated and regulated energy and water businesses are regulated does not mean they are comparable businesses for beta estimation purposes. On the other hand:⁹⁹

... if firms in the same industry under different forms of regulation have similar beta estimates, this suggests that industry is at least one relevant criteria for analysis.

The QCA and Incenta placed no reliance on transport infrastructure firms

Frontier's report expressed a view that the QCA's previous decision on Aurizon Network's benchmark asset beta was in error by not placing any weight on other rail and transport infrastructure firms:¹⁰⁰

⁹⁶ The Brattle Group (30 November, 2016), p. 47.

⁹⁷ Frontier (November, 2016), p.3.

⁹⁸ In this section we consider the issues raised by Frontier in section 3.1 of its report. See Frontier (November, 2016), pp.3-6.

⁹⁹ Frontier (November, 2016), p.6.

¹⁰⁰ Frontier (November, 2016), p. 4.

The QCA, via its consultant Incenta, applied its judgement to rule out placing any weight at all on other rail infrastructure companies. The rationale for this approach was Incenta's view that the systematic risk of the Central Queensland Coal Network is not related to the fact that it is a rail network but rather is related to the fact that it is regulated. This led the QCA to select comparators on the basis that they are regulated rather than on the basis that they are involved in the rail infrastructure business.

In contrast to the QCA and Incenta, Frontier submitted that “other regulators, credit rating agencies, and independent valuation experts all have regard to other rail infrastructure businesses.” Frontier provided the following examples of where it considered the QCA’s approach runs counter to that of “other regulators and market”:¹⁰¹

- *other regulators* – Frontier submitted that other regulators, such as ERAWA and the Canadian Transportation Agency,¹⁰² have regard to rail infrastructure companies while “the QCA simply restates its assumption that other rail infrastructure companies are not appropriate comparators – even those that have more than a quarter of their revenues subject to regulation.”
- *independent experts* - Frontier noted that “the QCA observes that Grant Samuel applied different betas for rail infrastructure companies and utilities,” and because the QCA concludes that “the Central Queensland Coal Network (CQCEN) is a utility rather than rail infrastructure, this leads the QCA to conclude that the Grant Samuel report supports the QCA approach.”
- *credit rating agencies* – Frontier stated that “the QCA concludes whereas other rail infrastructure companies may be similar to the CQCEN in terms of credit risk, this does not imply that they are also similar in terms of equity risk. That is, whereas the risk facing debt holders is similar, the risk facing equity holders might be so different that the other rail infrastructure companies should receive no weight at all.”

The QCA and Incenta approach is unique and unsubstantiated

Frontier’s report submitted that the ‘first principles’ approach adopted by Incenta is not substantiated as it is a conceptual argument, and not supported by empirical evidence:¹⁰³

*Incenta’s conclusions are presented as a “first principles analysis.” This involves a conceptual discussion about the possible uncertainty of future cash flows and results in Incenta concluding that the risk of cash flows generated by making rail lines available to a small number of mining companies is equivalent to the risk of cash flows generated by distributing electricity to households. Aurizon Network’s submission considered the same “first principles” and reached the opposite conclusion. **Because this all involves nothing more than conceptual discussion, there is no framework for determining whose conclusion is correct.** [emphasis added]*

Frontier’s view was that the approach applied by the QCA in its previous (UT4) decision was “unique” in that it relied on energy and water industry comparators rather than rail infrastructure:¹⁰⁴

¹⁰¹ Frontier (November, 2016), p.5.

¹⁰² Frontier (November, 2016), p. 4.

¹⁰³ Frontier (November, 2016), p.6.

¹⁰⁴ Frontier (November, 2016), p.5.

The QCA's reliance on water and energy utilities to the exclusion of other rail infrastructure companies is based on the "first principles" considerations of Incenta. Incenta's view is that the systematic risk of CQCN is not due to its industry characteristic of being a rail network, but rather is related [to] its status of being a regulated network.

By contrast, Frontier submitted that it considered the 'industry' characteristic to be the key feature determining systematic risk:¹⁰⁵

In our view, industry characteristics – rail & transport industry, customer concentration, and exposure to a particular type of customer (mining) – do matter and this leads to the QCA under-estimating the risk of Aurizon Network.

4.3.4 Aurizon Network is subject to a range of risks

Risk of instability in the coal market

Aurizon Network's submission considered that the key characteristic of its commercial environment was the "inherently volatile nature of the industry", and it presented a chart showing 'Historical metallurgical and thermal coal price' from 2009 to 2016 (its Figure 76). Aurizon Network's submission suggested that as a result of this high-risk environment:¹⁰⁶

Major producers such as Anglo American and Rio Tinto are selling down their coal operations, while others have scaled back production.

Stranding risk

When it commented on the QCA's approach, The Brattle Group noted that stranding risk also needs to be considered in order to form a view on asset beta. However, The Brattle Group's analysis gave little attention to stranding risk. On page 10 of its report it noted that:

While the current regulatory regime re-allocates any otherwise stranded costs to other shippers, this may not be feasible if the magnitude of the stranded asset cost becomes unmanageable. Therefore, the risk exists.

On page 47 of its report The Brattle Group submitted that FERC Order No. 636 requires a capacity reservation fee to be paid by customers of North American pipelines (i.e. "the customer pays regardless of the volume of commodity actually transported"), and that as a result:¹⁰⁷

This form of rate design mitigates revenue risk from fluctuating flows, and mitigates stranding risk.

Aurizon Network's submission stated that regulatory revenue smoothing (at least in NPV terms) and take-or-pay contracts do not protect against asset stranding, and considered that the risk of asset

¹⁰⁵ Frontier (November, 2016), p.6.

¹⁰⁶ Aurizon Network (30 November, 2016), p.249.

¹⁰⁷ The Brattle Group (30 November,2016), p.42.

stranding is much higher for Aurizon Network than it is for regulated energy or water networks. This is because:¹⁰⁸

In contrast, [to regulated energy and water networks] demand for access to Aurizon Network's infrastructure fundamentally depends on the ability of its customers to profit from transporting coal from and to the nodes of that network. That in turn depends on regional and global demand for Queensland coal supplies, as well as the price of those supplies.

Stranding risk from temporal decline in thermal coal demand

Aurizon Network's submission pointed to the temporal decline in thermal coal demand due to substitution away from non-renewable energy, which exposes its network to stranding risk. World-wide pressure to mitigate the impact of climate change is causing the shift away from thermal coal power generation.

Fragmentation of the RAB

Aurizon Network's submission noted that there "is no mechanism for Aurizon Network to recover revenue shortfalls between systems."¹⁰⁹ Therefore, the stranding risk of assets in these regions is particularly high because the closure of a mine in these areas could not be recovered from other areas. Similarly, Aurizon Network submitted that "users have the option to switch between electric and non-electric tractions without any penalties." If non-electric traction offers a more cost-effective traction alternative, electric traction assets could become stranded even if demand is strong.

Stranding risk from revenue deferrals

Aurizon Network's submission proposed that its regulation "materially increases exposure to stranding risk" through the deferral of revenue. The business invested \$900 million in the Wiggins Island Rail Project (WIRP); however, due to a fall in demand, the QCA deferred recovery of approximately \$250 million of this expenditure.¹¹⁰ While the deferred revenue is being escalated at the WACC, Aurizon Network submitted that this continues to impose a risk on Aurizon Network because "the QCA has effectively aligned the profile of revenue recovery of WIRP capital costs with the profile of volumes railed." That is, the full revenue will not be recovered if WIRP railings do not eventually reach the levels initially anticipated by the investment.

4.4 Response to Aurizon Network submission

4.4.1 Introduction

At the beginning of its WACC chapter, Aurizon Network's submission stated that "rather than simply looking to 'roll forward' the UT4 WACC, Aurizon Network has undertaken a comprehensive review of the WACC methodology and parameters from first principles."¹¹¹ However, neither Aurizon

¹⁰⁸ Aurizon Network (2016), p.273, quoting The Brattle Group (2016), pp.38-39.

¹⁰⁹ Aurizon Network (2016), p.272.

¹¹⁰ Aurizon Network (2016), p.272.

¹¹¹ Aurizon Network (2016), p.245.

Network's submission, nor the reports of its two consultants, The Brattle Group and Frontier, have undertaken an analysis that applies both theory and supporting empirical evidence to evaluate factors that could influence the choice of comparator group. In chapter 3, we undertook such analyses of Aurizon Network's asset beta based on the first principles categories,¹¹² and found regulated energy and water businesses to be the best available comparator industry that reflects the systematic risk faced by Aurizon Network. Our response to the submissions of Aurizon Network and its consultants draws on our analysis in chapter 3.

4.4.2 Response to The Brattle Group's "common characteristics"

Transporting 'a commodity along a fixed route that is generally up-stream of the retail end-use market'

The physical characteristics of transportation of a commodity along a fixed route up-stream from the end-use market is insufficient information to consider two activities to be appropriate comparators for a beta analysis. For beta risk, the key is the degree of systematic relationship of the returns on the business relative to returns on the market. The nature of the commodity transported may or may not be important for beta risk, depending on such factors as how the transporting business obtains its returns from the carriage of the commodity. If the transporting business obtains returns that are dependent on the price of the commodity and that price is correlated to the market, it will have a higher beta than a transport business whose revenue is independent of the commodity's price. As an illustration of this, the asset beta of Westshore Terminal, which operates unregulated coal transporting infrastructure in Vancouver, was approximately 0.40 to 0.50 prior to linking its loading rate to the price of coal, which was followed by a material increase in its asset beta, which approximated that of coal mining businesses.¹¹³

Servicing a limited number of customers

While Aurizon Network has a relatively small number of customers compared with energy or water distribution businesses, like regulated energy and water businesses, Aurizon Network has a position of market power with a captured customer base. Furthermore, the miners themselves have relatively strong positions on the international export coal cost curve. Ultimately, what is important for beta is resilience of revenue / earnings through the economic cycle. This can occur in energy and water businesses not because of the number of customers, but because the demand has a significant component of residential consumption, which has a low income elasticity of demand. As we found in our first principles analysis in chapter 3, Aurizon Network's absence of sensitivity to the economic cycle is due to its market power, captured and resilient customer base, long term contracting, and cost-based regulatory framework.

We agree with The Brattle Group that the risk inherent in Aurizon Network's relatively small number of customers (compared with an energy distribution business) depends on the competitive position of those customers in the global supply of seaborne coal exports. However, The Brattle Group did not

¹¹² See Incenta (9 December, 2013), *Review of Regulatory Capital Structure and Asset / Equity Beta for Aurizon Network, Report to the Queensland Competition Authority*, pp. 28-40; Incenta (March, 2014), *Review of Regulatory Capital Structure and Asset / Equity Beta for Aurizon Network and response to stakeholder comments*, Report to the Queensland Competition Authority, pp. 32-44; and Lally, M. (26 February, 2004), *The Cost of Capital for Regulated Entities, Report prepared for the Queensland Competition Authority*, pp. 79-84.

¹¹³ Incenta (March, 2016), *DBCT 2015 DAU: Review of WACC parameters*, Report for the Queensland Competition Authority, p.38.

acknowledge that in Queensland the position of these customers is strong,¹¹⁴ so that the risk is low. Moreover, Moody's recent credit opinion on Aurizon Network noted that:¹¹⁵

*The rating [BBB+ stable] is further underpinned by the take-or-pay nature of Network's contracts with users over the entire Queensland coal export rail network – which provides it with the right to recover operating costs and earn a return on its assets – **and the depth and diversification of its customer base.** [emphasis added]*

Aurizon Holdings Limited (with reference to Aurizon Network) has itself commented to its shareholder base that its regulated below-rail business is a:¹¹⁶

- *Defensive, regulated asset supporting major export industry with RAB of \$5.6bn, with*
- *Low volume and commodity price risk with socialisation and revenue protection, and*
- *High quality customers with high quality mines.*

These statements to the investment community are not consistent with the submissions and reports of Aurizon Network and its advisers. On the contrary, these statements imply that Aurizon Network considers it has low risk because its counterparties occupy strong positions in their own industry.

Elasticity of demand

The Brattle Group considered that the price elasticity of demand for Queensland coal would be higher than for energy and water, and that while “Aurizon Network’s exposure to demand risk in the short term [may be reduced by regulation and contract cover] those forces cannot eliminate such risks entirely”.¹¹⁷ However, The Brattle Group provided no data to show that the revenues or returns earned by Aurizon Network indicate materially higher systematic “demand risk” than that observed for regulated energy and water businesses. Neither did the Brattle Group’s report consider the North American pipeline industry’s relative “demand” risk, particularly over the past five years, when the gas price fell below that of coal, causing a substitution of gas-fired for coal-fired power stations.

Income elasticity of demand

The Brattle Group did not consider the relative income elasticity of demand (or more importantly, income elasticity of revenues or profits) for energy and water compared with Aurizon Network (not “Queensland coal”) and the North American pipeline industry. Income elasticity of demand is more likely than price elasticity of demand to be associated with beta, as it relates to demand through the economic cycle, while empirical evidence linking price elasticity of demand to beta has shown varying results. Our first principles analysis in chapter 3 noted that Aurizon Network’s revenue is decoupled from the income elasticity of demand for coal. The revenues of North American pipelines are not decoupled from demand for gas and liquids, nor are revenues buffered by regulation in the same manner.

¹¹⁴ See section 4.4.4 below for a full discussion of the position of Aurizon Network’s customer base.

¹¹⁵ Moody’s Investor Service (16 February, 2017), *Aurizon Network Pty Ltd – Update Following FY17 Half Year Results Announcement and Outlook Revision to Stable*, p.1.

¹¹⁶ Aurizon (2016), *Aurizon: Year in review*, Lance Hockridge – Managing Director & CEO, p.27.

¹¹⁷ The Brattle Group (30 November, 2016), p.39.

Cost of service regulation

Regulation of Aurizon Network

We do not agree with Frontier's submission that in recognising the importance of comprehensive cost-based regulation Incenta's approach is 'unique'. As noted in our first principles analysis in chapter 3, the cost-based regulatory approach applied to Aurizon Network by the QCA has resulted in cash flows that are essentially independent of the economic cycle. When considering the asset beta of the Dalrymple Bay Coal Terminal (DBCT), which is in the same coal supply chain as Aurizon Network, independent valuation experts Grant Samuel noted that while the beta they adopted for that business:¹¹⁸

... appears low, none of the other listed ports are regulated and in Grant Samuel's view, the regulated nature of the asset (and the certainty of its cash flows) warrants a lower beta.

In arriving at their conclusion, Grant Samuel considered a group of UK ports as inappropriate comparators for DBCT. While the UK ports were physically much closer to DBCT than other businesses, they were given no weight as comparators because they were not subject to the same type of cost-based regulation. Like Aurizon Network, regulated energy and water businesses are also subject to cost-based regulation, and like Aurizon Network, we find that on average their cash flows exhibit little or no association with GDP shocks (see our first principles analysis in chapter 3). Hence, on grounds that they are subject to cost-based regulation, and a number of the first principles systematic risk characteristics we examined in chapter 3, we consider that regulated energy and water businesses are appropriate comparators for Aurizon Network.

Regulation of North American pipelines

Our first principles analysis showed that it is incorrect to assume that Aurizon Network and North American pipelines are subject to comparable regulatory frameworks. Under the cost-based regulatory frameworks that Aurizon Network / regulated energy and water businesses are subject to in Australia, there are pre-determined regulatory periods, and at a review, prices are reset such that the regulated cost base is able to be recovered given the actual forecasts of demand. North American pipelines have no specified regulatory period. Rather, regulatory reviews arise when FERC initiates one on its own initiative, or a pipeline or pipeline customer makes a complaint to FERC, which then undertakes a review. In two cases currently before FERC, it has estimated that the pipelines under review have been earning returns on equity in the range of 17.7 per cent to 28.5 per cent in recent years.¹¹⁹ Returns of this magnitude suggest that at times there is considerable scope for North American pipelines to earn materially more than "just and reasonable" returns before a review is triggered. Moreover, as discussed previously, the regulatory regimes applying to Aurizon Network and the North American pipelines are materially different, with the latter being expected to provide less "buffering" than is the case for Aurizon Network.

¹¹⁸ Grant Samuel (24 September, 2010), *Proposal from Brookfield Infrastructure Partners L.P.*, Appendix 1 – Selection of Discount Rates, p. 10.

¹¹⁹ FERC (19 January, 2017), *Natural Gas Pipeline Company of America LLC: Order instituting investigation and setting matter for hearing pursuant to section five of the Natural Gas Act, Docket No. RP17-303-000.*

Conclusion on cost-based regulation

From these observations, we reiterate the findings of our first principles analysis: the regulatory framework that North American pipelines operate under is unlike that applied by the QCA to Aurizon Network, and unlike the regulation applied to regulated energy and water businesses. It does not buffer cash flows to the businesses in the way that Aurizon Network's revenue-capped regulatory framework would be expected to.

Long term contract cover

The Brattle Group's submission that Aurizon Network and North American pipelines are similar because they both have long term contract cover is not supported by the evidence.

The extent of contract capacity is more important for North American pipelines, in terms of limiting their exposure to systematic risk. We have previously noted that North American pipelines are exposed to volume risk on the uncontracted portion of their capacity. In a downturn, North American pipelines are also exposed to counterparty risk on its contracted capacity, since the failure of a contracting counterparty immediately impacts the pipeline. By contrast, Aurizon Network is not exposed in this manner to uncontracted or contracted capacity because of 'socialisation' under its regulatory framework. If forecast demand falls, or one of Aurizon Network's contracting parties fails, Aurizon Network is compensated (in NPV neutral terms) in two years' time through an adjustment to tariffs. No such provisions exist to buffer the cash flows of the North American pipelines industry.

The Brattle Group also pointed to a "potential for declining revenue from the gradual roll-off of [Aurizon Network's] contracts." However, for Aurizon Network's long term cash flows, more important than the coverage of its take-or-pay contracts, is the fact that its users are captured and the position that these users occupy in the global seaborne coal cost curve, and the long-term demand outlook for Queensland coal. Given these characteristics, export volumes are likely to be maintained and contracts renewed. Even if the parent business fails and the assets are sold, it would be expected that the volumes would be recontracted to new users. Thus, contract roll-off is not likely to be a significant issue for Aurizon Network. Neither of these critical issues were examined by The Brattle Group, but we do so below (in section 4.4.4 dealing with stranding risk).

4.4.3 Provision of weight to railroad industry comparators

Impact of regulation on choice of comparator group

Frontier's statement that "there is no empirical evidence that the form of regulation can be used to distinguish equity risk amongst firms" relates to studies of the effect of variations in the forms of cost-based regulation (e.g. "rate of return" vs price-cap vs revenue-cap).¹²⁰ It is true that there is a body of empirical work that has found no consistent differences in beta risk based on form of regulation.¹²¹ A major reason for this is the fact that these studies typically have tested for differences in beta caused by applying a different form of price control (i.e., price cap vs revenue cap) among utilities whose

¹²⁰ Frontier (2016), p.3.

¹²¹ Studies finding no consistent difference in beta due to the form of regulation include: ACG (17 September, 2008), *Beta for regulated electricity transmission and distribution*; CEG (June, 2013), *Information on equity beta from US companies*; Gaggero, A. (2012) "Regulation and Risk: A Cross-Country Survey of Regulated Companies," *Bulletin of Economic Research*, Vol. 64 (2); and Incenta (9 December, 2013), *Review of Regulatory Capital Structure and Asset / Equity Beta for Aurizon Network*, pp.17-18.

revenues are dominated by residential customers. Given that residential demand tends not to have a substantial pro-cyclical component, it is not surprising that it has been hard to discern a difference in the asset beta arising from a change in the form of price control. Moreover, the regulatory regimes applicable to the firms in these studies (reflecting mainly distribution entities) have also tended to reflect regimes whereby prices are reset to permit a full recovery of cost over reasonably short intervals (i.e., in the order of five years). Thus, the studies did not test how the beta under cost-based regulation compares with beta when there is an absence of cost-based regulation, or where the regulatory framework exposes the businesses to material market risk.¹²² Accordingly, we do not think that the studies to which Frontier refers provide guidance as to how the asset beta of Aurizon Network (i.e., with cost based regulation, 4 yearly price reviews and a revenue cap) would compare to:

- firms for which the regulatory price control is largely non-binding (as is the case for the US Class 1 railways), or
- firms for which price reviews are typically much less frequent and do not necessarily restore price to cost (as is the case for the North American pipelines), or
- firms that are regulated under a price cap and whose demand is dominated by industrial and commercial customers (as is also the case for the North American pipelines).

Moreover, we disagree with Frontier that studies have not found that the presence of regulation affects the asset beta. As noted in chapter 3, empirically, Rosenberg and Guy (1976) found that regulated industries have amongst the lowest betas after allowing for various firm specific variables.¹²³ For the electric utility industry in the US, Davidson, Rangan and Rostenstein (1997),¹²⁴ and Binder and Norton (1999) show that systematic risk was inversely related to the intensity of regulation. More studies indicating that the type of regulation matters are listed by Pedell (2006), who concludes:¹²⁵

All the studies find a significant influence of regulatory climate on the cost of capital. They confirm the conjectured correlation between a more favourable regulatory climate and a lower cost of capital. Obviously, a more continuous and cost-orientated regulation is associated with a lower risk, which can be understood as an indication that the buffering hypothesis proves true.

Relative systematic risk of railroad industry comparators

Both Aurizon Network and Frontier submitted that the QCA and Incenta gave “no weight” to rail infrastructure. However, Aurizon Network’s own adviser, The Brattle Group, also gave no weight to rail infrastructure businesses when it determined that the benchmark asset beta lies in the range

¹²² Moreover, a methodological problem in conducting such studies is the question of how to ‘hold other factors constant’. See Pedell (2006), p. 38, which refers to the study by Riddick, L.A. (1992) ‘The effects of regulation on stochastic systematic risk’, *Journal of Regulatory Economics*, Vol. 4, Issue 2, pp.139-157.

¹²³ Rosenberg, B. and J. Guy (1976), ‘Beta and Investment Fundamentals – II,’ *Financial Analysts Journal*, Vol. 32, No. 4, pp.62-76.

¹²⁴ Davidson, W., N. Rangan, and S. Rostenstein (1997), *The Financial Review*, Vol. 32, No. 1, pp. 163-184.

¹²⁵ Pedell, Burkhard (2006), *Regulatory Risk and the Cost of Capital: Determinants and Implications for Rate Regulation* (Springer), pp.35-39.

bounded by North American gas (lower bound) and liquids (upper bound) pipelines. The Brattle Group concluded:¹²⁶

*We believe the asset betas associated with U.S. Electric, Gas LDC, and Water distribution utility networks are lower than what is representative for Aurizon Network's equity, with the Electric sample being the least comparable. **In addition, we find that the U.S. Class 1 Rail subsample has higher risk than Aurizon Network. This excludes the two end points of our sample and narrows our range.** (emphasis added)*

The Brattle Group's conclusion that the "US Class 1 Rail subsample has higher risk than Aurizon Network" is the same conclusion that Incenta reached after undertaking the first principles analysis in chapter 3. The difference between Incenta and The Brattle Group is that the latter considers North American pipelines to be an appropriate comparator for Aurizon Network, while we do not. We have not given any weight to the available listed railroad infrastructure firms, after establishing that their systematic risk fundamentals indicate materially higher systematic risk than Aurizon Network.

On similar "patterns of cash flows"

As noted above, The Brattle Group submitted that the "patterns of cash flows" of Aurizon Network and Class 1 railroads are likely to be comparable, and that as a result, the beta evidence from US Class 1 railroads should be considered by the QCA. However, The Brattle Group provided no evidence to support its submissions on this point. Whilst we do not agree that the matters raised by The Brattle Group are likely to materially influence beta, we do not in any case believe they are correct or relevant. Considering the three cash flow items individually:

- Operating expenses – Our examination of operating leverage as part of our first principles analysis in chapter 3 showed that Aurizon Network's operating expenditure / assets ratio of 0.10 was much closer to that of regulated energy and water (0.13) than it was to Class 1 railroads (0.24);
- Maintenance and expansion capital expenditures – Although there is a physical resemblance between Class 1 railroad tracks and those of Aurizon Network, the latter's tracks are built to carry materially heavier loads, and consequently the capital expenditure per kilometre of track will be higher;¹²⁷ and
- Working capital balances – The QCA compensates for working capital via a direct allowance and not through the WACC, which makes this issue irrelevant for beta. Furthermore, The Brattle Group did not explain whether there is a link between working capital and beta, nor how such a link would operate.

¹²⁶ The Brattle Group (30 November, 2016), p.57.

¹²⁷ In a recent article (6 June, 2017), "Adani's trick of the 'green light'", *Australian Financial Review*, Matthew Stevens wrote that in connection with Adani's purchase of Arrium tracks, "no other heavy haul railway operator uses Arrium tracks. The three Pilbara operators source from Japan while the coal network operators use tracks acquired from both Japan and Austria. They do that because the pressures of heavy haul rail are more intense and wearing than those generated by, say, passenger or container traffic. The simple fact is Arrium tracks do not meet the specifications for heavy haul."

On Incenta's approach of giving no weight to available listed railroad comparators

Outlined below are our responses to the three examples that Frontier provided to imply that Incenta's approach of rejecting all rail infrastructure firms was unique, not well reasoned, and not well justified by the evidence.

- *Regarding regulators* - Our approach is not "unique", as it is similar to that applied by the West Australian Economic Regulation Authority (ERAWA) in relation to the Public Transport Authority (PTA).¹²⁸ In the case of the PTA, the ERAWA initially referenced a group of international toll road operators, removed the operator with the highest asset beta (Vinci SA), and then chose a beta below that level because it judged that the operations of the PTA had a lower systematic risk than even the downward adjusted beta for toll roads.¹²⁹

Given the low level of systematic risk present in the PTA rail network, the Authority considered that an asset beta on the lower end of this range is appropriate. Utilising regulatory discretion, the Authority considered that an asset beta of 0.3, at the lower end of this range and slightly lower than the average asset beta excluding Vinci SA is appropriate.

We have assessed that the asset beta of Aurizon Network is likely to be lower than for toll roads, which is a view that is based on a first principles analysis that is not only "theoretical", but includes comparative empirical analysis.¹³⁰

- *Regarding independent experts* – Frontier's submission implied that the QCA's defining of Queensland's below rail coal network as a utility has led it to the erroneous conclusion that the Grant Samuel report supported its approach. The QCA noted that Grant Samuel grouped DBCT (a regulated coal port in the same coal value chain as Aurizon Network) together with Powerco (regulated energy) rather than with WestNet Rail (which Grant Samuel placed in a separate category called 'Fee For Service – Australia'), which implied that for asset beta estimation Grant Samuel "believed that WestNet Rail was not a relevant comparator for DBCT and Powerco."¹³¹ More relevantly, the QCA noted that "Grant Samuel's estimate of DBCT's beta was based on the view that the most important characteristic of the business was its regulation and the certainty of its cash flows." In its decision, the QCA noted that Incenta "in the absence of direct comparators [found it] more important to 'look through' the physical characteristics and instead focus on how the cash flows are likely to be influenced by systematic factors."¹³² Frontier's report did not comment on this principle, which had been applied by Grant Samuel, and was also applied by Incenta. In other words, Incenta's approach is not "unique", but has been applied by both the ERAWA and independent expert Grant Samuel in cases where listed comparators have been available that operate in the same line of business as the target company. Incenta's approach has

¹²⁸ That is, in the sense that a number of physically similar rail businesses to the PTA (i.e. Class 1 railroads) were not used as comparators for the PTA.

¹²⁹ ERA (18 September, 2015), *Review of the method for estimating the Weighted Average Cost of Capital for the Regulated Railroad Networks – Final Decision*, p. 148.

¹³⁰ That is, "regulatory judgement" alone has not been applied.

¹³¹ QCA (April, 2016), *Aurizon Network 2014 Access Undertaking – Volume IV – Maximum Allowable Revenue*, p. 261.

¹³² QCA (April, 2016) p. 258.

differed only in its application of a more rigorous first principles and empirical analysis to support its conclusions.

- *Regarding credit rating agencies* – In its UT4 final decision the QCA noted that “Incenta stated that credit risk does not necessarily translate to greater beta risk if the factors underlying it are not systematic”,¹³³ while Frontier’s submission appeared to imply that there is a relationship between credit risk and systematic risk. That is, Frontier suggested that if two rail businesses are used as comparators for assessing credit risks they should automatically be used as comparators in a beta analysis. We disagree. While in most cases businesses in the same broad industry group will be reasonable comparators when estimating systematic risk, this is not necessarily the case. Furthermore, credit risk and asset beta are not likely to be correlated,¹³⁴ as businesses with widely varying systematic risks will tend to adopt gearing targets aimed at achieving an investment grade rating.¹³⁵ Hence, it cannot be assumed that if rail businesses have similar credit risks they are necessarily appropriate comparators for a beta analysis. In chapter 3 our first principles analysis concluded that North American Class 1 railroads are not appropriate comparators for Aurizon Network. If any weight were to be given to inappropriate comparators, the asset beta estimate would be biased in that direction.

On “conceptual discussions”

Frontier’s report also considered that when undertaking a first principles analysis Incenta has relied exclusively on “conceptual discussion”, and that Aurizon Network has considered the same range of factors in the same way, but has drawn very different conclusions. We do not agree. While our first principles analysis has provided theoretical discussion, we have undertaken empirical testing and illustrations of the factors being considered, and subsequently tested the cash flow implications and associations with GDP shocks. Neither Aurizon Network nor The Brattle Group have done this.

Conclusion

In summary, we consider that Incenta’s approach, which was previously accepted by the QCA, is neither unique nor unsubstantiated. When there is an asset that has no listed comparables, like the PTA in Western Australia, or DBCT in Queensland, an Australian regulator (ERAWA) and a leading firm of independent valuation experts (Grant Samuel) have had to “look through” the physical characteristics of the assets and focus on the underlying systematic risk factors and how they affect cash flows. In the current review, there has been no weighting of equally plausible alternative conceptual views as suggested by Frontier. Whilst neither The Brattle Group nor the Aurizon Network submissions have supported their propositions with a comprehensive discussion based on first principles and backed by empirical evidence, we have done this in chapter 3.

¹³³ QCA (April, 2016) p. 261.

¹³⁴ We found no correlation between the 5 year (monthly observations) asset beta and credit rating of the 58 ASX200 businesses that have a Standard & Poor’s domestic credit rating. The credit ratings of these businesses ranged from AA+ to B+.

¹³⁵ That is, when businesses face greater earnings volatility (which is a necessary but not sufficient condition for higher systematic risk) they will adopt lower gearing levels since they are likely to be targeting an investment grade credit rating. This process will undermine any relationship between credit rating and asset beta.

4.4.4 Risks faced by Aurizon Network

The majority of coal exported from Queensland is used for the production of steel (metallurgical), with a smaller component of coal exports for electricity production and heating (thermal). Aurizon Network's submission considered that the key risk characteristics of its commercial environment are the "inherently volatile nature of the industry", and its stranding risks. In this section, we examine these issues under the headings of 'counterparty risks,' 'price risk' and 'stranding risk'.¹³⁶

Coal price risk faced by Aurizon Network's counterparties

Aurizon Network's submission emphasised that its business is dependent on the risk position of its customer base (i.e. counterparty risk). To illustrate the "volatile nature" of its coal industry environment, Aurizon Network's submission presented a chart showing 'Historical metallurgical and thermal coal price' from 2009 to 2016 (in its Figure 76), and suggested that as a result of this high-risk environment:¹³⁷

Major producers such as Anglo American and Rio Tinto are selling down their coal operations, while others have scaled back production.

Whilst we agree that the coal industry is volatile (as evidenced by the high asset betas of coal mining businesses) Aurizon Network has over-stated its exposure to the risk position of these major miners. These businesses regularly undertake restructures and may be motivated to dispose of some assets at a time when coal prices have rebounded to relatively high levels.

Credit ratings of Aurizon Network's counterparties

Aurizon Network's submission also notes that a number of its customers have suffered credit rating downgrades, asset write-downs, and changes of mine ownership. Aurizon Network is correct in noting that China's economy and government policies have been important drivers of instability in the seaborne export coal industry. Bloomberg's Intelligence (Coal Operations) unit believes that average coal prices will be materially higher in 2017 than in 2016. During 2016 there was a rally in coal markets world-wide, with the global coal index outperforming the MSCI World index (after underperforming for five straight years). As shown in Table 4.1 below, JP Morgan has forecast near-term and long-term coal prices that exceed the all-in cost of production at producing Queensland mines (see Figure 3.4 above).

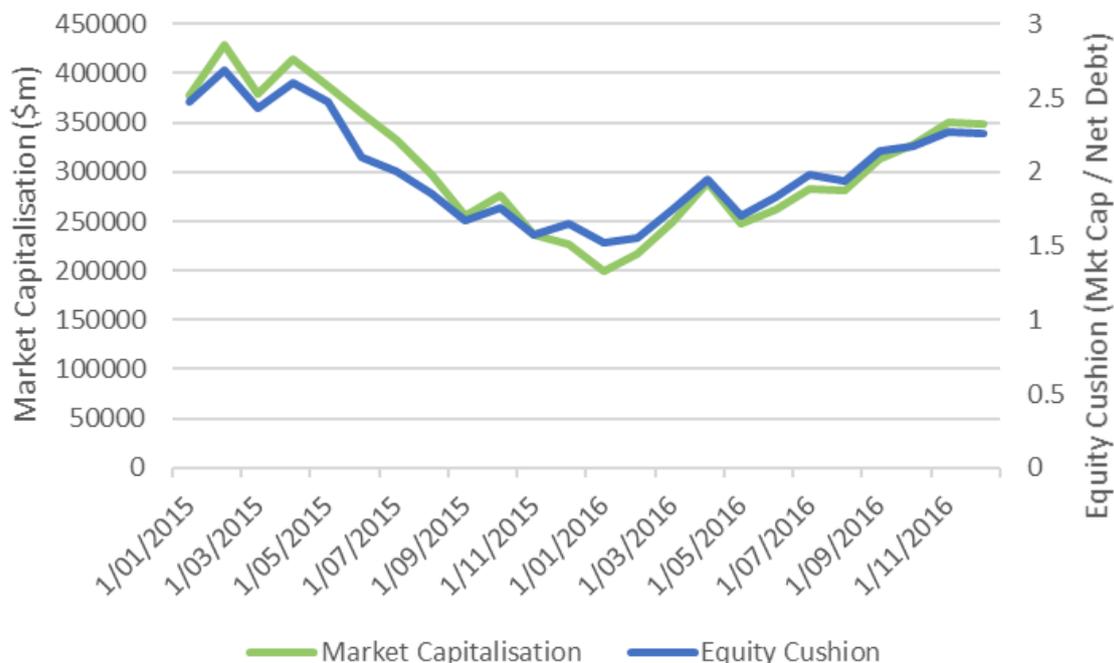
Table 4.1: JP Morgan Hard Coking Coal Price forecast

International coal	Units	2015	2016E	2017E	2018E	2019E	LT ('16\$)
Hard Coking - New Current	\$/Tonne	102.0	116.0	175.0	125.0	120.0	110.0

Source: JP Morgan (13 December, 2016), p.11.

¹³⁶ We considered Aurizon Network's demand risk as part of the first principles analysis in chapter 3.
¹³⁷ Aurizon Network (30 November, 2016), p.249.

Figure 4.1 Aurizon Network Customers – Market capitalisation and equity cushion, 2015 to 2016



Source: Bloomberg

We looked at the effect that the rebound in coal prices (and consequently coal miner share prices) had on the market capitalisation and equity cushion (Market Capitalisation / Net Debt) of the 11 Aurizon Network customers identified in its submission (in its Table 71). All but three of these companies had suffered credit rating downgrades, but in many cases, coal was not the dominant business activity and therefore not the dominant cause.¹³⁸ In any case, as Figure 4.1 shows, in aggregate the market capitalisations and equity cushions (i.e. market capitalisation as a proportion of net debt) of these firms reached a minimum point in January 2016, and have been improving ever since. As the equity cushion increases with commodity prices we would expect to see credit rating improve.

In any case, it is the economic viability of their coal operations rather than the credit ratings of Aurizon Network's customer businesses that creates risk exposure for Aurizon Network. In our first principles analysis we showed that the coal operations of Aurizon Network's customers are in a relatively strong position in the world export coal cost curve. Standard & Poor's has commented on this issue in its most recent credit rating review of Aurizon Network:¹³⁹

Generally, counterparty exposure in the dominant coal sector has been manageable with minimal downside risk... in recent years, credit stress on offshore entities (for example, Peabody Energy) owning coal mines in Queensland has not affected local operations or led to payment delays to AUN.

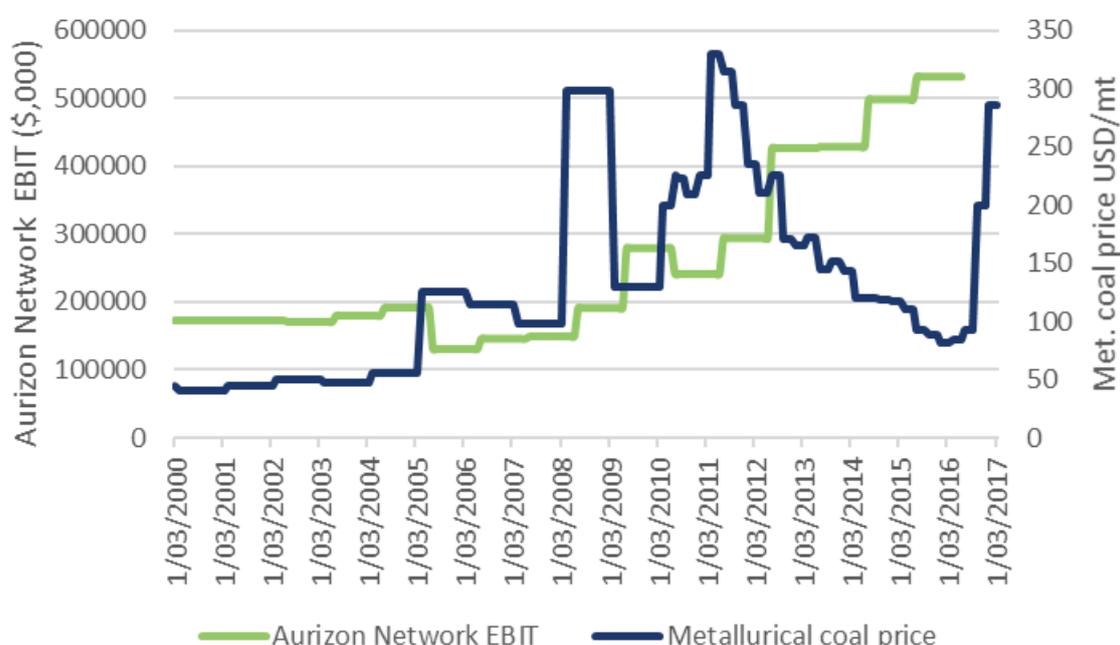
¹³⁸ A simple average of the share of coal revenue in the 2016 total revenues of the counter-parties listed by Aurizon Network shows that only 32 per cent of revenue was from this source.

¹³⁹ Standard & Poor's (17 May, 2017), *Aurizon Network Pty Ltd*, RatingsDirect, S&P Global Ratings, p. 5.

Aurizon Network's tariffs vs coal price

While the volatility of coal prices does impact on coal miners, whose systematic cash flow volatility is high, their experience does not match the relatively steady revenues of Aurizon Network. In comparison to the volatile coal prices faced by its user group, Aurizon Network's tariffs are relatively constant, and its cost-based regulatory framework smooths the revenue stream in NPV terms. In Figure 4.2 below it is apparent that there has been no relationship between the coal price and Aurizon Network's EBIT over time. This corroborates what we saw in Figure 3.2 above, which showed that Aurizon Network's ROA is not systematically related to the economic cycle.

Figure 4.2: Aurizon Network EBIT vs Metallurgical coal price



Source: Bloomberg, QCA, and Aurizon Network

Specific Aurizon Network stranding risks

Aurizon Network's submission raised two specific matters relating to stranding risk: Wiggins Island Rail Project (WIRP), and RAB fragmentation. Aurizon Network submitted that regulatory risk increases asset beta through the revenue deferrals that have been applied by the QCA to WIRP. In that case, the returns on approximately \$260 million in RAB have been deferred, albeit accumulated at the WACC, until sufficient demand eventuates. Aurizon Network submitted that this "materially increases exposure to stranding risk." However, Aurizon Network has informed its investors that "WIRP capacity of 27mtpa is protected by regulatory framework apart from the commercial fee".¹⁴⁰

Aurizon Network submitted that the 'fragmentation' of the RAB by system means that there is an increased risk of asset stranding relative to the case where all the systems were treated as a whole, which again means a higher level of stranding risk than that faced by regulated energy and water

¹⁴⁰ Aurizon (2016), *1HFY2016 Results: Lance Hockridge – MD & CEO; Keith Neate – EVP & CFO*, p.21.

businesses. Aurizon Network's submission emphasised that the Moura and Newlands systems are dependent on only two mine users each, and that as a result "Aurizon Network ends up bearing a similar risk to the mine."

We agree that a fragmentation of the RAB could potentially increase stranding risks. However, we do not agree with Aurizon Network's inference that, as a result, Aurizon Network faces the same risk as the mines. The mines in these areas are subject to coal price risk that Aurizon Network's regulatory framework shields it from. With respect to stranding risk, the number of coal mines in the region is not the critical issue. Stranding risk depends on where these mines are positioned in the seaborne export coal industry cost curve. The Brattle Group has provided no evidence regarding this issue.

While Aurizon Network and The Brattle Group are correct in noting that the viability of Queensland's seaborne coal export industry "depends on regional and global demand for Queensland coal supplies as well as the price of those supplies," in chapter 3 we presented evidence that the outlook on both dimensions is favourable. Queensland coal producers (especially for metallurgical coal) occupy relatively strong positions on the relevant seaborne export coal cost curves. As a result of its own below-rail monopoly position, and the strong market position of its customers in the international export coal cost curve, and the IEA's forecast of growing long term demand, we concluded that Aurizon Network's stranding risk is very low. This is consistent with the fact that market analysts place a valuation on Aurizon Network that comfortably exceeds its RAB value.¹⁴¹ Because the risk is low, we do not consider stranding risk to have a material impact on the systematic risk of Aurizon Network relative to the systematic risk of regulated energy and water businesses.

To the extent that Aurizon Network faces any residual stranding risk, we note that its regulatory arrangements enable it to depreciate new capital expenditure over a 20-year period, which mitigates that risk.

4.4.5 Systematic revenue risk and investor returns

In summarising its case that the North American pipeline industry is a suitable comparator for Aurizon Network, The Brattle Group considered that:¹⁴²

*The cost-based regulation and long-term contract features of the North American pipeline industry serve to **buffer revenue variability** in the manner identified by the QCA and Incenta with respect to Aurizon Network. [emphasis added]*

The Brattle Group's report considered that the "expected adequacy and volatility of revenue" is a relevant consideration when assessing systematic risk, and "that additional characteristics – such as supply risk, demand risk, operating risk" need to be considered. As noted above, The Brattle Group's view was that the unique "patterns of cash flows ... [of Aurizon Network] are, put simply, likely to be most comparable to those of other freight rail companies." However:

- The Brattle Group provided no evidence to demonstrate that the cash flows of the North American pipeline industry are buffered in the manner that Aurizon Network's cash flows are

¹⁴¹ J P Morgan's valuation of Aurizon Network was approximately \$6.6 billion as at December, 2016, exceeding its RAB by approximately 15 per cent.

¹⁴² The Brattle Group (30 November, 2016), p.46.

buffered, and did not compare this with the degree of systematic (i.e. pro-cyclical) cash flow variability of regulated energy and water businesses.

- The pattern of cash flow that is relevant to systematic risk is the degree to which cash flows to investors covary with the state of the economy and market. We considered these risks and cash flows when undertaking our first principles analysis in chapter 3, finding that the pattern of cash flows of North American pipelines have been more systematically volatile than those of Aurizon Network or regulated energy and water businesses. This (among other factors discussed in chapter 3) led us to conclude that regulated energy and water businesses are reasonable comparators for Aurizon Network, and that North American pipelines are not an appropriate comparator industry.

4.4.6 Empirical estimates of Aurizon Network's asset beta

Introduction

The Brattle Group estimated 5-year monthly and weekly asset betas, and has recommended that weekly betas are superior because this allows more observations, which narrows confidence intervals. The Brattle Group found the average (median) weekly asset beta estimates for natural gas and liquids pipelines to be 0.55 (0.56) and 0.66 (0.67) respectively. Based on The Brattle Group's conclusions, Aurizon Network's submission proposed a benchmark asset beta of 0.55 (the bottom of The Brattle Group's range, which was the estimate for natural gas pipelines subsample).

In this section, we first comment on the methods employed by The Brattle Group to obtain its findings, and then describe our own approach and results. Our main finding is that the regulated energy and water industries, which we consider to provide the best estimate of Aurizon Network's systematic risk, indicate an asset beta with a lower bound of 0.34 (our lowest estimate for regulated energy or water) and an upper bound of 0.50 (toll roads). Our point estimate within this range is an asset beta of 0.42.

The Brattle Group's methods

Estimate of beta

The Brattle Group obtained raw Bloomberg beta estimates for each business in its industry samples, and also estimated industry portfolio betas, with the portfolio contribution being weighted by each firm's market capitalisation. Portfolio betas were also estimated as a cross check.

Return window and estimation period

Five year and three-year return windows were estimated, and the weekly return interval was favoured over a monthly return interval, as The Brattle Group considered "the use of weekly data provides more confidence in the precision of the estimate."¹⁴³ The Brattle Group noted that if stocks are infrequently traded, this could impart a downward bias to the beta estimates, but reported that in any case, its weekly estimates were "in most cases actually slightly higher than the monthly estimates."¹⁴⁴ The Brattle Group also considered that a 5-year return window would provide the best trade-off, since it provides more beta stability than a 3-year window, and is not affected by the global financial crisis

¹⁴³ The Brattle Group (30 November, 2016), p.49.

¹⁴⁴ The Brattle Group (30 November, 2016), p.49.

(which would be the case if a 10-year window is employed). That is, it considered that a 5-year window may be better able to predict future beta.

The Brattle Group suggested that there are only minor differences in the betas estimated using weekly and monthly data. However, these differences appear to be material in the case of its water, electricity and gas distribution businesses (with weekly betas being materially higher). Weekly data have been applied in the estimation of beta in Australasian regulatory reviews in recent years. In the context of regulated energy, in 2008 and 2009, the AER's adviser, Professor Olan Henry, recommended the use of weekly data, and repeated this advice when updating his work in 2014.¹⁴⁵ Henry considered that monthly returns should be used as a robustness check, and also advocated the use of as long a period of data as was available. The AER has regard to both monthly and weekly data without considering either superior to the other.¹⁴⁶ However, in Western Australia, the ERAWA has applied weekly return intervals based on Henry's advice to the AER.¹⁴⁷ The New Zealand Commerce Commission has adopted an approach of averaging monthly and weekly beta estimates for the two most recent 5-yearly periods (2006-2011 and 2011-2016).¹⁴⁸

Recent empirical evidence casts some doubt on the proposed superiority of weekly returns (solely on grounds of lower standard errors). In the US, Gilbert *et al.* (2014) have shown that differences between betas estimated on low and high frequencies can be explained by proxies for the opacity of firms.¹⁴⁹ Opaqueness creates uncertainty about the impact of systematic news into share prices, which slows the speed with which that news can affect beta. At higher frequencies (days or weeks) the betas of opaque firms will not fully incorporate news, but at lower frequencies (monthly or quarterly) all systematic information will be impounded into returns for all firms. That is, lower frequency betas are expected to provide more accurate estimates. Gregory *et al.* (2016) have repeated the analysis for the UK and other countries, and added some further explanatory variables.¹⁵⁰ They found that high frequency beta estimates were systematically lower than low frequency betas, with the differences "explained by factors that are known to vary with risk: opacity (as measured by abnormal accruals); size; illiquidity; and BE/ME."¹⁵¹

Re-gearing formula and tax assumption

The Conine formula was applied by The Brattle Group together with a debt beta of 0.12 and estimated statutory tax rates. The Brattle Group applied a statutory tax assumption for all firms in the samples.

¹⁴⁵ Olan T Henry (April, 2014), *Estimating β : An update*, University of Liverpool Management School; and Olan T Henry (23 April, 2009), *Estimating β* , Report for the Australian Regulator; and Olan T Henry (November, 2008), *Econometric advice and beta estimation*.

¹⁴⁶ AER (October, 2013), *Better Regulation: Equity Beta Issues Paper*.

¹⁴⁷ Economic Regulation Authority (December, 2013), *Explanatory Statement for the Rate of Return Guideline*, p. 189.

¹⁴⁸ Commerce Commission New Zealand (16 June, 2016), *Input Methodologies review draft decisions, Topic paper 4: Cost of capital issues*, p.63. This method consists of giving equal weight to four estimates: the most recent 5 year monthly and weekly beta estimates, and the previous 5 year monthly and weekly estimates.

¹⁴⁹ Gilbert, T., Hrdlicka, C., Kalodimos, J. and Siegel, S. (2014), 'Daily Data is Bad for Beta: Opacity and Frequency-Dependent Betas,' *Review of Asset Pricing Studies*, Vol. 4 (1), pp.78-117.

¹⁵⁰ Gregory, A., Hua, S. and Tharyan, R. (March 2016), *In Search of Beta*, Xfi Centre, University of Exeter Business School.

¹⁵¹ Gregory, A., Hua, S. and Tharyan, R. (March 2016), p.21. Note, BE/ME refers to Book Equity / Market Equity.

Incenta's beta estimation methods

In this section we describe the key methods we used to estimate the asset betas of the potential comparator industries.

Bloomberg data

Like The Brattle Group, we downloaded standard raw Bloomberg equity betas for the period January, 2007 to December 2016, and for two sub-periods within (i.e. 1 January 2007 to 31 December 2011, and 1 January 2012 to 31 December 2016). This latter sub-period is four months later than The Brattle Group's main period of analysis, which was for the five years to 31 August, 2016. Our approach was to de-lever the raw equity betas using the average annual net debt gearing (i.e. net debt to net debt plus market capitalisation) over the beta estimation period using the Conine formula and standard QCA assumptions regarding debt beta (0.12), and gamma (0.46 in the case of Australian comparator businesses). The average Bloomberg-calculated effective tax rate over the previous 15-year period was used rather than statutory rates for de-gearing purposes.¹⁵² For North American pipelines we applied statutory tax rates, since these are tax pass-through LP (Limited Partnership) businesses and an unknown tax rate reflecting the tax status of its owners would ultimately be paid.

Return window and estimation period

The equity betas downloaded from Bloomberg were obtained using weekly and monthly return periods as these have been applied by other regulators, and in our view are likely to be the most appropriate return intervals. In the past we have relied on monthly data, and we recognise that there may be estimation issues associated with the use of the weekly return interval, which implies that some caution should be exercised.

With respect to estimation period, our view is that a 10 year period is likely to provide a better estimate of the forward looking asset beta, as there can be material short term fluctuations in beta estimates. However, we also estimated 5 year asset betas for greater comparability with The Brattle Group's results, and in view of the fact that regulatory practice elsewhere has had regard to both 5 and 10 years of data. We also estimated rolling (at annual intervals) 5-year term asset betas to gain a sense of how variable this estimate has been over the past decade.

Beta estimates by industry comparator group

Table 4.2 displays average and median Conine asset beta estimates for the industry comparator groups described above. Overall, we find that except for toll roads, weekly asset beta estimates exceed monthly beta estimates. For gas and liquids pipelines and for regulated energy and water, the differentials are particularly high. Hence, the question of whether weekly or monthly asset betas are relied on is a material one.

¹⁵² On average, the average effective tax rate was similar to the statutory rate, and would not be expected to make a material difference to the asset beta estimates, except in the case of North American pipeline businesses (which are tax pass-through).

Table 4.2: Conine asset beta estimates by industry to 31 December, 2016

Industry	No.	Return period	Average			Median		
			2007 to 2011	2012 to 2016	2007 to 2016	2007 to 2011	2012 to 2016	2007 to 2016
US Class 1 railways	4	Weekly	0.97	0.90	0.98	1.00	1.00	1.00
		Monthly	1.24	0.74	0.99	1.06	0.76	1.02
		Average	1.10	0.82	0.98	1.03	0.88	1.01
Non-US Class 1 railways	6	Weekly	0.85	1.00	0.88	0.78	0.94	0.82
		Monthly	0.74	0.89	0.77	0.68	0.90	0.74
		Average	0.80	0.94	0.83	0.73	0.92	0.78
Liquids pipelines	6	Weekly	0.71	0.81	0.74	0.73	0.79	0.76
		Monthly	0.35	0.80	0.44	0.34	0.80	0.42
		Average	0.53	0.81	0.59	0.53	0.80	0.59
Gas pipelines	6	Weekly	0.58	0.76	0.69	0.56	0.70	0.60
		Monthly	0.39	0.68	0.50	0.30	0.64	0.49
		Average	0.48	0.72	0.59	0.43	0.67	0.54
Gas & liquids pipelines	15	Weekly	0.62	0.77	0.68	0.63	0.74	0.67
		Monthly	0.40	0.70	0.48	0.38	0.73	0.48
		Average	0.51	0.74	0.58	0.51	0.74	0.58
Tollroads	6	Weekly	0.45	0.43	0.46	0.44	0.46	0.47
		Monthly	0.49	0.46	0.48	0.50	0.49	0.52
		Average	0.47	0.44	0.47	0.47	0.47	0.50
Regulated Energy and Water	78	Weekly	0.46	0.41	0.46	0.46	0.41	0.46
		Monthly	0.36	0.30	0.37	0.36	0.28	0.36
		Average	0.41	0.36	0.42	0.41	0.34	0.41

Source: Bloomberg and Incenta analysis Note: There were three businesses that The Brattle Group classified as engaged in both liquids and gas pipelines (therefore a total of 15 firms).

Class 1 railroads

Across the entire sample period (2007 to 2016), our estimated asset betas are:

- in the order of **0.80** to **1.0** for Non-US and US Class 1 railroads (averaging monthly and weekly interval estimates).

For the most recent period (2012 to 2016):

- Weekly interval estimates have been in the range of **0.90** to **1.0**.

This latter range of estimates is reasonably close to The Brattle Group's estimates for these industries using weekly returns data. Based on the first principles analysis in chapter 3, despite physical similarities with Aurizon Network's operations, we consider the Class 1 railroad industry not to be an appropriate comparator for Aurizon Network.

- North American pipelines - the results for the last 10 years to December, 2016, differ materially depending on whether monthly or weekly data are applied, with:
 - 0.68 / 0.67 (average / median) using weekly interval data; and
 - 0.48 (average and median) using monthly interval data.

However, there has been less variation in asset beta estimates based on the return interval for the most recent 5 year period ending 31 December, 2016 with:

- The weekly estimates (preferred by The Brattle Group) being 0.77 / 0.74 (average / median); and
- The monthly data estimates being 0.70 / 0.73 (average / median).

The previous 5 year period (2007–2011) saw materially lower asset beta estimates, with:

- The weekly estimates (preferred by The Brattle Group) being 0.62 / 0.63 (average / median); and
- The monthly data estimates being 0.40 / 0.38 (average / median).

It is likely that the material increase in the asset beta of North American pipelines over the past 10 years (i.e. between the first and second 5 year periods) has been due to the fracking revolution.

The weekly estimates for the last 5 years are higher than the results obtained by The Brattle Group for this industry. We undertook a sensitivity using the same (4 month earlier) period that was used by The Brattle Group, and found that for a number of the North American pipelines the asset beta had increased materially within that short period. We expect this reflects the rapidly changing dynamics in the North American pipelines industry, which over the past 10 years has been accompanied by a trend of increasing asset betas.

Tollroads

We find the asset beta estimate for toll roads over the full 10-year period (2007 to 2016):

- Ranged from 0.46 (average) to 0.47 (median) for weekly interval estimates; and
- Ranged from 0.48 (average) to 0.52 (median) for monthly interval estimates.

For the latest 5-year periods (2007 to 2011) and (2012 to 2016), estimates were slightly lower, with:

- Weekly interval estimates falling from approximately 0.45 to 0.43 (average) and rising from 0.44 to 0.46 (median); and

- Monthly interval estimates falling from 0.49 to 0.46 (average) and 0.50 to 0.49 (median).

Since the asset betas of North American pipelines exceed those of tollroads using weekly observations and appear to be rapidly rising, we continue to consider tollroads as defining an upper bound to the asset beta of Aurizon Network as it is the next higher asset beta estimate after regulated energy and water (see below).

Regulated energy and water

The conclusion that we drew from our first principles analysis in chapter 3 was that regulated energy and water businesses are the best available comparators for Aurizon Network given that both they and Aurizon Network have: strong natural monopolies with captured customers; similar regulatory frameworks; and relatively low systematic cash flow variability. There is considerable divergence in the asset beta estimates for regulated energy and water businesses depending on whether weekly or monthly data are employed, and depending on the period of analysis (i.e. 5 or 10 years):

- 10 year monthly interval data indicates an asset beta of 0.37/0.36 (average / median);
- 10 year weekly interval data indicates an asset beta of 0.46 (average and median); and
- Reliance on both monthly and weekly data indicates a 10 year asset beta of **0.42/0.41** (average / median).

In contrast to North American pipelines, the 5 year asset beta estimates for energy and water have been reducing from 2007-2011 to 2012-2016:

- weekly interval data indicate a fall in asset beta from 0.46 to 0.41 (both average and median); and
- monthly interval data indicate a fall in asset beta from 0.36/0.36 to 0.30/0.28 (average / median).

Our preference is to rely on the 10-year asset beta estimates taking account of both monthly and weekly data. This approach yields a Conine asset beta estimate of **0.42** for regulated energy and water businesses.

Our consistent view has been that 10-year asset beta estimates are likely to be more reliable given that shorter estimation periods are more likely to be influenced by aberrations. The global financial crisis is a case in point. Our preferred 10-year estimation period includes the global financial crisis, while The Brattle Group noted its preference for the latest 5-year period because it excludes the global financial crisis. Our view is that adopting 5-year estimation periods would be likely to introduce unnecessary volatility into the regulatory process. For example, we note the recent (and continuing) spike in the asset beta of North American pipelines, which appears to be linked to the fracking revolution and its influence on the price of oil and gas. Whilst it is clear that over the past five years the asset beta for regulated energy and water using 5-years of monthly data has been falling below our 10-year estimate of 0.42, we would not recommend adopting a lower value unless that was confirmed at a later date using long term data.

In previous assessments of beta for regulatory purposes, we have generally had regard to only monthly return interval beta estimates. However, in recent years reliance on both weekly and monthly data has increased among regulators. Furthermore, recent academic research in financial economics

indicates that there is a tradeoff between the statistical significance that accompanies more frequent (weekly) observations, and the greater accuracy of the estimate, which monthly or quarterly observations are able to provide. In these circumstances, we consider that taking account of both monthly and weekly estimates of beta can strike an appropriate balance. As we have seen, in some industries (e.g. tollroads) the return interval is not important, while in others, including regulated energy and water, it is.

Comparison with The Brattle Group's estimates

The key comparisons are for the North American pipelines, and regulated energy and water businesses, as these are the comparators that respectively The Brattle Group and Incenta have identified as most likely to be reflective of the systematic risks faced by Aurizon Network. Using weekly data for the 5 years to August 2016, The Brattle Group found the average (median) asset beta estimate was 0.55 (0.56) for natural gas, 0.66 (0.67) for liquids pipelines, and 0.61 for all pipelines. These results lay in between The Brattle Group's estimates for rail freight (1.11 for US Class 1) and energy and water (ranging from 0.39 to 0.46).

We found that the Bloomberg weekly 5-year equity beta estimates ending 4 months later (as at 31 December, 2016) increased the equity beta estimate by 0.22 (from 0.79 to 1.01) for the 6 North American liquids pipelines and 0.08 (from 0.78 to 0.86) for the 4 natural gas pipelines in The Brattle Group's sample. As noted in our first principles analysis, midstream oil and gas has been a volatile sector in North America over the past five years. The rise in equity values during 2016 was particularly dramatic, after equally dramatic falls in late 2015, both of which movements followed the price of crude oil.¹⁵³ In our view this level of sensitivity, especially for liquids pipelines, reinforces our preference for longer term (10 year) beta estimates that smooth out short term effects.¹⁵⁴

Despite the timing differential, The Brattle Group's weighted average weekly beta estimates for the 5 years to August 2016 for 42 regulated energy and water businesses were 0.41 (both average and median), which is approximately the same as the estimates we obtained for our 78-firm regulated energy and water business sample for the 5 years to 31 December, 2016 using weekly data. That is, the beta estimates for regulated energy and water businesses appear to be more stable than those for North American pipelines.

Conclusion

In summary, our view is that data over a period of 10 years provides a stable asset beta estimation period that is not as affected by short term variations in beta, and for this reason, we continue to rely on these estimates. Having examined the systematic risk factors that influence beta in our first principles analysis in chapter 3, we concluded that regulated energy and water businesses provide the best available estimate of Aurizon Network's beta. Taking account of the beta estimates for the estimation period (2007 to 2016), we consider Aurizon Network's asset beta has:

¹⁵³ Bloomberg Intelligence (6 December, 2016), *Peer Valuation 3. Rebound in Midstream Overshoots Ebitda Projections, Growth Cycle*.

¹⁵⁴ The Brattle Group also reported asset beta estimates using three years of data which were much higher (0.78 and 0.90 on average for natural gas and liquids pipelines respectively). This is further confirmation that in recent years the asset betas of North American pipelines have been rising at a rapid rate.

- A best estimate – of **0.42**, based on regulated energy and water businesses using 10-year monthly and weekly data; and
- An upper bound estimate – of **0.50**, based on 10-year monthly and weekly data for tollroads.

If emphasis were to be placed on more recent data using 5 years of observations, we would obtain a lower beta estimate. However, we consider that identification of a lower bound would involve considerable imprecision. While our assessment of an upper bound is also subject to imprecision, we have identified an industry (tollroads), that on the basis of first principles analysis we consider to have greater systematic risk than Aurizon Network.

4.5 Benchmark capital structure

4.5.1 Background

The term “benchmark capital structure” refers to the proportions of debt and equity capital that are employed in financing the operations of a comparable firm with similar underlying volatility of cash flows. More specifically, it refers to the ratio of net debt to net debt plus market value of equity. The QCA has previously applied a benchmark capital structure of 55 per cent, and Aurizon Network’s submission also proposes a 55 per cent capital structure:¹⁵⁵

Aurizon Network’s benchmark gearing ratio has consistently been set at 55% since UT1. Aurizon Network is not proposing to modify this assumption for UT5, noting that it is also consistent with its actual and intended capital management practice and the maintenance of its target BBB+ credit rating (noting that Aurizon Network continues to issue debt to investors who have an expectation that a rating of BBB+ will be maintained).

The QCA’s Terms of Reference require us to review the 55 per cent capital structure assumption for the coming regulatory period (UT5).

4.5.2 Our assessment of Aurizon Network’s benchmark capital structure

Aurizon Network’s actual capital structure

When Aurizon Network was privatised in 2011, it did not possess a commercial capital structure. In 2013 it was announced that Aurizon Network would be adopting a long-term capital structure policy, which was to achieve “gearing levels consistent with the regulator’s assumption of 55% debt/RAB”.¹⁵⁶ A sum of \$3 billion of committed debt lines was established, and \$2.2 billion drawn down initially, while the RAB value was approximately \$4.8 billion (i.e. 45 per cent of RAB). More recently, Aurizon has informed the market that Aurizon Network’s gearing level was 62.6 per cent as at 30 June, 2016, which was based on the ratio of Net Debt / Net Debt plus Total Equity.¹⁵⁷ At that time Aurizon’s Debt to Total Assets was approximately 51 per cent.

¹⁵⁵ Aurizon Network (30 November, 2016), p.267.

¹⁵⁶ Aurizon (May, 2013), *Further Information on Aurizon Network*, p.8.

¹⁵⁷ Aurizon (December, 2016), *Aurizon Investor Roadshow: “Aurizon – Australia’s largest rail freight operator”*, p. 7.

Capital structures of potential comparator industries

Table 3.3 below shows the capital structures of potential comparator industries. We find that Class 1 railroads have the lowest gearing levels (20 per cent to 25 per cent), which is expected given their volatile earnings profiles. North American pipelines also have a relatively low gearing level (approximately 35 per cent). We find that the mainly European tollroads have had higher gearing (approximately 50 per cent) compared with regulated energy and water (approximately 40 per cent). In Australia, the benchmark gearing of regulated energy distribution businesses has been considered by the AER on two occasions in recent years, and both times it has determined that a benchmark gearing level of 60 per cent is supported.¹⁵⁸

Table 3.3: Capital structure by industry (Net Debt / Net Debt plus Market Capitalisation), 2007 to 2016

	5 Year Average	5 Year Median	10 Year Average	10 Year Median
Class 1 railroads	20%	20%	22%	24%
Gas and liquids pipelines	36%	39%	35%	34%
Tollroads	48%	46%	50%	52%
Regulated Energy & Water	39%	40%	41%	42%

Source: Bloomberg

We expect Aurizon Network to potentially exhibit greater (non-systematic) cash flow volatility than regulated energy businesses owing to such factors as weather (e.g. floods) and its regulatory revenue cap adjustment (which operates with a two-year lag). Hence, we would expect Aurizon Network's benchmark gearing level to be less than that observed for Australian regulated energy networks.

Conclusion on benchmark capital structure

Aurizon Network's submission proposed a 55 per cent benchmark gearing level, which is consistent with the QCA's position over a number of regulatory periods. Aurizon Network's actual gearing level is currently reasonably close to the benchmark, and the business has stated an aim of approximating the benchmark level of 55 per cent gearing. We consider that this benchmark is likely to be appropriate in the context of empirical evidence for other industries, and note it is slightly lower than the regulatory benchmark for regulated energy businesses in Australia.

4.6 Equity beta

4.6.1 Aurizon Network's submission on equity beta

Aurizon Network submitted that, at a benchmark gearing level of 55 per cent, its estimate of the benchmark equity beta was 1.0, based on advice it had received from The Brattle Group:¹⁵⁹

The analysis by Brattle arrived at an asset beta range of 0.55 to 0.65. Aurizon Network proposes the lower bound of this range for its UT5 proposal and therefore submits an asset

¹⁵⁸ AER (December, 2013), *Better Regulation: Explanatory Statement – Rate of Return Guidelines (Appendices)*, p. 126; AER (1 May, 2009), *Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, p. 124.

¹⁵⁹ Aurizon Network (30 November, 2016), p.274.

beta of 0.55. This is considered conservative. Aurizon Network has taken this approach in order to minimise potential areas of disagreement. Using the QCA's preferred Conine re-levering approach, assuming gearing of 55% and a debt beta of 0.12, an asset beta of 0.55 equates to an equity beta of 1.0.

4.6.2 Our estimate of the benchmark equity beta

As noted above, we agree with Aurizon Network's proposed 55 per cent benchmark gearing level; however, we disagree that the asset beta is as high as 0.55, which is based on the North American gas pipeline industry. As discussed in detail above, we consider that regulated energy and water businesses are better comparator industries, and that a reasonable point estimate of the benchmark asset beta of Aurizon Network is 0.42. Tollroads, which we consider to be an upper bound for Aurizon Network's asset beta, are observed to have an asset beta of 0.50, which is lower than Aurizon Network's proposal (0.55).

Applying benchmark gearing of 55 per cent to an asset beta estimate of 0.42 results in an equity beta estimate of 0.73. This is the same value that we recommended in our previous report on Aurizon Network's systematic risk,¹⁶⁰ but it is lower than the value of 0.80 that the QCA adopted in UT4.

4.7 Conclusions

Our conclusions regarding the key WACC parameters reviewed in this chapter are as follows.

Asset beta

We estimate a benchmark asset beta of 0.42 for Aurizon Network. We derived this estimate by reference to both monthly and weekly beta estimates for regulated energy and water businesses over a 10-year period to December 2016. While monthly data indicate an asset beta of 0.37, weekly data indicate a 0.46 asset beta. Our view balances these approaches. We also consider that the upper bound on Aurizon Network's asset beta is determined by the 0.50 asset beta we estimated for mainly European tollroads.

A large part of this chapter reviewed whether the best comparator group for Aurizon Network is the North American pipeline industry. Our first principles analysis and response to The Brattle Group provided evidence that, despite physical similarities (e.g. a relatively small number of customers compared with the many customers of a regulated energy network), the systematic risk characteristics of Aurizon Network, its natural monopoly status, its captured customer base and resilient demand, its regulatory framework and the non-responsiveness of its cash flows to GNP shocks indicate that regulated energy and water businesses are better comparators than North American pipelines.

Benchmark gearing

We consider that the existing 55 per cent benchmark gearing level remains appropriate for Aurizon Network. We first examined Aurizon Network's actual gearing level, and found that it is currently approximately 50 per cent to 60 per cent depending on the approach taken. We found that while regulated energy and water businesses that are mostly located in North America have gearing levels in

¹⁶⁰ Incenta (9 December, 2013), *Review of Regulatory Capital Structure and Asset / equity Beta for Aurizon Network*, Report to the Queensland Competition Authority, p. 4.

the range of 35 per cent to 45 per cent, Australian regulators (e.g. the AER) have found that a 60 per cent benchmark gearing level is appropriate for regulated energy. We consider that given the likelihood that Aurizon Network's cash flows can be affected by (non-systematic) earnings volatility, a lower benchmark gearing level of 55 per cent is likely to be more appropriate.

Equity beta

Re-levering the benchmark asset beta of 0.42 to the benchmark level of gearing (55 per cent) using the Conine formula with a debt beta assumption of 0.12 results in an equity beta estimate of 0.73. This is lower than the QCA's previous decision (UT4), which applied an equity beta of 0.80, but it is consistent with the level that we recommended for UT4.

5. Benchmark credit rating, term of debt and debt risk premium

In this chapter we estimate the benchmark debt risk premium of Aurizon Network based on its benchmark credit rating. We first consider the benchmark credit rating, and benchmark term of debt at issuance, and then apply these parameters in deriving the benchmark debt risk premium.

5.1 Benchmark credit rating

Aurizon Network's submission

Aurizon Network's submission assumed a benchmark BBB+ credit rating for UT5:¹⁶¹

Aurizon Network has applied gearing of 55%. It continues to target a notional benchmark credit rating of BBB+ and assumes that the QCA will analyse the resulting credit metrics to ensure that the proposed UT5 revenue outcome remains consistent with this.

Aurizon Network's assumption that the business would continue to attract a BBB+ credit rating came after it had enumerated a number of sources of increased risk for the business that it considered would result in "the increased likelihood of cash flow volatility (thereby requiring a higher capital buffer)."¹⁶² In particular, Aurizon Network pointed to the fact that whilst at an earlier time an FFO/Debt cover ratio of 13 per cent was required for it to maintain a BBB+ debt risk premium, since the business had been placed on negative watch by Moody's, the new requirement was a "funds from operations (FFO) cover above 18 % and FFO interest coverage above 4.5."¹⁶³

Aurizon Network's submission quoted liberally from a recent Moody's ratings report, which noted:¹⁶⁴

Whilst the regulatory framework allows Network to recoup revenue if actual volumes fall below forecasts – and to rebalance future tariffs based on reduced volumes – the weakened financial position of its counterparties increases the risk of them not having the capacity to pay such increased costs. This risk is a consequence of the escalating financial pressures facing the mine counterparties from weak commodity fundamentals.

To illustrate its exposure to counterparties, in its Table 71 Aurizon Network showed how the Moody's credit ratings of 8 out of 11 of its major customers had deteriorated by 1 to 9 notches between 2014 and 2016. Aurizon Network considered that the "deterioration in major mining companies' credit ratings has materially increased the risk exposure of owners of supply chain infrastructure dedicated to the industry, including Aurizon Network."¹⁶⁵

Response to Aurizon Network's submission

Moody's

At the time that Aurizon Network submitted its UT5 proposals (in November, 2016), the prices of metallurgical and thermal coal had been increasing markedly for some months. However, Moody's

¹⁶¹ Aurizon Network (30 November, 2016), p. 268.

¹⁶² Aurizon Network (30 November, 2016), p. 267.

¹⁶³ Aurizon Network (30 November, 2016), p. 267.

¹⁶⁴ Moody's Investor Service (2016), *Credit Opinion, Aurizon Network Pty Ltd*, p.4.

¹⁶⁵ Aurizon Network (30 November, 2016), p. 254.

still maintained a negative outlook on its BBB+ rating, which it had applied at the start of 2016 when the metallurgical export coal price was near its minimum point. In the discussion at section 3.2.3 above (dealing with asset beta) we saw that the “equity cushion” of Aurizon Network’s mining company counterparties (i.e. those listed in Table 71 of Aurizon Network’s submission) had risen materially in line with the rising coal prices. In view of the changing circumstances, on 16 February, 2017, Moody’s published a credit opinion that revised its outlook on Aurizon Network BBB+ negative outlook to BBB+ stable. Moody’s began its report with the following comments:¹⁶⁶

Aurizon Network Pty Ltd’s (“Network”) Baa1 rating reflects its essential role in the Queensland coal supply chain, and the predictable nature of its regulated revenues which account for the vast majority of its operating cash flows.

It also noted:

We expect Network’s financial leverage as measured by its ratio of funds from operation (FFO) to debt to be above the rating tolerance level of around 16%, subject to the outcome of the company’s forthcoming (UT5) access undertaking. The rating is predicated on management adopting the necessary countermeasures to strengthen Network’s capital structure in the event of the UT5 outcome being weaker than expected.

One of the “credit challenges” listed by Moody’s was “Metrics close to rating tolerance level under downside regulatory scenarios”. Moody’s modelling of FFO/Debt is displayed in its Exhibit 2, and presumably took into account embedded and forecast costs of debt, and actual as well as forecast revenues and operating costs. The FFO/Debt ratio was shown to decline from a level of 19 per cent in June 2016 to approximately 17 per cent by 2018 under its downside scenario (i.e. just above the 16 per cent tolerance level for a BBB+ credit rating).

Standard & Poor’s

Standard & Poor’s May 2017 credit assessment of Aurizon Network also considered the business to be BBB+ / Stable based on an assessment of its key business and financial risks.¹⁶⁷ Standard & Poor’s employs the following method to determine a credit rating, which involves a number of steps:¹⁶⁸

- First, an “anchor credit rating” is calculated, which is the product of an assessment of the firm’s “business risk profile” and its “financial risk profile”.
 - The “business risk profile” is expressed as a score from 1 to 6, ranging from “excellent” to “vulnerable”. This assessment is based on an assessment of country risk (score of 1 to 6, although this is irrelevant for low levels of country risk) and the risk of the industry in which the firm operates (score of 1 to 6), as well as an assessment of the competitive position of the firm in question. Standard & Poor’s assessed Aurizon Network’s business risk profile to be “strong” (score of 3) due to the following factors:
 - Solid low-risk monopolistic, below-rail operator serving all major Queensland producers

¹⁶⁶ Moody’s Investor Service (16 February, 2017), *Aurizon Network Pty Ltd, Update Following FY17 Half Year Results Announcement and Outlook Revision to Stable*, p.1.

¹⁶⁷ Standard & Poor’s (17 May, 2017), *Aurizon Network Pty Ltd, Ratings Direct*.

¹⁶⁸ Standard & Poor’s (19 November, 2013), *Corporate Methodology, Ratings Direct*.

- Generally supportive regulatory regime, which mitigates volume and counterparty risks
- Exposure to ongoing competitiveness in the Queensland and global coal markets.
- The “financial risk profile” is then determined, which also comprises a score of 1 to 6, ranging from “minimal” to “highly leveraged”. The financial risk profile is established from a consideration of financial indicators, which are discussed below.
 - The assessment of the financial risk profile is dependent in part on the firm’s business risk profile because tougher thresholds for financial ratios are imposed for firms that operate in a more risky industry. Standard and Poor’s has three sets of financial ratios, being the ratios applied for “standard volatility” industries, one for low volatility industries, and a third for industries between these two points. Standard & Poor’s assesses Aurizon Network’s financial risk profile against its “low volatility” set, the same as it applies to energy network businesses (see Table B.1 in Appendix B below). For its assessment of Aurizon Networks’ key metric (FFO/Debt of 17-18 per cent over coming years), Standard & Poor’s assessed Aurizon Network to have “intermediate” financial risk (i.e. where FFO/Debt range is from 13 per cent to 23 per cent).
 - A matrix is applied (shown in Table B.2 in Appendix B below) that shows the anchor credit rating that is derived for a given combination of business risk profile and financial risk profile. Based on Standard & Poor’s assessment of Aurizon Network’s business and financial risk profiles an anchor credit rating of BBB+ is derived.
- Secondly, a range of factors that may affect the rating relative to the “anchor” are considered, which may include diversification, quality of capital structure, financial policy, liquidity, management and governance. These factors may cause the rating to be raised or lowered, or left unchanged. An overall check is then applied (with the opportunity for an overall judgement to be exercised), which may result in a rating being increased or decreased. The product of this assessment is the stand-alone credit rating. In the case of Aurizon Network, Standard & Poor’s did not change its assessment from the anchor credit rating of BBB+.
- Thirdly, where the firm exists as part of a wider group, then the effects of being part of the group are considered. This may cause the rating to be raised (for example, for firms with a government owner), or reduced (for example, if the parent has a lower rating than the issuer’s stand-alone rating). On this factor Standard & Poor’s concluded that “the network business is a core subsidiary of the parent [Aurizon Holdings Ltd, rated BBB+ / Stable], and therefore, its ratings and outlook reflects that on the parent.”¹⁶⁹

Simulation applying Standard & Poor’s method to QCA draft decision outcomes

We have undertaken a high level simulation of the *ex ante* credit metrics ratio outcomes that are implied based on the QCA’s draft decision. We consider that Standard & Poor’s broad approach to calculating these credit metrics is appropriate for this simulation. The outcomes in terms of the core Standard & Poor’s ratios are displayed in Table 5.1 below. The average of the core FFO/Debt ratio over the coming regulatory period is 12.03 per cent, which would indicate a financial risk profile that is “significant” (rating 4). Given a business risk profile that is “strong”, these metrics imply a core

¹⁶⁹ Standard & Poor’s (17 May, 2017), p.3.

credit rating of BBB. However, there are a number of caveats, since a material component of Aurizon Network's RAB is subject to an NPV-neutral revenue deferral for the UT5 regulatory period. The metrics shown in Table 5.1 include that RAB component whilst not attributing any revenue to it during the coming regulatory period, which depresses the outcome. In addition, we understand that there is a small component of unregulated income (with no associated cost) that would be considered by Standard & Poor's, but has not been included in the revenue underpinning the metrics shown in Table 5.1.

Table 5.1: Aurizon Network's core S&P ratios, 2017-18 to 2020-21

	2017-18	2018-19	2019-20	2020-21	Average
FFO/Debt	11.87%	11.79%	12.12%	12.36%	12.03%
FFO/Interest cover	3.88	3.85	3.93	3.99	3.91

Source: QCA and Incenta analysis

Conclusion on benchmark credit rating

While the credit metrics implied in Table 5.1 indicate a credit rating of BBB, we consider it appropriate to apply a benchmark credit rating of BBB+. A BBB+ benchmark credit rating has been proposed by Aurizon Network, and has been supported by QRC. In addition, while the simulated credit metrics shown in the table are marginally below the BBB+ cut-off that has been identified by Standard & Poor's,¹⁷⁰ if the deferred RAB component were to be isolated from the calculation, it is likely that metrics consistent with a BBB+ credit rating would be achieved.

5.2 Efficient term of debt

Aurizon's submission applied a 10 year assumption for the efficient term of debt without discussion of empirical evidence.¹⁷¹ Our opinion is that the benchmark term of debt should remain at 10 years. This is consistent with the QCA's previous practice, and with the practice of other Australian regulators. The QCA's decision on the trailing average approach considered that refinancing risk, which allows utility businesses to carry larger amounts of debt in their capital structure than the average business, can be managed by: issuing longer term debt, staggering the issuance, and diversifying sources. It noted PwC's empirical finding that Australian regulated energy firms issue debt with a 10-year term:¹⁷²

Empirical evidence indicates that Australian listed, regulated energy firms have a weighted average term of debt at issuance of 10.2 years for the three principal types of debt listed above (PwC, 2013:20, Table 2.7).¹⁷³

¹⁷⁰ That is, an FFO/Debt ratio that is below 13 per cent on a sustained basis would result in a ratings downgrade to BBB.

¹⁷¹ Aurizon Network (30 November, 2016), p. 246.

¹⁷² QCA (April, 2015), Final decision, Trailing average cost of debt, p.8.

¹⁷³ That is, for domestic bonds, domestic bank debt and international bonds.

In recent years the decisions / pronouncements made by each of the Australian Energy Regulator (AER),¹⁷⁴ ERAWA,¹⁷⁵ Essential Services Commission of South Australia (ESCOSA) and the Independent Pricing and Regulatory Authority (IPART)¹⁷⁶ have reaffirmed the application of a benchmark 10 year debt term. The AER's most recent review of the evidence indicated that among Australian regulated energy businesses the average term of debt at issuance was 8.7 years, with a range of 6.7 years to 16.3 years, which caused it to adopt a 10 year benchmark term.¹⁷⁷ The PwC (2013) report indicated a 9.9 year weighted average term of debt at issuance.¹⁷⁸ Our view is that the weight of available evidence indicates a benchmark 10-year debt term assumption remains appropriate for relatively highly geared regulated infrastructure businesses such as Aurizon Network.

5.3 The risk free rate

We estimated the risk free rate using linear interpolation of the Commonwealth Government bond data that are published on the Reserve Bank of Australia (RBA) website. Taking the two Commonwealth Government bonds with maturities closest to the required target maturities of 4 and 10 years and adjusting the observed yields to be effective annual rates, we estimated the following risk free rates based on the averaging period ending 30 June, 2017:

- 1.90 per cent at a term of 4 years; and
- 2.44 per cent at a term of 10 years.

5.4 Benchmark debt risk premium – Aurizon Network's submission

5.4.1 Introduction

In this section, we estimate the 10-year BBB+ debt risk premium. We begin with a consideration of submissions made by Aurizon Network and its adviser, Competition Economists Group (CEG),¹⁷⁹ provide our responses, and then provide our estimates of the debt risk premium applying the method outlined under the QCA's preferred approach, taking account of the points made in the CEG report and Aurizon submission.

5.4.2 Aurizon Network's submission

Aurizon Network's submission on the debt risk premium placed heavy reliance on the report prepared by CEG, and adopted the main recommendations of that report, which were that:

¹⁷⁴ ERA (May, 2016), *Final Decision: Actew AGL Distribution Access Arrangement 2016 to 2021, Overview*, p. 34.

¹⁷⁵ ERAWA (10 September, 2015), *Draft Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020 - Appendix 4 Rate of Return*, p.289.

¹⁷⁶ IPART (February, 2014), *Fact Sheet: New Approach to Estimating the Cost of Debt: Use of the RBA's Corporate Credit Spreads*, p.3.

¹⁷⁷ AER (December, 2013), *Better Regulation – Explanatory Statement, Rate of Return Guide*, p.147.

¹⁷⁸ PwC (2013), p. iv.

¹⁷⁹ CEG (November, 2016), *Debt risk premium of coal transporters, A report for Aurizon Network*.

- The PwC method as applied by Incenta is subject to estimation error, including because of asymmetry in the debt risk premium across neighbouring credit bands. Regression based on a single credit rating regression, as Incenta undertook for DBCT, is superior to other approaches;
- If the PwC method is to be applied the sample of bonds should be supplemented with Australian issued foreign denominated bonds, whose yields can be estimated as AUD yield equivalents (and which reflects business practice), and Australian denominated bonds with call / put options;
- Reliable third party fair value yield / debt risk premium estimates from Bloomberg, the Reserve Bank of Australia (RBA), or Reuters could be applied; and
- In keeping with other coal raiiling businesses around the world, the debt risk premium of Aurizon Network is affected by a 'coal premium' due to heightened asset stranding risk.

5.4.3 Aurizon Network's debt risk premium proposal

Following the advice of CEG, Aurizon Network's submission proposed a 10 year BBB+ debt risk premium of 2.47 per cent for an averaging period between 1 June and 30 June, 2016. Aurizon Network's estimate was obtained using a single credit rating regression for its sample of 6 AUD denominated BBB+ bonds complying with the PwC (2013) selection criteria. We note that if the same method is applied to the 20-day averaging period to 30 June 2017 used in this report, an estimate of 2.50 per cent is obtained for 7 AUD denominated BBB+ bonds.

5.5 Benchmark debt risk premium – response to Aurizon Network's submission

5.5.1 Introduction

In this section we consider each of the main points / recommendations raised in the Aurizon Network submission and CEG's report and respond in turn.

5.5.2 PwC method is subject to estimation error and asymmetry - a single credit rating estimation is superior

Aurizon Network / CEG submission

Aurizon Network's submission considered that "the PwC method is very sensitive to the specific econometric technique and sample used," noting that CEG addressed the issue of asymmetric margins between adjacent credit ratings by adopting a single rating regression. This regression, which was carried out on a sample of 6 BBB+ bonds derived a 10-year debt risk premium of 2.47 per cent, which was the value that Aurizon Network adopted as its estimate of the debt risk premium in building up the cost of debt. Aurizon Network considered that:¹⁸⁰

This estimate is close to the result of the PwC pooled regression when the Australia Pacific Airports (Melbourne Airport) bond is excluded. It is also closer to (although materially below) the independent third party estimates produced by Bloomberg, the RBA and Reuters (at least compared to the other two approaches). The single rating regression is also

¹⁸⁰ Aurizon Network (30 November, 2016), pp.276-277.

consistent with the approach recommended by Incenta in its most recent report for the QCA in relation to the DRP to apply to DBCT.

Our response

We agree with CEG that one of the assumptions behind using the “pooled regression” approach is that approximate symmetry exists in the debt risk premium on either side of the target credit rating, and that bias could result if this is not the case. We draw attention to the fact that the pooled regression approach was a second-best approach. It was made clear in our previous report on DBCT that “the pooled regression approach was designed to overcome the problem of there not being enough bond observations in a given credit rating band to allow a reliable estimate to be made.”¹⁸¹

On the other hand, we disagree with CEG’s suggestion that a sample of only six BBB+ AUD bonds would result in an improved estimate. We also disagree with CEG’s submission that adopting such an approach was consistent with the QCA’s approach (and our advice) in the DBCT case. For the current averaging period, and at the time of CEG’s averaging period, only 6 BBB+ AUD denominated bonds are available. Our view is that this is too small a sample size to deliver a reliable and robust empirical estimate of the BBB+ debt risk premium. This is a different situation to that of DBCT where the target credit rating was BBB and there were 25 BBB AUD-denominated bond observations available.¹⁸² If it becomes necessary to move away from applying a pooled estimate, our preference is to retain all bonds in the sample and use statistical methods to allow for differences in yields between credit ratings (i.e., to insert dummy variables and hence not assume symmetry).¹⁸³ This has the advantage of maximising the use of the information that is available, while also reducing the dependence of the estimate on the assumptions inherent in pooled estimates.¹⁸⁴

CEG submitted that Melbourne Airport bonds (MELAIR) have the potential to exert downward bias in the context of a pooled regression. Between the CEG report’s averaging period (June 2016), and our initial review of the cost of debt (January, 2017), an additional long-dated Melbourne Airport bond was issued. At the time we considered that these two long-dated MELAIR bonds had the potential to bias the estimate downwards, and were minded to exclude them.¹⁸⁵ However, in the next few months two additional long-dated A- bonds with yields and terms to maturity that were not far

¹⁸¹ Incenta (June, 2016), *DBCT – debt risk premium to 31 May 2016*, Report to Queensland Competition Authority, p. 4.

¹⁸² In the case of DBCT, the pooled regression would have comprised BBB-, BBB and BBB+ bonds, and a very large difference was observed between the yield on the BBB- and BBB bonds (which was substantially greater than the difference in yield observed between BBB and BBB+ bonds).

¹⁸³ As noted above, the motivation in PwC (2013) for using a pooled regression rather than a system of dummy variables was to provide robust results, because the latter at that time sometimes produced implausible results.

¹⁸⁴ While the use of dummy variables to account for different credit ratings assumes that the slopes of all three credit rating band functions are the same, we think this is a reasonable assumption at this point in time and note that it is likely to have the least distorting effect on the slope estimate for the central credit rating band (in this case BBB+).

¹⁸⁵ In previous reports we have noted a potential downward bias that can be caused by a single bond observation that is the longest in a credit rating band, because this is likely to be an issue by a highly regarded issuer. This potential has also been recognised in the academic literature: see, Jean Helweg and Christopher M. Turner (October, 1999), ‘The Slope of the Credit Yield Curve for Speculative Grade Issuers,’ *Journal of Finance*, p.1872.

from the two long MELAIR bonds were issued. As a result, we consider there is no basis for treating any of them as outliers and we have retained them all within the sample.¹⁸⁶

5.5.3 Foreign bonds and bonds with special features (call / put options) should be included in the sample

Aurizon Network / CEG submission

Consistent with CEG's report, Aurizon Network's submission proposed that the sample used should be expanded when applying the PwC (2013) method in order to reduce estimation error:

Aurizon Network also submits that the sample of bonds should be broadened to include foreign bonds issued by Australian entities, as well as bonds with optionality (applying the adjustments for optionality consistent with the ERA) [which is] consistent with Aurizon Network's actual circumstances, where it needs to issue debt in domestic and global markets in order to efficiently meet its capital needs.

Aurizon Network's submission included evidence that, in addition to financing just under 50 per cent of its own debt offshore, several regulated Australian energy networks obtain between 58 per cent and 90 per cent of their debt offshore. That is, bonds issued in foreign markets should be included because this would reflect actual practice. CEG's report considered that the Economic Regulation Authority Western Australia's (ERAWA) approach could be applied to broaden the bond sample. That is, in addition to the inclusion of bonds issued in foreign currency, the sample should include:

...bonds with options (callable and puttable bonds) where the DRPs on those bonds are adjusted to take account of the impact of the option (using Bloomberg's OAS (option adjusted spread) calculations).

Aurizon Network's submission also proposed the inclusion of Australian denominated bonds with options attached.

Our response

Incenta was engaged by the QCA to apply the PwC (2013) estimation approach in accordance with the QCA's preferred approach to cost of debt estimation. Our view is that there is merit in considering the results obtained with an expanded sample that includes bonds with options and foreign denominated bonds, which could provide another cross-check of the results obtained using the PwC (2013) approach in addition to the cross-check that is provided by referring to estimates published by Bloomberg and the RBA.

¹⁸⁶ We note that a sensitivity excluding two long-dated MELAIR bonds increases the dummy variables BBB+ estimate by 10 basis points to 2.10 per cent using OLS (although NSS and NS estimates are still well below 2 per cent). Removing the two long-dated MELAIR bonds from the expanded sample (including bonds with options and foreign denominated bonds) has no perceptible influence on the BBB+ estimate using OLS, which remains at approximately 2 per cent.

Bonds with options

The PwC (2013) report recommended not including bonds with special features such as call / put options, since at that time there were available sufficient AUD-denominated bonds without such features.¹⁸⁷

Call options were excluded since the observed yield needs to be adjusted to remove the effect of the option, which adds complexity and the potential for analyst-induced error. Floating rate notes were included, as they can be readily converted to fixed rate equivalents, and provide a larger sample of valid observations.

We note that the Bloomberg OAS feature can now be applied quite readily due to improvements in Bloomberg's offerings. The tasks of deriving option adjusted yields and AUD equivalent yields for foreign denominated bonds are relatively low-cost and straightforward compared with the period of PwC's (2013) report. More importantly, we find that in most cases the actual adjustment to the yield of bonds with such features is relatively minor.¹⁸⁸ We are therefore less concerned than PwC (2013) about the potential for analyst-induced error. Our view is that, whilst there is currently a sufficient number of Australian denominated bonds without embedded options to undertake a rigorous empirical estimate of the BBB+ credit rating band (and, with preference, using the dummy variable approach), a useful cross-check could be provided by expanding the sample to include AUD-denominated bonds with options attached.¹⁸⁹

Foreign denominated bonds

The PwC (2013) report considered at length the question of whether a 'simple portfolio' or 'complex portfolio'¹⁹⁰ approach should be applied, and decided at the time that the former was preferable. The latter approach required weighting of the bank debt, domestic bonds, and foreign denominated bonds components by benchmark proportions. At the time, however, it was considered that the benchmark cost of bank debt could only be estimated with error. With respect to international bonds, while the PwC (2013) report considered including them in the sample of observations, it concluded:¹⁹¹

...we find that the DRP on international corporate bonds (for the same term and credit rating) are reasonably similar to domestic corporate bonds when swapped into Australian fixed rate equivalent terms. An implication of this is that if the number of corporate bonds on issue is considered inadequate to draw meaningful results, the domestic and international bond observations could be pooled to increase the sample size. Against this, however, the consideration of international bonds involves additional complexity, which is why the majority of Australian regulators to date have relied solely on domestic corporate bonds, and why we recommend that the authority continue with this practice.

Hence, the PwC (2013) report was open to the potential inclusion of bonds issued internationally by Australian businesses if there is a relative shortage of domestic bonds. Empirically, the PwC (2013)

¹⁸⁷ PwC (2013), p.34.

¹⁸⁸ Using the Bloomberg option adjustment (OAS) method, we found the difference between nominal vs option adjusted yields to be in the order of 14 basis points.

¹⁸⁹ That is, by employing the bonds in the adjacent credit rating categories.

¹⁹⁰ PwC (2013), p. iv, identified three sources of debt that comprise the 'complex portfolio', which were: bank debt, domestic bonds, and bonds issued by Australian businesses in foreign markets.

¹⁹¹ PwC (2013), pp.55-56.

report found that there was little difference in the debt risk premium estimate whether or not foreign denominated bonds were included in the sample. This is what would be expected based on the theory of arbitrage in open capital markets. Our own findings reported below show that at 10 years the BBB+ debt risk premium estimate based on Australian issued AUD denominated bond data is relatively close to that obtained by including foreign denominated bonds.

However, we note that PwC's (2013) observation that "the majority of Australian regulators to date have relied solely on domestic corporate bonds" is no longer the case. Currently several Australian regulators either have regard to the RBA's third party fair value yields (which are based in part on foreign issued bonds), or directly employ yield data that incorporate Australian bonds issued in foreign currencies (USD, GBP and EUR).

Accordingly, like with bonds with embedded options, we also consider that a useful cross-check could be provided by expanding the sample to include foreign-currency-denominated bonds issued by Australian firms.

5.5.4 Reliable third party estimates of the fair value BBB+ credit rating yield are available

Aurizon Network / CEG submission

Aurizon Network submitted that:¹⁹²

To avoid the situation where the results are sensitive to the model form and sample used, consideration should be given to reverting to the use of independent third party data sources (for example Bloomberg, the RBA and / or Reuters), noting that with the exception of the QCA and ERA, all other Australian regulators currently rely on these estimates (favouring Bloomberg and / or the RBA).

However, Aurizon Network acknowledged that "these third party estimates are also variable across time."¹⁹³

Our response

As noted above, third party methods have been volatile in the past, with unexplained spikes in their reported debt risk premiums at times. CEG's discussion of the influence that the Jemena (LW474837 Corp) bond had on the Bloomberg BBB curve, when it was subject to split ratings (i.e. rated BBB+ by Standard & Poor's and A3 by Moody's).¹⁹⁴ For some years CEG has been critical of the debt risk premium estimates of third party providers.¹⁹⁵

We do not agree with CEG's submission that the PwC / Incenta estimates have "typically resulted in lower estimates than the third party providers as is illustrated in the below time series, shown up to 31

¹⁹² Aurizon Network (30 November, 2016), p. 277.

¹⁹³ Aurizon Network (30 November, 2016), p. 277.

¹⁹⁴ CEG (November, 2016), pp. 28-30. We note that during the averaging period to 30 June, 2017, the Jemena bond was part of Bloomberg's A- sample set, so the issue raised by CEG has been corrected.

¹⁹⁵ See CEG (September, 2009) *Estimating the cost of 10 year BBB+ debt during the period 17 November to 5 December 2008*; and CEG (September 2016), *Criteria for assessing fair value curves: an update*.

July 2016.”¹⁹⁶ The time series in CEG’s Figure 1-1 shows that Incenta’s two BBB estimates for DBCT were often close to those of third party provider estimates. For example, the May 2016 estimate for DBCT (BBB) recommended a debt risk premium of 2.65 per cent, which was 11-12 basis points lower than the RBA / Bloomberg BBB benchmark.¹⁹⁷ While the three PwC / Incenta BBB+ estimates lie below the third party BBB estimates, this is to be expected given that the BBB debt risk premium as reflected in the Bloomberg and RBA BBB curves should be higher than the BBB+ debt risk premium at the same term to maturity given the different credit ratings. We find that for the current averaging period to 30 June, 2017, the average RBA / Bloomberg BBB debt risk premium is 24.5 basis points above the interpolated RBA / Bloomberg BBB+ debt risk premium.¹⁹⁸ For the current averaging period we also find that our recommended BBB+ debt risk premium of 2.00 per cent lies between those of the third party providers, Bloomberg and the RBA.

In short, not only are the third party estimates sometimes volatile, but in the current matter, Aurizon Network and CEG are also targeting the wrong credit rating by suggesting that the third party estimates for the broad BBB band be adopted. In 2013 the QCA tasked PwC to develop a methodology that could be applied to estimate the cost of debt for a range of potential credit rating bands, including BBB and BBB+. For Australia, none of the third party providers do this.

5.5.5 The debt risk premiums of coal railing businesses are affected by a material ‘coal premium’

Aurizon Network / CEG submission

CEG devoted substantial effort analysing whether there is a ‘coal premium’, and concluded that the “DRPs on Aurizon’s bonds are materially higher than the DRPs on other BBB+ bonds”, and that this “likely reflects a ‘coal’ premium being priced in by debt investors who are concerned about Aurizon’s ability to recover its fixed and sunk investments (primarily below rail assets) serving the expanded coal sector.” Furthermore, according to CEG’s analysis “Aurizon’s experience in this regard is shared by other downstream coal transport companies in Australia and internationally.”¹⁹⁹

The evidence that CEG provided to support its case relating to a ‘coal premium’ included these observations:

- The three AUD and EURO denominated BBB+ rated Aurizon Network bonds saw an increase in their yields in late 2015 / early 2016 relative to an earlier period;
- While the debt risk premium of the (AUD denominated) Aurizon Network bond has at times traded below the interpolated BVAL BBB debt risk premium, early in 2016 a premium developed; and
- The average debt risk premium of four “BBB+ coal railway operators with bonds issued in USD” (CSX Corp, Canadian Pacific Railway, Norfolk Southern Corp, and Aurizon) increased by

¹⁹⁶ CEG (November, 2016), p.1.

¹⁹⁷ Incenta, (June, 2016), *DBCT – debt risk premium to 31 May 2016*, p. 1.

¹⁹⁸ That is, where the BBB+ debt risk premium is interpolated based on the respective RBA / Bloomberg BBB and A credit rating bands.

¹⁹⁹ CEG (November, 2016), p. 38

between 36 basis points and 48 basis points between January 2015 and January 2016, while South Africa's Transnet Soc Ltd's debt risk premium increased by 219 basis points in the same period.

CEG concluded that:²⁰⁰

Aurizon's increase in DRP (relative to US Treasuries) [of 47 percent] is in line with the increase in DRP for comparable businesses with long term USD debt. In light of this evidence we consider that it is reasonable to conclude that the increase in Aurizon's observed DRP is consistent with a generalised debt market view that infrastructure providers serving the coal network attract a material risk premium compared to other similarly rated businesses.

Finally, CEG's report notes that the rise in relative debt risk premiums observed for Aurizon's and Aurizon Network's bonds is due to "substantial asset stranding risk if demand for coal declines", and this is recognised in Moody's credit rating reports for Adani Abbot Point (AAPT), Newcastle Coal Infrastructure Group (NCIG), and Dalrymple Bay Coal Terminal (DBCT).²⁰¹ These Moody's reports, dated between December 2015 and March 2016, refer to the potential for a situation where a defaulting user's lost revenue cannot be socialised by other miner counterparties who are themselves under financial pressure due to the then conditions in the export coal market.

Our response

We note that, in contrast to the CEG report, Aurizon Network's submission did not emphasise the 'coal premium' issue, and did not incorporate an estimate of its value when proposing a debt risk premium of 2.47 per cent for the averaging period to 30 June, 2016.²⁰² Nevertheless, this issue illustrates recent developments in the seaborne coal export industry, and how they have impacted risk perceptions. Hence, we provide a full response.

Three Aurizon Network debt risk premiums

CEG's Figure 5-1 showed the yields of three Aurizon Network bonds between October 2013 and June 2016.²⁰³ The message presented by CEG was that, between January 2015 and January 2016, the yield on two of the bonds had increased. This chart is not very informative, as there is no benchmark against which to assess the movement of Aurizon Network's yields. In our Figure 5.1 below, we show that the yields on all three Aurizon Network bonds have fallen since January 2016. However, this is not instructive either, as there is no benchmark against which the falls are measured. We rectify this in the next section.

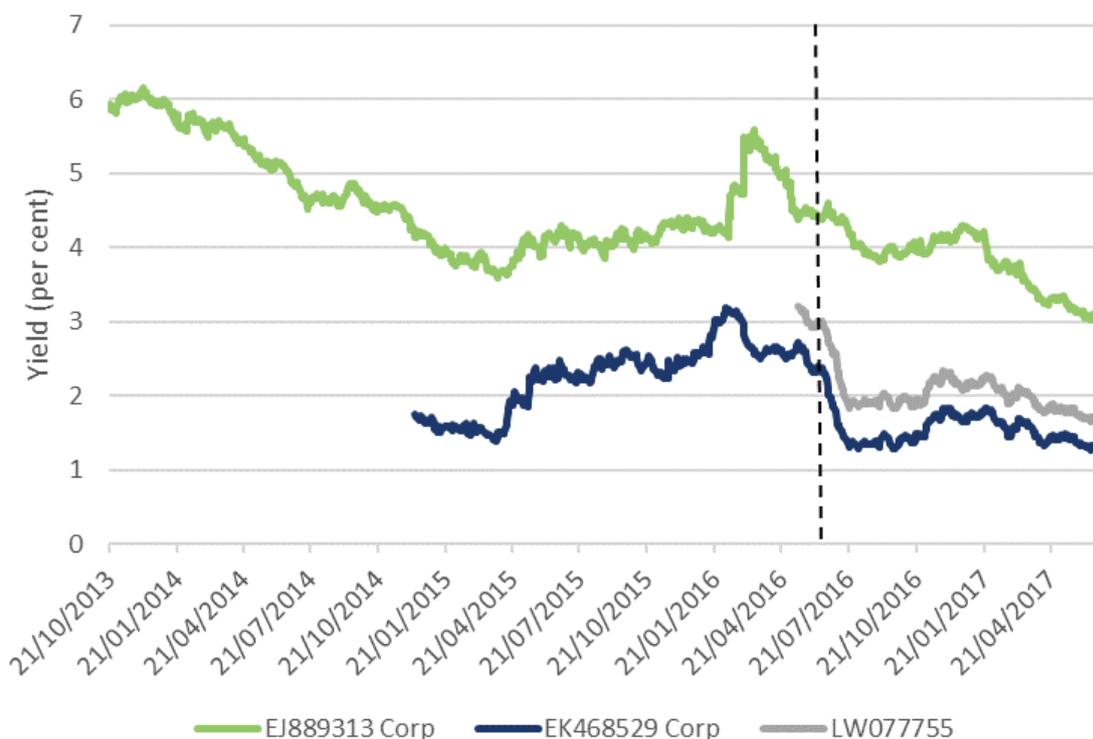
²⁰⁰ CEG (November, 2016), pp.44-45.

²⁰¹ CEG (November, 2016), pp.46-48.

²⁰² With transaction costs included Aurizon Network's proposed debt risk premium is 2.61 per cent.

²⁰³ CEG (November, 2016), pp.40. The identifiers of the bonds are EJ889313 Corp, EK468529 Corp and LW077755 Corp.

Figure 5.1: Yields of AUD and EURO denominated bonds issued by Aurizon Network (extension of CEG's Figure 5-1)



Source: Bloomberg Note: Dotted line shows extent of CEG data

Debt risk premiums of Aurizon Network's bonds

In its Figure 5-2 CEG also undertook an analysis examining the debt risk premium of Aurizon Network's only AUD denominated bond against the debt risk premium of the interpolated Bloomberg broad BBB benchmark. That figure showed that while "the DRP of the Aurizon bond is broadly similar in level compared to the BVAL broad-BBB benchmark":²⁰⁴

...there are periods in which the former Aurizon's debt is perceived to be of higher risk, as evidenced by the elevated DRP of the Aurizon bond after the spike on 9 February 2016, which is consistent with the experiences of other coal carriers in the same timeframe...

Whilst we agree that the debt risk premium of the AUD denominated Aurizon bond spiked in February 2016, we do not agree with the conclusions drawn by CEG. The spike in the Aurizon Network bond's debt risk premium relative to the BBB+ benchmark occurred in the weeks following the release of Moody's 1 February 2016 review of Aurizon Network for possible downgrade. The Moody's press release pointed to market weakness and resulting deteriorating counterparty credit profiles:²⁰⁵

²⁰⁴ CEG (November, 2016), pp.42.

²⁰⁵ Moody's Investors Service (1 February, 2016), *Rating Action: Moody's reviews Aurizon Holdings and Aurizon Network for possible downgrade.*

Given sustained market weakness, Holdings and Network's ratings may transition over time in the absence of a material improvement in operating conditions, including a sustained improvement in coal and iron ore prices above Moody's base prices.

In January 2016, the seaborne metallurgical coal contract price had fallen to its lowest point of USD 81 per metric ton based on falling China demand due to a GDP slowdown.²⁰⁶ Moody's confirmed its negative outlook on Aurizon Network on 11 April 2016.²⁰⁷ In subsequent months, the market outlook changed substantially. The contract price for metallurgical coal increased to USD 84 at the end of April 2016, then to USD 200 in October, and to USD 285 by January 2017. It has remained at that price throughout the first half of calendar 2017.

We do not consider the broad BBB benchmark that CEG applied in its Figure 5-2 to be appropriate, since the benchmark credit rating of Aurizon Network is BBB+. We constructed an interpolated Bloomberg BBB+ benchmark from Bloomberg's published yields for the broad BBB and A credit rating bands, and compared the daily interpolated debt risk premium of the synthetic BBB+ benchmark against Aurizon Network's debt risk premium for the period from 15 September 2014 to 30 June 2017.

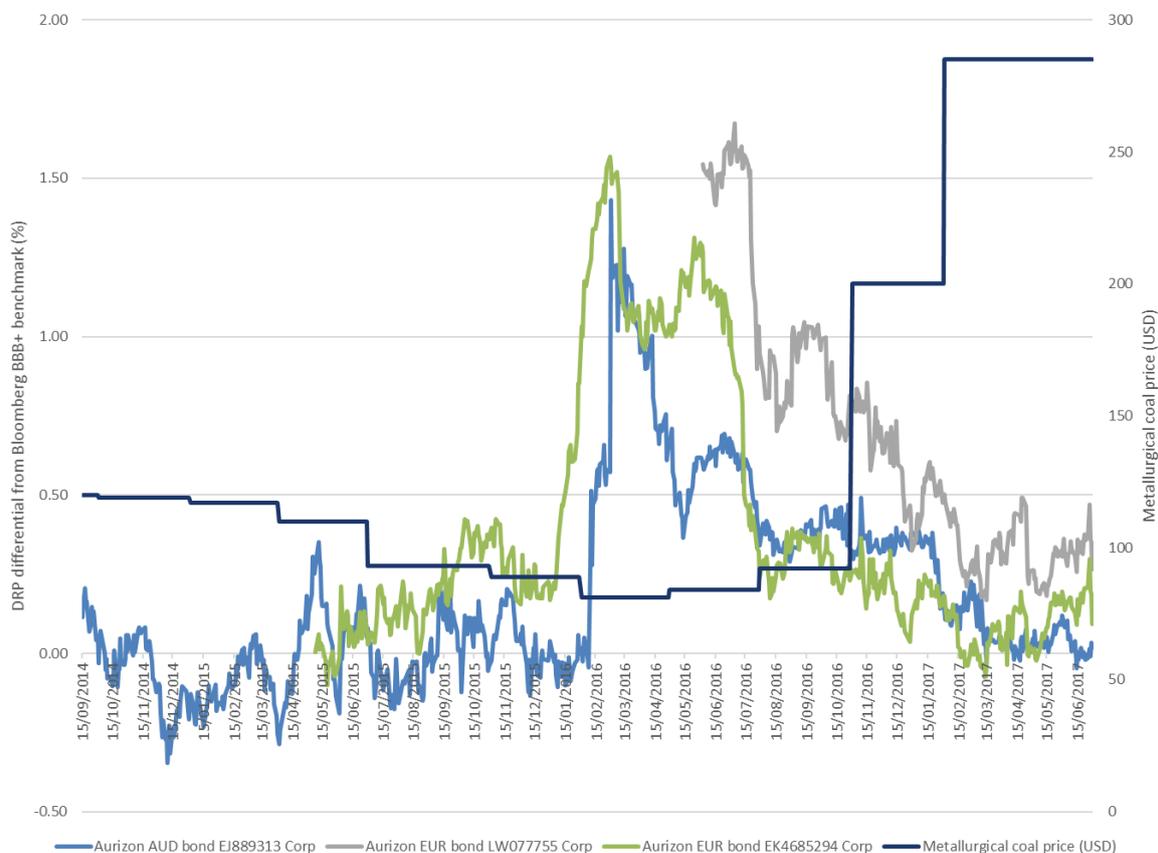
At different times Aurizon Network's debt risk premium has been 40 basis points to 50 basis points below (July 2014 to March 2015), approximately equal to (April 2015 to February 2016), or 100 basis points or more above the BBB+ benchmark (February 2016 to January 2017). More recently (during February to March 2017), the AUD denominated Aurizon Network bond once again began to trade at a discount to the BBB+ benchmark (which we note is considerably lower than the BBB benchmark applied by CEG).²⁰⁸ It is apparent from Figure 5.2 that the differential is linked to the price of metallurgical coal (right hand side axis). While the coal price remained above USD 100 the Aurizon bond oscillated near the BBB+ benchmark. We expect that the recent closing of the gap has been due to positive export coal market news, particularly the fact that coal prices have rebounded strongly.

²⁰⁶ See, Bloomberg HARDCOAL Index.

²⁰⁷ Moody's Investors Service (11 April, 2016), *Rating Action: Moody's confirms Aurizon Network Baa1 rating: outlook negative.*

²⁰⁸ Hence the trading yield discount would be even greater against the BBB benchmark that was proposed by Aurizon Network and CEG, although we note that the actual debt risk premium they have proposed is based on a single credit rating band regression using six BBB+ bonds.

Figure 5.2: Aurizon Network's bonds – Debt risk premiums vs Interpolated Bloomberg benchmark BBB+ debt risk premium, 15 September 2014 to 30 June 2017



Source: Bloomberg and Incenta analysis

In contrast to its AUD denominated bond, Aurizon Network's two EURO denominated bonds (EK4685294 Corp) was trading at a premium to the BBB+ benchmark in 2015/2016 prior to the decline in the metallurgical coal price. This suggests that there may have been other reasons for the premium observed for the EURO bond issue. However, the premium of the EURO denominated bonds (i.e. including LW077755 Corp) spiked at approximately the time when the coal price reached its minimum point, and then recovered at approximately the same time. For a while the EK4685294 Corp EURO bond differential relative to the benchmark dipped below the AUD denominated bond. For a period early in 2017 the longer dated EURO denominated bond (EK4685294 Corp maturing 01/06/2026) traded at a discount to the BBB+ benchmark. In light of the relevant evidence, we do not consider it appropriate to apply a 'coal premium' to Aurizon Network relative to the estimated benchmark debt risk premium.

In summary, we find no evidence of a permanent 'coal premium' in the market's pricing of Aurizon Network's bonds.

Assessment of evidence for an international 'coal premium'

We have also considered CEG's submission that Aurizon's bond is subject to the same 'coal premium' as its 'list of coal-transporting railroad companies' operating in North America, South

Africa and Australia. We conclude that there is no evidence that the US Class 1 railways have ever been subject to a “coal premium” that is linked to the coal export market, and that while a temporary coal premium is likely to have impacted TransNet Soc Ltd, it no longer does.

With the exception of Aurizon Network, not one of the businesses referred to as ‘coal-transporting railroad companies’ in CEG’s sample derives a majority of its revenue from the transportation of coal. The three North American BBB+ rated Class 1 railway businesses that have the highest ‘coal transporting intensity’ have coal revenues amounting to 10 per cent (Canadian Pacific Railway Ltd) to 17 per cent and 19 per cent (Norfolk Southern Corp (NSU) and CSX Corp (CSX) respectively) of their total revenues. These are general freight businesses that include some highly volatile (economy-cyclical) traffic such as motor vehicles.

With respect to their coal traffic, we note that export coal (particularly metallurgical coal), which is most comparable to Aurizon’s situation, is a negligible component of NSU and CSX revenues. Table 5.2 shows that only 13 per cent to 25 per cent of the coal on most coal-intensive North American Class 1 railways is export oriented, which means that only between 2.3 per cent and 4.8 percent of the total railings of these businesses are reliant on export coal that may be subject to the same supply curve as coal that is exported from the CQCN. Instead it is apparent from the table that, the majority of the coal transported by these US Class 1 railroads is thermal coal for use in domestic power stations. This component of North American railway traffic has been falling in recent years owing to the substitution of gas and renewable energy sources.²⁰⁹ By contrast, Aurizon Network’s tonnages have not been subject to temporal decline.²¹⁰

Table 5.2: Export coal intensity of CSX Corp and Norfolk Southern

mm tons	CSX	Norfolk Southern (NSC)
Coal as % of Total Railings	19.0%	17.0%
Export Metallurgical Coal (mm tons)	18.9	12.1
Export Thermal Coal (mm tons)	11.9	4
Utility (mm tons)	66.2	81.1
Domestic other (mm tons)	24.3	22.7
Total (mm tons)	121.3	119.9
Export coal (%)	25.4%	13.4%
Export coal as % of Total Railings	4.8%	2.3%

Source: JP Morgan (2016), Annual reports

The data shown in CEG’s report concluded in January 2016 (for US Class 1 debt risk premium comparisons), and June 2016 (for the yields of Aurizon Network’s US bonds), while the report is dated November 2016. More up-to-date information is required. Furthermore, the change in debt risk premium itself is not evidence that a ‘coal premium’ exists (even if the proposed comparator businesses were actually reflective of Aurizon’s business operations). We consider it is more instructive to compare the movements in the debt risk premiums of the comparator businesses against those of an appropriate underlying benchmark. For US Class 1 railways, the relevant benchmark in our view is the US BBB+ (Industrials) fair value debt risk premium. The three case studies drawn

²⁰⁹ An exception has been Burlington Northern Santa Fe railway, which has expanded coal railings, and was acquired by Berkshire Hathaway Inc. in February, 2016.

²¹⁰ Given the relatively favourable position of the underlying coal-mining assets on the international cost curve, the outlook for Queensland’s thermal coal is not exhibiting long-term temporal decline.

from CEG's sample are discussed in more detail in Appendix C. They show that the relative debt risk premiums of North American Class 1 railways have recently risen against the relevant BBB+ benchmark, which does not appear to be coal related, since coal railings have increased as has the international coal price. If the North American railways have consistently higher debt risk premiums, it is more likely to reflect the fact that they have high operating leverage, and transport goods with higher cyclical demand. Aurizon Network's operating leverage is lower than that of US Class 1 railways, and its revenues are regulated, and its coal traffic has been observed to be largely invariant to economic cycles. The relative performance of US Class 1 railway company bonds is therefore not likely to provide any evidence that is directly relevant to Aurizon Network.

Moody's reports

CEG's report referred to a credit ratings report by Moody's, which proposed that:²¹¹

Aurizon faces substantial asset stranding risk if demand for coal declines, since demand for Aurizon's freight services will also be expected to decline as coal miners reduce their coal outputs.

CEG considered that its views on the asset stranding risk of Aurizon Network were supported by other Moody's reports on assets in the same or similar coal supply chains:

- Adani Abbot Point Terminal (AAPT) – Moody's Investors Service (March, 2016), *Rating Action: Moody's downgrades Adani Abbot Point Terminal's rating to Ba2; outlook negative.*
- Newcastle Coal Infrastructure Group (NCIG) - Moody's Investors Service (December, 2015), *Rating Action: Moody's places NCIG's ratings on review for downgrade.*
- Dalrymple Bay Coal Terminal (DBCT) - Moody's Investors Service (December, 2015), *Rating Action: Moody's downgrades DBCT's rating to Ba2: outlook negative.*

In Figure 5.2 above, we saw that as the coal price began to rise again during mid-2016, the Aurizon bond's debt risk premium differential over the BBB+ benchmark began to fall; however it only came back to within a few basis points of the BBB+ benchmark in January 2017, after relatively high metallurgical coal contract prices had been observed for several months. The current behaviour of the Aurizon bond (i.e. trading at a discount to the BBB+ benchmark) may suggest that the market has taken a view that, at the coal prices expected to be maintained over the longer term, the stranding risk of any of Aurizon Network's assets is low. Moody's has recently revised its credit rating position on Aurizon Network from 'negative' to 'stable'.²¹² We expect that the 2017 credit rating risk reviews of the other coal terminal businesses in the Queensland and New South Wales coal chains to also reflect the more positive picture that is emerging through these market prices.

Summary

In summary, we consider that the idea of a permanent 'coal premium' has not been demonstrated in the empirical data that CEG provided in its report. As shown by our first principles analysis, and

²¹¹ CEG (November, 2016), p. 46.

²¹² Moody's Investor Service (15 February, 2017), *Rating Action: Moody's revises Aurizon Holdings and Aurizon Network's ratings outlooks to stable from negative; affirms Baa1 ratings.*

empirical ROA analysis for the assessment of Aurizon Network's asset beta, Class 1 railways are not appropriate comparators for Aurizon Network.

The Moody's rating reports that CEG has focussed on to support a 'coal premium' do not provide evidence that such a premium exists permanently. Moody's downgrading report coincided with a further fall in the coal price, which in turn coincided with the observed spike in the yield (and debt risk premium) of the Aurizon Network bond in February 2016. However, we have seen that the materially higher debt risk premium disappeared in January 2017, after a six-month period that saw coal prices rise to materially higher levels relative to those observed a year earlier. In February, 2017, Moody's amended its outlook on Aurizon Network from 'negative' to 'stable'.

5.6 Our estimate of the benchmark debt risk premium

5.6.1 The bond sample

Australian issued AUD-denominated bond sample - PwC (2013)

The core bond sample that we selected was based on the PwC (2013) selection criteria, with some qualifications. The characteristics that we used to filter the sample were as follows:²¹³

- issuance denominated in AUD by an entity with Australian country risk,
- investment grade credit rating by at least one of Standard and Poor's, Moody's or Fitch,
- the issuing entity is not a financial entity,
- the corporate bond is senior (i.e. not subordinated),
- standard corporate bonds without special features such as call / put options attached,
- a term to maturity greater than one year, and
- yields reported by Bloomberg.²¹⁴

The specific details of the search process that we followed in Bloomberg to derive the sample is provided in Appendix D below. Further specific aspects of the process are discussed below.

The bond sample that we compiled based on the criteria set out above is shown in Appendix D. The modified PwC (2013) selection process, which we have fully described there, results in a sample of 55 bonds that were rated A- to BBB.

²¹³ PwC (2013), p. 34. Note that the original PwC (2013) criteria required a credit rating from Standard & Poor's, which has been relaxed to include bonds rated by any one of Standard & Poor's, Moody's or Fitch.

²¹⁴ The original PwC (2013) selection criteria required bonds to be sourced from either Bloomberg or UBS; however, during 2016 UBS changed its bond Term Sheet distribution criteria, which made this source inaccessible to any but UBS clients. Hence, we have dropped this requirement.

Credit rating agencies

In order to increase the size of the sample, and in keeping with our previous practice, we expanded the PwC (2013) criteria for credit rating agency, by including bonds that have been rated by one or more of Standard and Poor's, Moody's or Fitch (and that satisfy the other criteria). The bonds were allocated to a credit rating band by the following process:

- adopt the single credit rating if only one was available,
- adopt the predominant credit rating if there were three credit ratings,
- adopt the lower credit rating if there were two divergent ratings one notch apart, and
- averaging the credit ratings if the divergence in the credit ratings was more than one notch.

Finance industry bonds

CEG's report included a number of scenarios that included the bonds of businesses classified as 'Financials' by Bloomberg. Under Bloomberg's BIS (Bloomberg Industry Segment) classification system, 'Financials' includes the following: Banks, Commercial Finance, Consumer Finance, Diversified Banks, Financial Services, Funds & Trusts, Life Insurance, Property & Casualty Insurance, and Real Estate. CEG did not offer a reason for including financial bonds, apart from noting that Bloomberg and Reuters include them.²¹⁵ PwC (2013) "excluded the bonds of financial institutions on the basis of advice from debt market professionals who told [PwC] that the market interprets these bonds as trading differently to what their credit rating would suggest for corporate bonds." In their seminal study of the determinants of bond yields, Elton et al (2001) noted that the term structure of financial bonds differed from that of industrials, and they chose to report the results for these two groups separately. They noted that this was "not surprising because industrial and financial bonds differ both in their sensitivity to systematic influences and to idiosyncratic shocks that occurred over the time period."²¹⁶

While the ERAWA excludes real estate businesses from its sample on grounds that these are part of the BIS 'Financials' group, we have retained these businesses in the sample as they typically receive rental streams or take on development risk, and therefore differ from "financial institutions" such as banks, credit cooperatives and insurance companies. CEG noted that in previous samples it has employed, Incenta included "finance industry" bonds which Incenta had "purported to exclude."²¹⁷ However, while Incenta had included "real estate", which the Bloomberg industry classification incorporates within its 'Financials' group, we excluded *financial institutions* such as "banks, credit cooperatives and insurance companies." This was in keeping with the PwC (2013) report's characterisation of "finance industry" as meaning "financial institutions", and not property trusts.²¹⁸

²¹⁵ CEG (November, 2016), p.25.

²¹⁶ Edwin J Elton, Martin J. Gruber, Deepak Agarwal and Christopher Mann (February, 2001), "Explaining the Rate Spread on Corporate Bonds", *The Journal of Finance*, Vol. LVI, No.1, p.252.

²¹⁷ CEG (November, 2016), p.25.

²¹⁸ See PwC (2013), p. 9 footnote 11, which notes that it had discussions with "Mr. Michael Bush, Head of Fixed Interest Securities at National Australia Bank, confirmed that the industry practice is to remove the bonds of financial institutions when estimating FVCs for corporate bonds."

Coca-Cola Amatil bonds

CEG's report (p. 37) references the undesirability of including a number of Coca-Cola Amatil bonds that are issued in the European market, but denominated in AUD. It was noted that these bonds are excluded from the third party curves published by Bloomberg and the RBA. These bonds were not issued in the Australian bond market and therefore fell outside of the PwC (2013) selection criteria. CEG considered that if Incenta were to derive a broader sample of bonds, these bonds would need to be excluded. It also relied on an ACCC report, which had obtained the following response from Bloomberg regarding its exclusion of Coca-Cola Amatil bonds:²¹⁹

The reason that some coca cola bonds appeared in the AUD BBB curve in April but not anymore is because of internal changes we made. We assessed the AUD BBB curve and, whilst these coca cola bonds are indeed BBB rated, they were much richer than other BBB rated AUD bonds (see attached file). As such, we decided that the A rated curve (BVSC0160 Index) is more appropriate for these bonds and better represents their yields, which is where you will be able to find them now.

We concur with the ACCC, CEG, Bloomberg and the RBA regarding the exclusion of the Coca-Cola Amatil bonds from the BBB credit rating band. Having examined the yields of these bonds we believe they are so low for their credit rating as to not be comparable to other bonds in the rating band. In our view, their inclusion would have an artificially depressing effect on the estimates.

Bond sample applying modified PwC (2013) approach

Some key characteristics of the resulting sample obtained by applying the PwC (2013) approach are shown in Table 5.3 below. The sample for the 20 business days to 30 June, 2017, is comprised of 55 bonds, which includes 32 A- bonds, 7 BBB+ bonds and 16 BBB bonds. Out of the 55 bonds 47 were fixed rate, and 8 were floating rate bonds. The average remaining term to maturity of the bond sample was 3.9 years, with the longest average term being observed for the A- credit rating band.

Table 5.3: Key characteristics of the bond sample

Credit rating band	Term to maturity (years)	Fixed rate bonds	Floating rate bonds	Total bonds
A-	4.30	27	5	32
BBB+	3.53	7	0	7
BBB	3.28	13	3	16
Total	3.91	47	8	55

Source: Bloomberg and Incenta analysis

5.6.2 Application of the PwC (2013) method

CEG's report submitted that "it would be bad practice to apply the PwC (2013) and Incenta (2016a, and 2016b) approaches in a mechanistic way."²²⁰ However, Incenta has not applied the PwC (2013)

²¹⁹ ACCC, Regulatory Economics Unit (August, 2014), *Return on debt estimation: a review of the alternative third party data series*, p.32.

²²⁰ CEG (November, 2016), p. 16.

approach in a mechanistic manner. In particular, Incenta considers that it is necessary practice to examine whether all of the conditions underlying the method have been met. These conditions are:

- *No material bias in the bond sample* – that is, the average implied credit rating of the bond sample used in the pooled regression should approximate the target credit rating;
- *No material asymmetry in the debt risk premiums of credit rating bands* – that is, the average debt risk premium *differential* between the bonds in the target band and in the band on either side of the target credit rating band should be approximately equal; and
- *No material debt risk premium 'aberrations' / 'influential bonds'* – that is, there should be no aberrant or 'influential' bonds whose debt risk premiums are: a) materially out of line with the debt risk premium / term relationship for that credit rating band, which becomes more important the smaller the sample size; or b) influential relative to their numbers among the bonds in the sample. The former will increase / decrease the intercept of the estimate, while the latter will influence the slope of the relationship between term and debt risk premium.

When one of these conditions is not met, Incenta's approach has been to investigate ways of overcoming the potential for distorted estimates of the debt risk premium, and to obtain the most appropriate estimate based on the available data. This has at times involved the running of sensitivities with excluded bonds that looked like aberrations. An example was a set of DBCT bonds that were rated BBB+ but were actually being priced as BBB (and were subsequently re-rated to BBB and below). Consistent with the PwC (2013) approach, we have had regard to results obtained by the introduction of dummy variables, and have also applied single credit rating regression when the number of bonds has been sufficient. In addition, the QCA's preferred approach requires that we compare our findings using the PwC (2013) approach against the third party estimates of Bloomberg and the RBA. Rather than creating risk, Incenta's flexible application of the PwC (2013) approach has provided greater regulatory certainty by not applying the method mechanistically.

Pooled regression and single credit rating regression centred on the BBB+ credit rating band

Pooled regression estimates

Table 5.4 displays the weighting of bonds that we have used to derive the pooled regression estimates centred on BBB+. Applying values of 1, 2 and 3 to bonds with credit ratings of A-, BBB+ and BBB respectively resulted in a weighted average credit rating of 1.71, which indicates a potentially substantial degree of bias towards the A- credit rating category.

Table 5.4: Weighted average credit rating

Credit rating band	Value	Number of bonds	Product
A-	1	32	32
BBB+	2	7	14
BBB	3	16	48
Total		55	94
Weighted Average			1.71

Source: Bloomberg and Incenta analysis

In Table 5.5 below, we show the results of using “pooled regression” to estimate the 10 year BBB+ debt risk premium based on a pooled sample of A-, BBB+ and BBB bonds. Using all 55 bonds in the pooled regression derives a 10 year BBB+ debt risk premium estimate of 1.80 per cent. Given the weighting of bonds observed in Table 5.4, which is materially weighted towards A-, we expect this approach to under-estimate the BBB+ debt risk premium. In its own sample, CEG considered that during its averaging period (June 2016), pooled regression estimate was likely to under-estimate the BBB+ debt risk premium owing to two “influential” A- rated bonds issued by Australia Pacific Airports (Melbourne Airport (MELAIR)), one of which had the longest term to maturity in it’s A-sample.²²¹ In the current sample there are now three additional longer term A- rated bonds (including an additional longer term MELAIR bond), which make it difficult to argue for the exclusion of any of them from the sample.²²² We do not place reliance on the pooled regression estimate (1.80 per cent) owing to the imbalance of A- bonds, and the fact that we consider the dummy variables approach provides a superior estimate at this point in time.

Table 5.5: Pooled regression analysis estimating the BBB+ debt risk premium for 20 business days to 30 June, 2017

Bond sample	No. of bonds	Intercept	T-statistic	Term coefficient	T-statistic	Predicted DRP at 10 years
Pooled regression:						
BBB, BBB+ and A-bonds	55	0.988	16.802	0.082	6.146	1.80
Single credit rating regression:						
BBB+ bonds only	7	0.794	3.736	0.170	3.051	2.50

Source: Bloomberg, RBA, and Incenta analysis

Single BBB+ credit rating estimate

In our analysis for DBCT we applied a single credit rating (BBB) regression to estimate the debt risk premium because:

- The pooled regression method was likely to provide an inaccurate estimate owing to extreme asymmetry in the debt risk premium differentials around the BBB bond; and
- There were sufficient BBB bonds available (25) to place reliance on a single credit rating category.

In this case, for comparative purposes, in Table 5.5 we have also provided a single credit rating estimate of the BBB+ rating category because this was done by CEG. For the current averaging period we obtain an estimated 10 year debt risk premium of 2.50 per cent, but do not consider this estimate to be reliable, as it is based on only 7 bond observations.

²²¹ CEG (November, 2016), p.23. CEG identified two Australia Pacific Airport bonds as influential. Since that time an additional bond has been issued by Australia Pacific Airport, and two additional (non-MELAIR) longer term A- bonds have been issued.

²²² The Bloomberg tickers for the two longer term bonds issued by Australia Pacific Airports Melbourne Pty Ltd, are QJ5397360 (term to maturity of 8.4 years), and QZ9328522 (term of 9.4 years). The additional two long term A- rated bonds are: AM4028255 Corp (AusNet Services Holdings, term 10.2 years); and AN1618205 Corp (ICPF Finance, term 9.9 years).

Alternative functional forms

We also tested (as a further cross check) different functional forms for the debt risk premium, specifically the Nelson-Seigel Curve (NS) and the Nelson-Seigel-Svensson Curve (NSS) functional forms. Since the PwC (2013) report, these functional forms have been applied by the ERAWA (NS and NSS) and the New Zealand Commerce Commission (NSS only). In both cases, we have followed the NZ Commerce Commission's approach of estimating the relationship between the debt risk premium and the term (this differs to the ERAWA approach, which estimates the relationship between the yield and term). We found that the NSS estimate of the debt risk premium using the pooled regression approach was 1.57 per cent, while the NS estimate was 1.64 per cent (i.e. respectively 23 and 16 basis points lower than the Ordinary Least Squares (OLS) estimate).

Disputed credit ratings

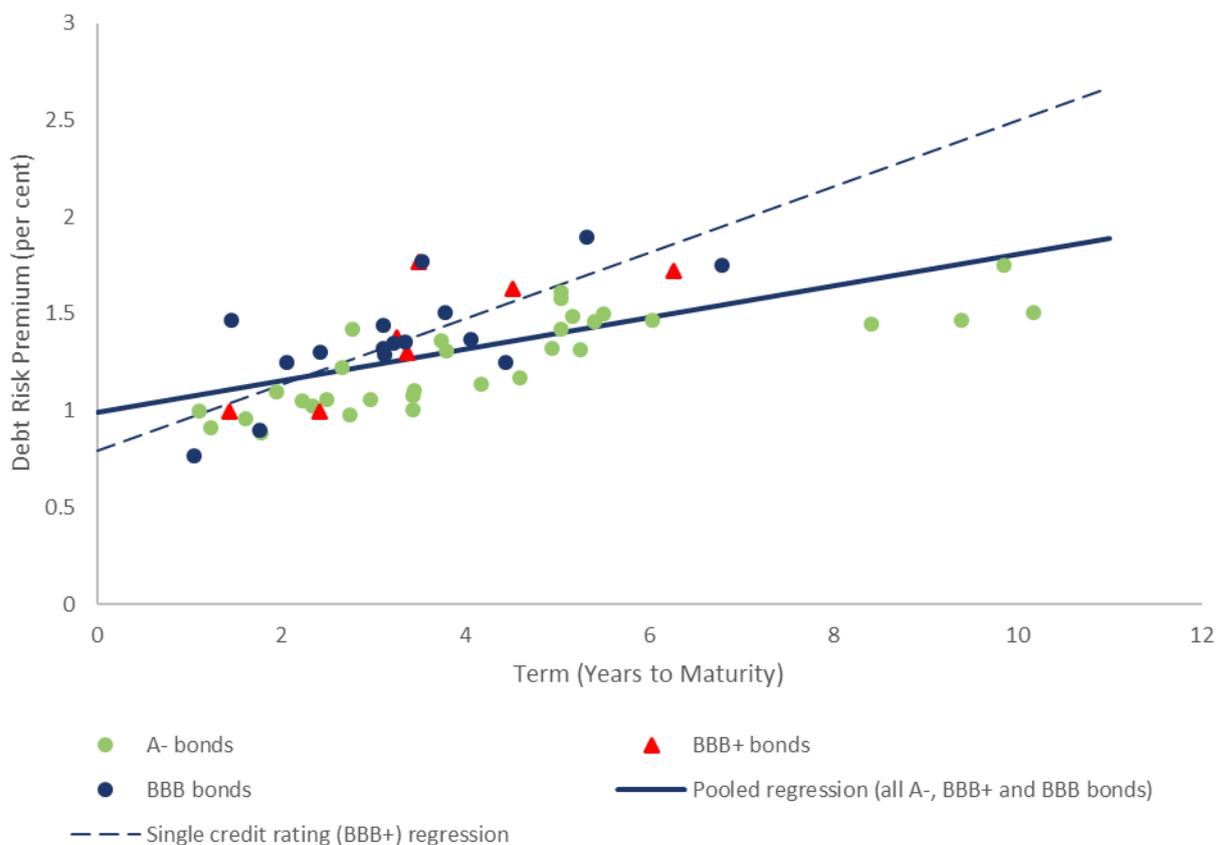
CEG noted that, by adopting an approach which, like Bloomberg, uses the lower credit rating when two credit rating agencies apply different ratings to a bond, there is a possibility that the debt risk premium estimate would be biased downwards.²²³ We tested this by running a sensitivity that placed the disputed bond into the higher credit rating band rather than the lower one. We found that the estimate of the debt risk premium applying the pooled regression approach was approximately the same, at 1.79 per cent, while the NSS and NS estimates were 1.59 per cent and 1.65 per cent respectively.

Graphical presentation of alternative BBB+ debt risk premium estimates

A graphical representation of the spread of bond observations is provided in Figure 5.3. Also shown is the relative position of the BBB+ single credit rating regression line based on 7 bond observations.

²²³ CEG (November, 2016), p.32, para. 115, considers that the lower debt risk premium estimates obtained using Bloomberg can at least partly be explained by the "bias" imparted.

Figure 5.3: Pooled regression estimating BBB+ debt risk premium for 20 days to 30 June, 2017



Source: Bloomberg, RBA, and Incenta analysis

Symmetry of debt risk premium differentials

When applying the pooled regression, PwC (2013) assumed a reasonable degree of *symmetry*, with the expectation that the average debt risk premium differential of the target credit rating bond observations (in this case BBB+) should on average be close to the estimated pooled regression line, and with the two neighbouring credit rating band debt risk premiums (BBB and A-) being on average relatively equidistant from the pooled regression line. Relative to the pooled regression using A-, BBB+ and BBB bond observations to estimate the BBB+ debt risk premium, we found that:

- The 16 BBB bonds were 11.8 basis points above the pooled regression line;
- The 7 BBB+ bonds were 11.9 basis points above the pooled regression line; and
- The 32 A- bond observations were 8.5 basis points below the pooled regression line.

These results indicate considerable asymmetry of BBB+ bonds around the pooled regression line (which is meant to estimate the BBB+ credit rating band), with a positive differential of 10.1 per cent, and 5 out of the 7 BBB+ bonds being above the line.

In summary, the pooled regression indicates a 10 year BBB+ debt risk premium of 1.80 per cent. However, we are concerned that:

- The 55 bond sample is heavily weighted towards A- (as shown in Table 5.4 above); and
- an overwhelming majority of the BBB+ debt risk premium observations lie above the regression line that generates an estimate of 1.80 per cent (with an average differential of 10.1 basis points).

These two observations, which indicate that the restrictive assumptions of the pooled regression approach are not met, have influenced us to apply the dummy variables regression method.

Using dummy variables to estimate the BBB+ debt risk premium

The advantage of a dummy variable approach (relative to pooled regression) is that it incorporates more information by allowing the intercept to vary by credit rating. Taking the benchmark target BBB+ credit rating as the ‘base’, the regression equation with intercept dummy variables for the other two credit rating categories can be written as follows:²²⁴

$$DRP = \gamma_1 + \gamma_2 \cdot Term + \gamma_3 \cdot (BBB) + \gamma_4 \cdot (A-) + \varepsilon$$

Where, γ_1 is the intercept and γ_2 to γ_4 are parameter estimates;

Term is the term to maturity of the bond (in years);

BBB is the dummy variable with a value of 1 if the bond is BBB rated, and zero otherwise;

A- is the dummy variable with a value of 1 if the bond is A- rated and zero otherwise; and

ε is the stochastic error term.

Under this approach, the average term premium coefficient (γ_2) will be influenced by all of the bond observations employed. Our results using dummy variables are displayed in Table 5.6 below. The 55 bonds sample indicates a BBB+ debt risk premium of 2 per cent.

Table 5.6: Debt risk premium estimates using dummy variables for 20 days to 30 June, 2017

No. of bonds	Intercept	Dummy Variable Intercept Coefficient	T-statistic	Term coefficient	T-statistic	Predicted DRP at 10 years
55						
A- bond		-0.212	-2.814			1.78
BBB+ bond	1.067		13.349	0.093	7.778	2.00
BBB bond		0.002	0.019			2.00

Source: Bloomberg, RBA, and Incenta analysis

Relative to the BBB+ function estimated with dummy variables, we found that:

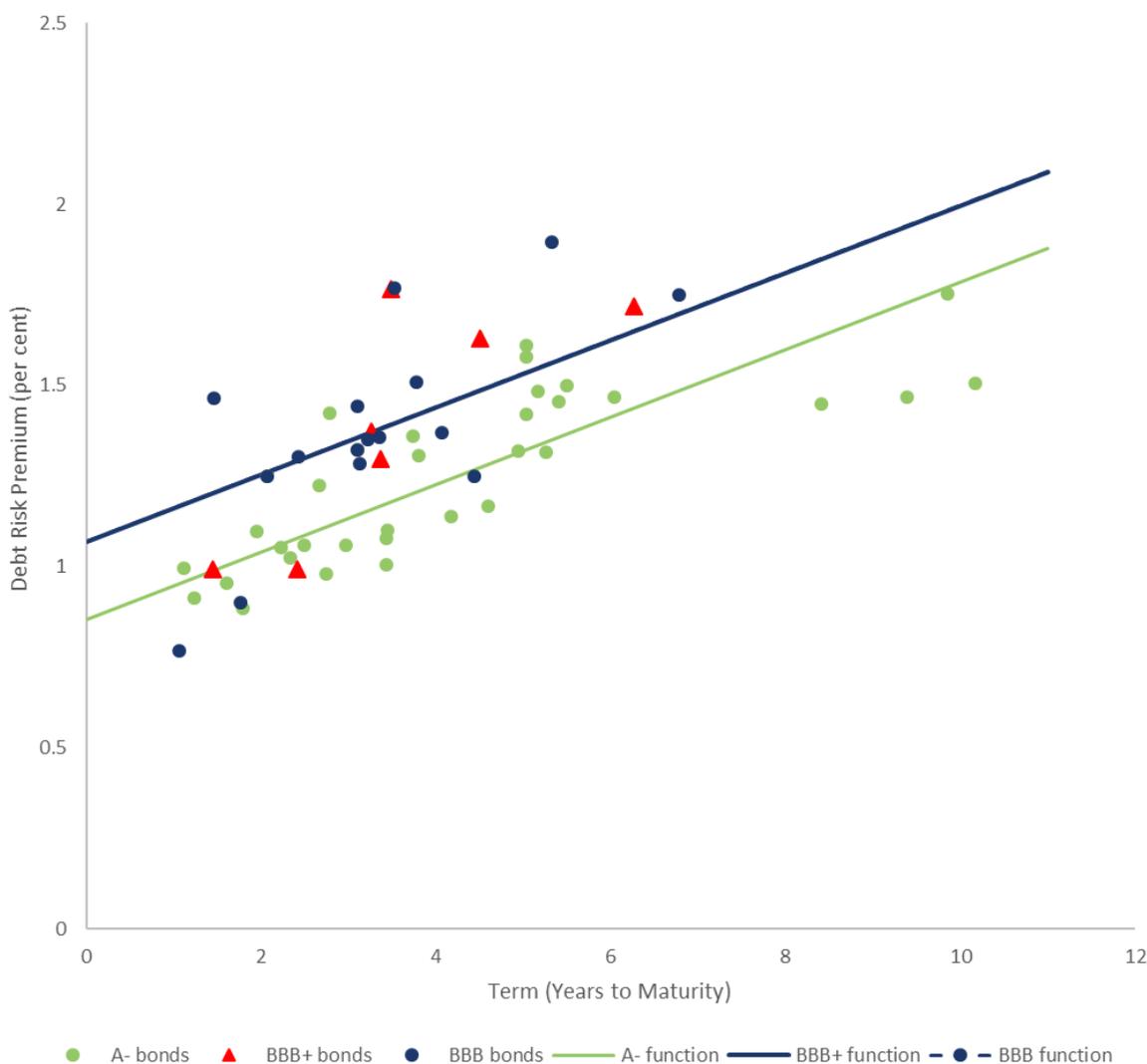
- The 16 BBB bonds were 1.6 basis points above the BBB+ function; and

²²⁴ Since BBB+ rated bonds are used as the base, the coefficients (γ_3 and γ_4) on the BBB and A- parameters are the increments in the intercept associated with the respective credit ratings relative to the BBB+ credit rating (whose intercept is γ_1).

- The 32 A- bond observations were 21.2 basis points below the BBB+ function.

The very small differential between the BBB and BBB+ bonds is not expected given the higher risk of BBB rated bonds. This may be due to the relatively small numbers of BBB and BBB+ bonds, and the model specification, which constrains all three functions to a single slope. However, our primary concern is to estimate the BBB+ function.

Figure 5.4: Dummy variables regression estimating BBB+ debt risk premium for 20 days to 30 June, 2017



Source: Bloomberg, RBA, and Incenta analysis

5.7 Conclusion on debt risk premium

Taking account of the evidence using Australian bond data and applying the modified PwC (2013) bond selection criteria, we consider the dummy variables analysis indicates a 10 year BBB+ debt risk premium of 2 per cent. This is higher than the 1.80 per cent estimate that would be obtained using the pooled regression approach that PwC (2013) chose to apply in its report.

Reasons for preferring the estimate obtained using dummy variables

In this instance, we consider 2 per cent, derived by the dummy variables approach, to be the better estimate of the BBB+ debt risk premium, rather than the 1.80 per cent obtained through the pooled regression approach.

We would prefer not to apply the pooled regression approach because this requires a number of restrictive assumptions be satisfied.²²⁵ In the current averaging period we have found an imbalance in the relative number of A- bond observations, which implies that a pooled regression will tend to under- estimate the BBB+ debt risk premium.

We note that the PwC (2013) report was open to application of the dummy variables approach, but found that it provided unreasonable results at that time. At the time of the report, the predicted BBB+ debt risk premium using dummy variables was higher than the BBB debt risk premium and inconsistent with the other evidence (such as the estimated debt risk premium for A- bonds and the output of the Bloomberg fair value curve). It was hypothesised at the time that this may have been caused by a small, and possibly non representative, set of BBB+ bonds).

In the current circumstances, we think the dummy variable approach to be most robust because the concern that PwC (2013) had with the dummy variables approach is no longer present. The predicted BBB+ debt risk premium using the dummy variables approach now sits between the A- and BBB curves, and so this issue is no longer present.²²⁶

Furthermore, the cross-checks that we have undertaken, as discussed below, indicate that a BBB+ debt risk premium of 2 per cent is appropriate, rather than an estimate close to 1.80 per cent.

5.8 Cross-checks of debt risk premium estimate

In this section we cross-check our estimate of the benchmark 10 year BBB+ debt risk premium against alternative approaches.

5.8.1 Comparison with RBA and Bloomberg fair value curve estimates

The QCA's statement on cost of debt estimation suggests that findings obtained using the PwC (2013) method be compared against estimates published by third party providers. As noted above, both Aurizon Network's submission and the CEG report suggest that third party fair value curves could be used to estimate the debt risk premium for Aurizon Network. That is, they suggest that, for Aurizon Network's benchmark BBB+ credit rating, the broad BBB credit rating band should be used.

Further, the PwC (2013) method that we are applying was designed so that the debt risk premiums applying to benchmark BBB+ rated businesses could be estimated. Hence, it would be inconsistent with the QCA's preferred methodology to apply a broad BBB band debt risk premium to a benchmark

²²⁵ One assumption is that there is symmetry between the change in the debt risk premium for the one-notch either side of the target credit rating. A second assumption is that there is approximate symmetry in the number of bonds for the one-notch either side of the target credit rating. It is further implicitly assumed that the two symmetries referred to exist across all maturities within the sample.

²²⁶ Although we note this is narrowly the case in the current averaging period for the PwC (2013) sample. The cross-check afforded by reference to a wider sample (see below) corroborates the 2 per cent estimate obtained using the Australian PwC (2013) sample.

BBB+ rated business. It is our view that the only practical way to cross-reference our estimates to the third party fair value curves produced by the RBA and Bloomberg is to interpolate the broad BBB and broad A fair value curves that they publish.

Given that there are two credit rating notches between the BBB and A credit rating bands (BBB+ and A-), if we assume that there is no inherent bias in the RBA or Bloomberg estimates, to obtain the estimated BBB+ debt risk premium, a weighting of 0.67:0.33 would need to be applied to the observed third party BBB and A debt risk premiums (respectively) at 10 years.

In the left-hand columns of Table 5.7 below, we show the broad BBB and broad A debt risk premiums that are obtained by reference to the RBA and Bloomberg services. Averaging the BBB estimates produces an estimate of 2.26 per cent, while the respective A rating band estimate is 1.55 per cent. On the assumption that the samples are unbiased (relative to the central 'BBB' and 'A' credit rating bands), we find an estimated interpolated average debt risk premium of 2.02 per cent, with the interpolated Bloomberg estimate of 2.06 per cent defining the upper end of the BBB+ range, and the interpolated RBA estimate of 1.99 per cent defining the lower end.

Table 5.7: Interpolated RBA and Bloomberg estimates of the 10 year BBB+ debt risk premium for the 20 days to 30 June, 2017

	BBB	A	Weighting (unbiased)		BBB+
	credit rating	credit rating	BBB	A	Unbiased
RBA	2.18	1.60	0.67	0.33	1.99
Bloomberg	2.34	1.49	0.67	0.33	2.06
Average	2.26	1.55			2.02

Source: Bloomberg, RBA, and Incenta analysis

In our view, the estimated range of 1.99 per cent (Bloomberg) to 2.06 per cent (RBA) obtained for the interpolated BBB+ debt risk premium based on the third party providers supports the estimate of 2 per cent that we have obtained applying the dummy variables approach to the PwC (2013) sample bonds, as we have recommended earlier.

5.8.2 Expansion of the sample to include AUD denominated bonds with options and foreign currency bonds

The ERAWA approach and sample selection

CEG submitted that application of the PwC (2013) approach can result in relatively small samples, and therefore:

... some consideration should be given to the inclusion of bonds issued in foreign currencies (swapped back into AUD) and bonds issued with options (but with DRPs adjusted using ERA's methodology as cited in section 3.3.2). This involves more or less adopting the ERA/RBA approach to sample selection.

While the PwC (2013) approach does not adopt such an approach, we agree with CEG that adopting the ERAWA's method for adjusting yields of bonds with options and foreign bonds to AUD equivalents can provide advantages through transparency and uniformity of approach. In this report we have adopted the ERAWA's method of bond yield adjustment, which incorporates Bloomberg's

OAS facility.²²⁷ We do not agree that adopting the yield adjustment approach requires the complete adoption of the ERAWA's approach to sample selection. As noted above, for example, PwC (2013) did not envisage the exclusion of real estate businesses as 'financial firms', which the ERAWA excludes because they come under Bloomberg's industrial classification (BICS) as 'Financials'. In addition, we do not believe it is necessary to constrain the sample to consider only bonds rated by Standard & Poor's. Having said that, we consider there are a number of positive features in the ERAWA's sample procedure. If a decision to include foreign denominated bonds were to be made, we agree with the ERAWA's approach of including foreign denominated bonds issued in the USD, EUR and GBP currencies. We also agree with the exclusion of duplicate bonds.²²⁸ The full details of our sample selection approach are provided in Appendix D below.

Expanded bond sample

If AUD denominated and Australian market issued bonds with options are included, the sample size (across the BBB, BBB+ and A- credit ratings) increases by 27 bonds (from 55 to 82 bonds). If bonds with Australian country risk denominated in AUD, USD, GBP or EUR but issued in foreign markets were included, then the sample size would increase by a further 64 bonds. The maximum sample contained 146 bonds, as shown in Table 5.8 below.

Table 5.8: The PwC (2013) and expanded samples (comprising BBB, BBB+ and A- bonds) for the 20 day averaging period to 30 June, 2017

Maturity	AUD bonds	USD / GBP / EUR / AUD bonds	Total bonds
	issued in Australia	issued outside Australia	
Bullet - PwC (2013)	55		
Call / put	27		
Total			82
Bullet		40	
Call / put		24	
Total			64
Total bonds			146

Source: Bloomberg and Incenta analysis

The weighted average credit rating for the expanded sample is shown in Table 5.9. Here we find that the weighted average credit rating around the BBB+ credit rating band is slightly biased towards A- (i.e. 1.93). We have not undertaken pooled regression for the expanded sample, since the dummy variables approach provides plausible estimates based on a large sample of bonds, and we have 38 BBB+ bond observations with which to undertake a single credit rating regression.

²²⁷ That is, we adopted the approach described in ERAWA (22 December, 2015), *Draft Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020: Appendix 4 Rate of Return*, pp.272-278.

²²⁸ Some bonds in foreign markets are issued simultaneously as public and private issues. Unless they are consolidated, the same bond may be counted twice.

Table 5.9: Weighted average credit rating for the pooled expanded sample

Credit rating band	Value	Number of bonds	Product
A-	1	59	59
BBB+	2	38	76
BBB	3	49	147
Total		146	282
Weighted Average			1.93

Source: Bloomberg and Incenta analysis

Single credit rating regression using the expanded sample

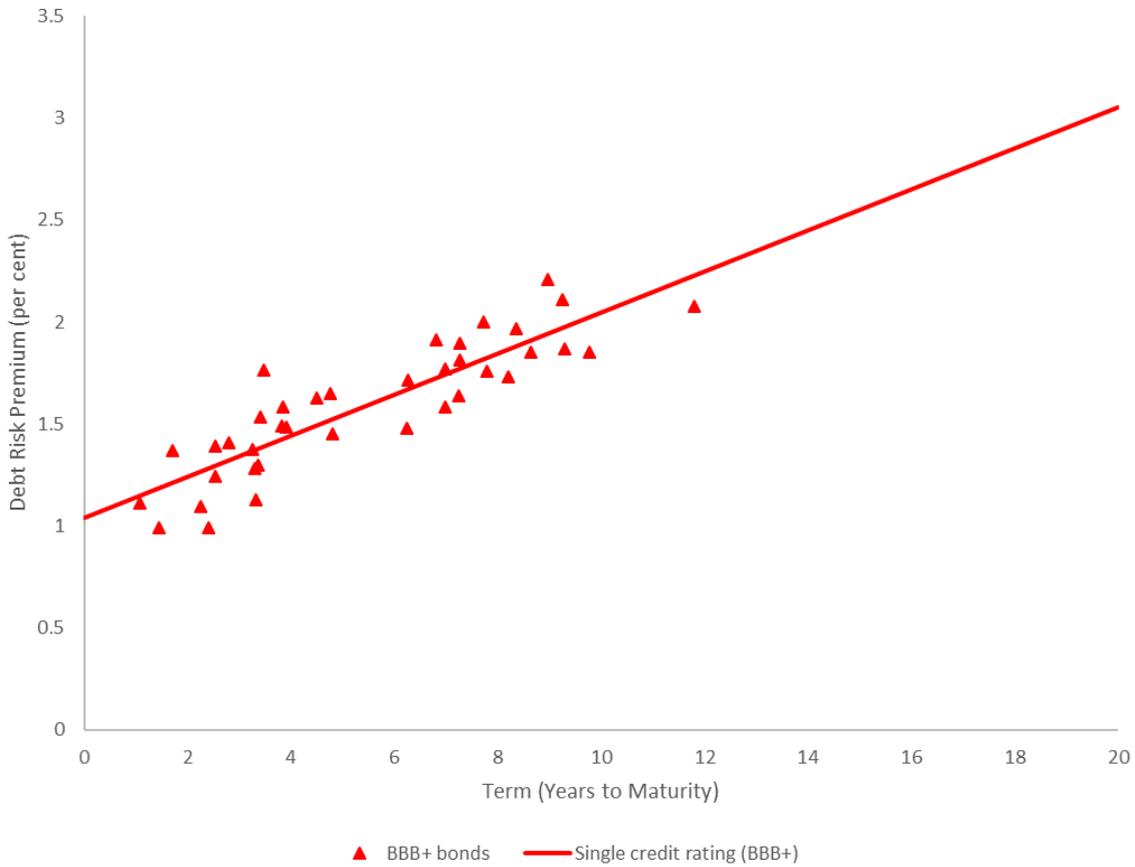
Using the expanded sample, there were enough BBB+ bonds (38) to undertake a single credit rating regression. As shown in Table 5.10 below, this approach yielded a debt risk premium of 2.05 per cent, which is 45 basis points lower than that obtained using only 7 AUD-denominated BBB+ bonds issued in the Australian market, but only 5 basis points higher than the debt risk premium estimate obtained applying the dummy variable approach to the PwC (2013) sample.

Table 5.10: Ten year BBB+ estimates - Pooled regressions with expanded sample

Bond sample	No. of bonds	Intercept	T-statistic	Term coefficient	T-statistic	Predicted DRP at 10 years
BBB+ bonds only	38	1.043	18.596	0.101	10.939	2.05

Source: Bloomberg and Incenta analysis

Figure 5.5: Expanded sample of bonds – single credit rating band regression estimating BBB+ debt risk premium for 20 days to 30 June, 2017



Source: Bloomberg and Incenta analysis

Expanded sample BBB+ debt risk premium estimate using dummy variables

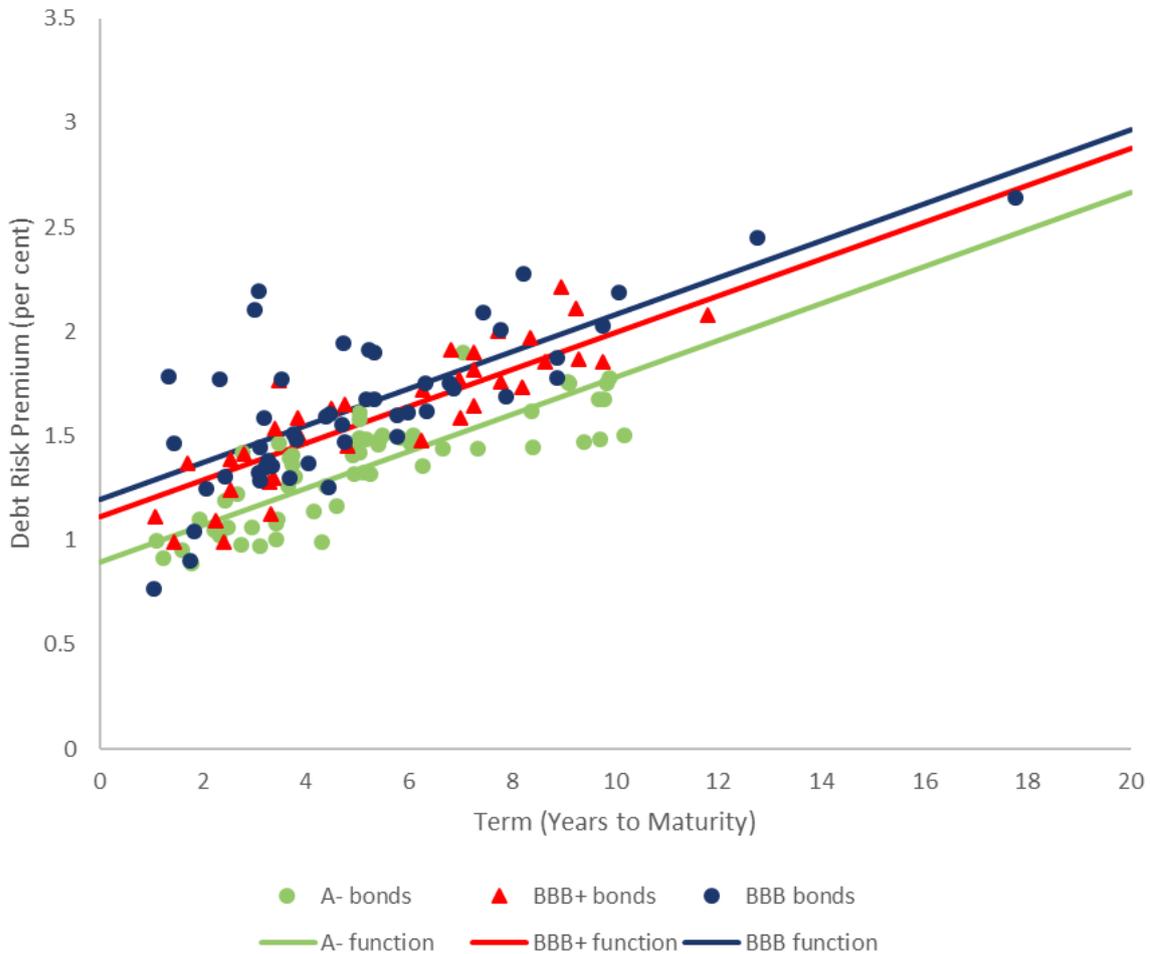
Table 5.11 shows the dummy variable regression results for the expanded sample. The estimate of the 10-year BBB+ debt risk premium using the expanded sample is 1.99 per cent. We also note that the intercept and all three coefficients are statistically significant. A visual representation of the debt risk premiums of BBB+ rated bonds in the expanded sample is provided in Figure 5.6.

Table 5.11: Comparison with expanded bond sample - dummy variables estimates of debt risk premiums for 20 business days to 30 June, 2017

No. of bonds	Intercept	Dummy Variable	T-statistic	Term coefficient	T-statistic	Predicted DRP
146		Intercept Coefficient				at 10 years
A-bond		-0.213	-5.371			1.78
BBB+ bond	1.109		25.293	0.089	15.556	1.99
BBB bond		0.083	2.023			2.08

Source: Bloomberg, RBA, and Incenta analysis

Figure 5.6: Expanded bond sample –debt risk premium estimates using dummy variables for 20 business days to 30 June, 2017



Source: Bloomberg, RBA, and Incenta analysis

Conclusion

Using the expanded sample, and applying dummy variables we have estimated a 10 year BBB+ debt risk premium of 1.99 per cent. The single credit rating (BBB+) estimate was 2.05 per cent. Our key finding is that a very similar estimate to our preferred estimate of 2 per cent using only AUD-denominated bonds is obtained using the expanded sample, regardless of the estimation method (i.e. the estimates generally lie within ± 5 basis points).

Alternative functional forms

Applying alternative functional forms to the expanded sample using dummy variables, we obtained estimates of 1.97 per cent and 1.98 per cent respectively for each of the NSS and NS methods, which is only one or two basis points lower than that obtained using ordinary least squares (OLS) (for the 146 bond sample). For the expanded 38 BBB+ bonds single credit rating sample we obtained estimates of 2 per cent for both the NSS and NS methods when estimating debt risk premiums (i.e. 5 basis points lower than the 2.05 per cent estimate using OLS).

Disputed credit ratings

When we dropped the disputed credit rating bonds from the sample (leaving 133 bonds), we obtained an estimate of 2 per cent using OLS and 1.98 per cent and 1.99 per cent respectively using NSS and NS.

5.9 Conclusion on BBB+ debt risk premium estimate

Placing reliance on AUD denominated bonds, which is consistent with the QCA's preferred cost of debt approach, we recommend a 10 year BBB+ debt risk premium estimate of **2 per cent**, as this was the estimate obtained using the dummy variables approach. Our preferred estimate is close to the estimates obtained using the alternative NS and NSS functional forms, and alternatively classifying disputed bonds into the higher / lower credit rating band. It is also close to estimates obtained by interpolating RBA and Bloomberg estimates and close to the estimates obtained by expanding the sample to include 91 additional bonds with options attached and issued in foreign markets.

5.10 Benchmark interest rate swaps

5.10.1 Introduction

The QCA has determined that a regulated entity such as Aurizon Network would fund itself with an average of 10-year fixed rate bonds in order to manage refinancing risk. However, the regulatory period is shorter, at four years. The QCA's approach assumes that an efficient regulated firm would have the incentive to align its debt with the term of the regulatory period, in order to match the regulatory benchmark. In principle, the regulated firm can employ both interest rate swap (IRS) and credit default swap (CDS) contracts to achieve this objective. However, in practice it is difficult to hedge the debt risk premium using CDS contracts due to the lack of market liquidity in these instruments. The QCA's approach recognises that the market for CDS contracts is illiquid, and accordingly assumes that firms do not use CDS contracts at this time. Hence, this exercise addresses the transaction cost, i.e. the IRS margins, for implementing interest rate swap contracts.

5.10.2 Assumptions underpinning the swaps

Assumptions

The key assumptions underpinning the analysis were as follows:

- Enterprise Value: Aurizon Network's regulatory asset base (RAB) was taken as \$6.225 billion;
- Benchmark gearing of 55 per cent, implying a nominal principal profile of \$3.424 billion for the debt for swap pricing;
- A benchmark credit rating of BBB+; and
- The swaps are priced as at 30 June, 2017.

Approach

For each hypothetical swap, the execution and risk spreads can be derived. The swap is assumed to be to Bank Bill Reference Rate (i.e. the BBSW mid-market swap rate). The swap spreads have not been further adjusted for the timing of any difference payments (calendar quarters, monthly etc.) rather than quarterly, as quoted. For the principal profile, the swap from 10 year fixed to floating was derived – as well as the spread breakdown; then the swap from floating into 4 year fixed was derived – and the spread breakdown:

- *The execution spread* - is an estimate of the buffer that a bank levies for fluctuations in the market while the back-to-back transactions are placed.
- *The risk spread (credit and capital costs)* - is an estimate of the charge that a bank makes for the risk of the counterparty defaulting.

It was assumed that (hypothetically) the volume was dealt over several trading days to minimise the impact on the market.

Basis for swap rate derivation and spreads

The fixed rates shown below are based on the prevailing mid inter-bank market Australian Dollar swap rates as published by ICAP (an inter-bank broker) on Reuters page ICAPAUWAPS01 and relevant basis swap markets as published on Reuters page ICAPAUWABASIS (same publisher) as at 10:00am Australian Eastern Daylight Savings Time on 30 June, 2017. The rates are mid-market (BBSW). The credit spreads are based upon: BBB band credit ratings, the specified terms (4 and 10 years), and on an internal bank process which will be representative of the market. Execution spreads are based on current market pricing and a bank's internal pricing model.

Results

Table 5.12 below gives a summary of results. Points to note are:

- The pricing has been carried out for BBB, BBB- and BBB+;
- The units used are basis points or 'bp', where 100bp = 1.00 per cent;
- The pricing of a swap from fixed to floating is virtually (but not exactly) the same as for the reverse swap, but within the limits of this exercise the difference is not material. Thus, only one set of pricing has been given for any swap, be that fixed to floating or floating to fixed;
- The pricing for the two stage swaps can be derived by adding the spreads for the first swap to those of the second. For example, the cost of swapping a 10 year fixed, BBB+ rated debt to 4 year fixed, BBB+ rated debt = $(3.0 + 4.0) + (3.0 + 2.5) = 12.5 \text{ bp} = 0.125\%$.

Table 5.12: Swap costs as at 30 January, 2017

Spread bp	4 Years			10 Years			Total Swap Cost
	BBB+	BBB	BBB-	BBB+	BBB	BBB-	
Execution spread (%)	3.0	3.0	3.0	3.0	3.0	3.0	
Risk spread (%)	2.5	3.0	3.0	4.0	5.0	5.5	
Total Swap Cost	5.5			7.0			12.5

Source: Academie, based on Reuters

5.11 Conclusions

Our conclusions regarding the key WACC parameters reviewed in this chapter are as follows.

Benchmark credit rating

Based on our assessment of information currently available to us, we concur with Aurizon Network's submission that a benchmark credit rating of BBB+ is appropriate. We would expect to review this conclusion once the implications of the QCA's UT5 draft decision for the future cash flows of Aurizon Network are known.

Benchmark term of debt

We consider that for an infrastructure business like Aurizon Network the benchmark term of debt is 10 years, which is in accord with the term applied to other regulated infrastructure businesses in Australia.

Benchmark debt risk premium

Based on our analysis applying the PwC (2013) approach that is preferred by the QCA, we recommend a benchmark 10 year debt risk premium of **2 per cent**. This estimate is close to the interpolated average BBB+ debt risk premium that is obtained by reference to the third party estimates of Bloomberg (2.06 per cent) and the RBA (1.98 per cent), and is close to estimates obtained using an expanded sample that includes bonds with options and bonds issued in foreign currencies (1.99 per cent using the dummy variables approach).

Benchmark swap costs

Based on Reuters data, and the key regulatory benchmark characteristics of Aurizon Network (such as RAB and gearing), as at 30 June, 2017, we estimate the benchmark cost of interest swap contracts associated with financing to be **12.5 basis points**.

6. Stakeholder submissions

6.1 Overview of submissions

Stakeholders were given the opportunity to comment on submissions, and the QCA received comments relating to Aurizon Network's benchmark WACC parameters from the following:

- Anglo American (17 February, 2017), *Submission in response to the Aurizon Network 2017 DAU lodged with the QCA on 30 November 2016*;
- QCoal Group (17 February, 2017), *Submission on Aurizon Network Pty Ltd's (Aurizon Network) draft 2017 access undertaking*; and
- Queensland Resources Council (17 February, 2017), *Aurizon Network's 2017 DAU – QRC Submission, Volume 2: Pricing Submission*.

Of these submissions, the Queensland Resources Council (QRC) submission was the most comprehensive with respect to WACC issues. QCoal Group noted that Aurizon Network's submissions on the cost of equity "move to raise the WACC," and expressed a view that "there has been no substantive change in underlying circumstances [relative to UT4] used to calculate the parameters, and as a result "only time dependent parameters, such as the risk-free rate and debt-risk premium should change from that approved as part of UT4."²²⁹

Our tasks have included assessment of the risk environment faced by Aurizon Network, which has been examined in the context of the first principles analysis contained in chapter 3. We found that while there has been some volatility in the broader seaborne export coal industry served by Aurizon Network, owing to such factors as the strong market position of the Queensland export coal sector and the regulatory framework applied by the QCA, Aurizon Network's revenues have proved to be resilient.

Anglo American's submission expressed disappointment in Aurizon Network's submission, and considered that "the UT4 WACC should be materially reduced for the UT5 period and that the changes proposed by Aurizon Network are not justified." Anglo American noted that it "supports the position on WACC calculations and reasoning as detailed by the QRC."²³⁰ In this chapter, we therefore focus on the QRC submission with respect to WACC issues.

6.2 QRC's submission on WACC parameters

6.2.1 Introduction

Of the WACC parameters that are reviewed in our report, the QRC agreed with Aurizon Network on the question of gearing and credit rating. That is, the QRC considered that benchmark gearing of 55

²²⁹ QCoal Group (17 February, 2017), *Submission on Aurizon Network Pty Ltd's (Aurizon Network) draft 2017 access undertaking*, p. 7.

²³⁰ Anglo American (17 February, 2017), *Submission in response to the Aurizon Network 2017 DAU lodged with the QCA on 30 November 2016*, p. 13.

per cent and a benchmark credit rating of BBB+ continue to remain appropriate.²³¹ However, the QRC questioned the approaches adopted in Aurizon Network's submission with respect to beta and the debt risk premium. In the following sections we summarise the case presented by the QRC in respect to these parameters, and provide our comments, as informed by our own most recent analysis and findings.

6.2.2 Risk profile and beta

QRC submission on beta

The QRC submission considers that the UT4 asset beta of 0.45, and its rounded equity beta equivalent of 0.80 were too high given the systematic risk characteristics of Aurizon Network. The QRC holds that whilst the UT4 reasoning on beta applied by Incenta and the QCA "remains applicable," the "UT4 estimate was conservative." The main points raised in relation to the UT4 reasoning were that:

- The regulatory framework aligns revenue with cost at regular periods;
- There is surety of demand due to strong underlying economics, regulation and long term take-or-pay contracts; and
- Low asset stranding risk due to the regulatory framework.

The QRC also supports the findings that regulated energy and regulated water assets are the "best comparator groups for Aurizon Network, since they:

- Are subject to similar regulation;
- Revenue buffering results in revenues "largely unrelated to the state of the market";
- Have relatively low operating cost risk; and
- Generally low stranding risk.

The QRC also agrees with Incenta and the QCA's conclusion that the beta evidence for rail networks was inappropriate due to differing regulatory and competitive environments. However, the QRC's view is that the QCA's decision in UT4 was too conservative given that the 0.45 asset beta adopted was higher than the 0.42 point estimate provided by its adviser Incenta, and an equity beta of 0.80 implied a rounding up from the calculated re-levered equity beta of 0.79 (based on an asset beta of 0.45 and benchmark gearing of 55 per cent). The QRC does, however, agree that "Incenta's recommended point estimate for the UT4 asset beta of 0.42 (within its identified reasonable range of 0.35 to 0.49) is justifiable."

Incenta's response

We agree with the general points made by the QRC in relation to Aurizon Network's systematic risk and the use of regulated energy and water businesses as the best available comparator group. These

²³¹ Queensland Resources Council (17 February, 2017), *Aurizon Network's 2017 DAU – QRC Submission, Volume 2: Pricing Submission*, p. 17

conclusions align with the first principles analysis that we have presented in chapter 3 above. Asset beta estimation is subject to considerable error. Our approach has been to provide a range of estimates and to choose a point estimate within that range. In chapter 4 above, we have again identified an asset beta range of 0.34 to 0.50, with a point estimate of 0.42.

QRC submission on risk in the coal market

The QRC's submission notes that Aurizon Network's submission emphasises that its own risk has increased because its customers are exposed to volatile international coal markets. However, the QRC's submission considered that contrary to Aurizon Network's views:

- Currently coal prices are at historical highs and there is a positive outlook for Queensland coal production;
- What is important for Aurizon Network is coal production rather than prices, and even though there was a recent period of low prices, production was not materially impacted; and
- Aurizon Network's "regulatory environment" insulates it from risks in a way that its customers are not insulated.

The QRC's submission notes that in 2016 Queensland's coal exports were a record 221 million tonnes, which exceeded 2015, which was also a record. Furthermore, it noted that there were a number of reasons that volumes can be expected to hold up in the long term, including take-or-pay contracts, long term port contracts, and the fact that the Bowen Basin coal producers "are extremely well placed on the coal industry cost curve".²³² One of the QRC's charts (its Figure 11) titled "The whole seaborne market is cash-positive" is drawn from Macquarie Research.²³³ With respect to the ownership changes that have occurred in the coal industry, the QRC submission states that what matters is the economics of a mine's operation rather than its ownership, and that such changes may be expected to improve efficiency. Based on the above, the QRC submission believes that "the existing beta [Aurizon Network] has been awarded substantially overstates its risk profile."²³⁴

As evidence of its view that Aurizon Network faces materially less risk than its customers, the QRC submission provides empirical evidence in the form of share price movements of Aurizon Network relative to those of coal producers. It shows that volatility has been much higher among the coal producers.

Incenta's response

We agree with the points raised by the QRC in relation to Aurizon Network's systematic risk profile being lower than that of its customers, as we have made the same points in our current report. For example, we have emphasised the favourable positions that Queensland coal producers occupy on the international export coal cost curves, which underpins the long term security of the industry and of Aurizon Network. However, the empirical evidence that the QRC has provided on share price volatility is not persuasive evidence that the systematic risk of Aurizon Network is materially lower than that of its customers. First, the share price data does not show which businesses have a higher degree of correlation / co-variability with the relevant market index. Secondly, the share price of

²³² Queensland Resources Council (17 February, 2017), p.26.

²³³ Macquarie Research (August, 2016), based on company data.

²³⁴ Queensland Resources Council (17 February, 2017), p.28.

Aurizon Limited is only a partial indicator of the asset beta of Aurizon Network. Our first principles analysis and empirical evidence on betas indicates that asset beta of Aurizon Limited's Aurizon Network business is likely to be much lower than its substantial freight rail business. As noted by the QRC, this is recognised in Aurizon Limited's 2016 investor presentation, which describes Aurizon Network as a 'defensive business'.

QRC submission on why regulated energy and water businesses are Aurizon Network's closest comparators

The QRC submission agrees with Incenta's first principles analysis, which was undertaken in the course of the UT4 period, and outlines the key findings of our previous report.

Incenta's response

We agree with the QRC on this point with respect to UT4, but note that in the case of UT5 we have provided a new first principles analysis, which also addresses the North American pipelines industry as a potential comparator for Aurizon Network. As discussed in chapter 3, based on the latest evidence we conclude that the regulated energy and water industry remains the best available comparator industry for Aurizon Network.

6.2.3 Cost of debt

QRC submission

On the question of benchmark cost of debt, the QRC's submission:

- Considers that a 5 year term to maturity should be applied, which reflects Aurizon Network's "actual debt financing arrangements", and would facilitate debt raising because it more closely aligns with the regulatory period;
- Suggests that the Bloomberg methodology should be "either utilised instead of, or at a minimum considered in combination with the QCA's econometric methodology (referred to as the PwC approach in QCA decisions)",²³⁵
- Disagrees with Aurizon Network's request to engage in a review of the debt risk premium estimation process after the averaging period had previously been set, because this could allow Aurizon Network to "game the outcome"; and
- Considers that the QCA's application of a single credit rating approach in the case of DBCT has no application to Aurizon Network in UT5, since the concern was with BBB- bonds, and Aurizon Network has a benchmark BBB+ credit rating.

Incenta's response

We do not agree with the QRC that a 5 year term to maturity for the debt risk premium should be applied, based on its claim that this reflects Aurizon Network's "actual debt financing arrangements". The QCA's regulatory approach is based on benchmarking, which provides Aurizon Network with an incentive to out-perform the benchmark. In section 5.2 above, we review evidence that supports a

²³⁵ Queensland Resources Council (17 February, 2017), p.17.

benchmark debt term of 10 years for an infrastructure business with Aurizon network's characteristics. In any case, Aurizon Network's actual financing practice indicates a weighted average term of debt at issuance that is likely to be closer to 10 years than to 5 years.²³⁶

With respect to the QRC's suggestion that the Bloomberg methodology should be considered in combination with the QCA's econometric methodology", we note that it is an integral part of the QCA's referred method to assess the cost of debt. As discussed in chapter 5, we have compared findings applying the PwC approach with those obtained by interpolating the Bloomberg BBB and A fair value curves. The QRC's submission was not clear on how it would prefer the Bloomberg methodology to be applied, or whether it considers that the generic BBB debt risk premium estimated by Bloomberg is appropriate to apply when the target is a benchmark BBB+ business.

We agree with the QRC that the QCA's application of a single credit rating approach in the case of DBCT has no application to Aurizon Network in UT5. As explained in chapter 5, the issue in the case of DBCT was that debt risk premium differential between BBB- bonds and the target BBB bonds was large, and there were 25 BBB bonds to place reliance on. These issues do not arise in relation to Aurizon Network, which has a benchmark BBB+ credit rating.

6.3 Conclusion

In conclusion, while we agree with much of what the QRC submission proposes regarding beta risk and the cost of debt, on some issues we disagree. With respect to cost of debt issues we note that the approach preferred by the QCA already requires a cross-check against Bloomberg, although the QRC has not specified how it considers this should be applied in the case of a BBB+ benchmark credit rating. We agree with the QRC's view that Aurizon Network's reliance on a single credit rating band regression is not appropriate when there are too few bond observations. However, we disagree with QRC's view that it is appropriate to apply a 5 year debt term to Aurizon Network's debt risk premium.

²³⁶ The weighted average term at issuance is 8.9 years based on the four Aurizon Network bonds currently issued. There are two with 10 year terms (accounting for 61 per cent of total value) and two with 7 year terms.

A. Industry samples used in beta estimation

Energy and water

Companyname	Ticker	Energy or water	Country
ALLETE	ALE US Equity	Energy	US
Alliant Energy	LNT US Equity	Energy	US
Ameren Corp	AEE US Equity	Energy	US
American Electric Power	AEP US Equity	Energy	US
APA Group	APAAU Equity	Energy	Australia
Atco Ltd	ACO/X CN Equity	Energy	Canada
Atmos Energy Corp	ATO US Equity	Energy	US
AusNet Services	AST AU Equity	Energy	Australia
Avista Corporation	AVA US Equity	Energy	US
Black Hills Corporation	BKH US Equity	Energy	US
Canadian Utilities Ltd	CU CN Equity	Energy	Canada
CenterPoint Energy	CNP US Equity	Energy	US
Centrica PLC	CNALN Equity	Energy	UK
Chesapeake Utilities Corp	CPK US Equity	Energy	US
CMS Energy Corp	CMS US Equity	Energy	US
Consolidated Edison	ED US Equity	Energy	US
Delta Natural Gas Co Inc	DGAS US Equity	Energy	US
Dominion Resources	D US Equity	Energy	US
DTE Energy	DTE US Equity	Energy	US
DUET GROUP	DUE AU Equity	Energy	Australia
Duke Energy Corp	DUK US Equity	Energy	US
Edison International	EIX US Equity	Energy	US
El Paso Electric	EE US Equity	Energy	US
Emera Inc	EMACN Equity	Energy	Canada
Empire District Electric Co	EDE US Equity	Energy	US
Entergy Corp	ETR US Equity	Energy	US
Eversource Energy was NorthEast Utilities	ES US Equity	Energy	US
Exelon Corporation	EXC US Equity	Energy	US
First Energy Corp	FE US Equity	Energy	US
Fortis Inc	FTS CN Equity	Energy	Canada
Great Plains Energy	GXP US Equity	Energy	US
Hawaiian Electric Industries Inc	HE US Equity	Energy	US
IDACORP Inc	IDA US Equity	Energy	US
MGE Energy	MGEE US Equity	Energy	US
National Fuel Gas Company	NFG US Equity	Energy	US
National Grid PLC	NG/ LN Equity	Energy	UK
New Jersey Natural Gas Co	NJR US Equity	Energy	US
NextEra Energy	NEE US Equity	Energy	US

Energy and water (cont.)

Company name	Ticker	Energy or water	Country
NiSource Inc	NI US Equity	Energy	US
Northwest Natural Gas	NWN US Equity	Energy	US
NorthWestern Corporation	NWE US Equity	Energy	US
OGE Energy	OGE US Equity	Energy	US
Otter Tail Corp	OTTR US Equity	Energy	US
PG&E Corp	PCG US Equity	Energy	US
Pinnacle West Capital	PNW US Equity	Energy	US
PNM Resources Inc	PNM US Equity	Energy	US
Portland General Electric Co	POR US Equity	Energy	US
PPL Corporation	PPL US Equity	Energy	US
Public Service Enterprise	PEG US Equity	Energy	US
SCANA Corp	SCG US Equity	Energy	US
Sempra Energy	SRE US Equity	Energy	US
South Jersey Industries Inc	SJI US Equity	Energy	US
Southwest Gas Corp	SWX US Equity	Energy	US
Spark Infrastructure Group	SKI AU Equity	Energy	Australia
Spire Inc	SR US Equity	Energy	US
SSE PLC	SSE LN Equity	Energy	UK
The Southern Company	SO US Equity	Energy	US
TransCanada Corp	TRP CN Equity	Energy	Canada
UGI Corporation	UGI US Equity	Energy	US
United Utilities Group PLC	UU/ LN Equity	Energy	UK
Unitil Corporation	UTL US Equity	Energy	US
Vector Limited	VCT NZ Equity	Energy	New Zealand
Vectren Corporation	WC US Equity	Energy	US
WEC Energy Group	WEC US Equity	Energy	US
Westar Energy	WR US Equity	Energy	US
WGL Holdings Inc	WGL US Equity	Energy	US
Xcel Energy Inc	XEL US Equity	Energy	US
American States Water Co	AWR US Equity	Water	US
American Water Works co Inc	AWK US Equity	Water	US
Aqua America Inc	WTR US Equity	Water	US
Artesian Resources Corp	ARTNA US Equity	Water	US
California Water Service Group	CWT US Equity	Water	US
Connecticut Water Service Group	CTWS US Equity	Water	US
Middlesex Water co	MSEX US Equity	Water	US
SJW Corp	SJW US Equity	Water	US
York Water Co	YORW US Equity	Water	US
Pennon Group PLC	PNN LN Equity	Water	UK
Severn Trent PLC	SVT LN Equity	Water	UK

Tollroads

Company name	Ticker	Country
ABERTIS INFRAESTRUCTURAS SA	ABE SM Equity	Spain
ASTM SPA	AT IM Equity	Italy
ATLANTIA SPA	ATL IM Equity	Italy
GRUPE EUROTUNNEL SE - REGR	GET FP Equity	France
Societa Iniziative Autostradali e Servizi SpA	SIS IM Equity	Italy
TRANSURBAN GROUP	TCL AU Equity	Australia

North American pipelines

Company name	Ticker	Gas vs Oil	Country
Boardwalk Pipeline Partners LP	BWP US Equity	Gas	US
EQT Midstream Partners LP	EQT US Equity	Gas	US
Spectra Energy Partners LP	SEP US Equity	Gas	US
T C Pipelines LP	TCP US Equity	Gas	US
Williams Partners LP	WPZ US Equity	Gas	US
Kinder Morgan Inc/DE	KMI US Equity	Gas	US
Buckeye Partners LP	BPL US Equity	Oil	US
Enbridge Energy Partners LP	EEP US Equity	Oil	US
Enterprise Products Partnership LP	EPD US Equity	Oil	US
Magellan Midstream Partners LP	MMP US Equity	Oil	US
Plains All American Pipeline LP	PAA US Equity	Oil	US
Sunoco Logistics Partners LP	SXL US Equity	Oil	US
ONEOK Partners LP	OKE US Equity	Mixed	US
Enbridge Inc	ENB CN Equity	Mixed	Canada
TransCanada Corp	TRP US Equity	Mixed	US

Class 1 railroads

Company name	Ticker	US vs non-US Class 1	Country
CSX Corporation	CSX US Equity	US Class 1	US
Kansas City Southern	KSU US Equity	US Class 2	US
Norfolk Southern Corporation	NSC US Equity	US Class 3	US
Union Pacific Railroad	UNP US Equity	US Class 4	US
Canadian National Railway Company	CNR CN Equity	Non-US Class 1	Canada
Canadian Pacific Railway Limited	CP CN Equity	Non-US Class 1	Canada
Asciano Limited	AIO AU Equity	Non-US Class 1	Australia
Aurizon Holdings Ltd	AZJ AU Equity	Non-US Class 1	Australia
Daqin Railway Co. Ltd	601006 CH Equity	Non-US Class 1	China
Genessee & Wyoming	GWR US Equity	Non-US Class 1	US

B. Application of Standard & Poor's credit rating criteria

The tables below are based on criteria that Standard & Poor's applies to assess the core credit rating of Aurizon Network.²³⁷ There are two core ratios and a number of supplementary coverage and payback ratios, however the key ratio focused on by Standard & Poor's is the FFO/Debt cover. Standard & Poor's has a "standard volatility" set of ratios that it applies to most businesses, and a "low volatility" set that it applies to businesses that are generally regulated. Table B.1 shows the "low volatility" set of ratios that Standard & Poor's applies to Aurizon Network and to regulated energy businesses.²³⁸ For an FFO/Debt ratio in the range of 13 per cent to 23 per cent, Standard & Poor's would assess the financial risk of Aurizon Network to be "intermediate" (rating 3).

Table B.1: Standard & Poor's Low Volatility ratios assessment of Financial Risk Profile

	Core ratios				Supplementary coverage ratios				Supplementary payback ratios	
	FFO / debt (%)		Debt / EBITDA (x)		FFO / cash interest (x)		EBITDA / interest (x)		CFO / debt (%)	
	From	To	From	To	From	To	From	To	From	
[1] Minimal		35+		< 2		> 8		> 13		> 30
[2] Modest	23	35	3	2	5	8	7	13		20
[3] Intermediate	13	23	4	3	3	5	4	7		12
[4] Significant	9	13	5	4	2	3	2.5	4		8
[5] Aggressive	6	9	6	5	1.5	2	1.5	2.5		5
[6] Highly leveraged		< 6		> 6		< 1.5		< 1.5		< 5

Source: Standard & Poor's

Based on its assessment of Aurizon Network having a "strong" business risk profile, and an "intermediate" financial profile, the "core" credit rating would be in the range of A- / BBB+. That is, at the intersection of these two profiles. If the ratios indicate a "weaker intermediate" then a BBB+ credit rating is indicated, and if a "strong intermediate" position is indicated (e.g. FFO/Debt greater than 20 per cent) then an A- credit rating could be assessed.

Table B.2: Determination of Standard & Poor's "core credit rating"

		Financial risk profile					
		1 Minimal	2 Modest	3 Intermediate	4 Significant	5 Aggressive	6 Highly leveraged
Business risk profile	1 Excellent	AAA / AA+	AA	A+ / A	A-	BBB	BBB- / BB+
	2 Strong	AA / AA-	A+ / A	A- / BBB+	BBB	BB+	BB
	3 Satisfactory	A / A-	BBB+	BBB / BBB-	BBB- / BB+	BB	B+

Source: Standard & Poor's

Table B.2 shows that given Aurizon Network's "strong" business risk profile, if its financial risk profile were to be considered "significant" (rating 4), then a core credit rating of BBB would be implied.

²³⁷ See Standard & Poor's (17 May, 2017), *Aurizon Network Pty Ltd*, Ratings Direct; and Standard & Poor's (19 November, 2013), *Corporate Methodology*, Ratings Direct.

²³⁸ We note that Standard & Poor's has an "excellent" (rating 1) business risk profile for regulated energy businesses, which applies lower credit metric hurdles to achieve a BBB+ credit rating.

C. Relative bond performance of North American and South African transport businesses

Introduction

The case studies in this appendix examine the relative debt premiums of a number of North American and South African railways included in CEG's list of businesses that it considered demonstrate the existence of a permanent 'coal premium'. In each case the relativity of debt risk premiums is measured against the appropriate benchmark credit rating for the same interpolated term to maturity. We consider that none of these cases provides evidence supporting the existence of a permanent 'coal premium' that is relevant to Aurizon Network's circumstances.

CSX Corp

In Figure C.1 below we display the debt risk premium of a CSX Corp bond maturing in May, 2027.²³⁹ Debt risk premiums were calculated relative to the relevant interpolated US Treasury bond.²⁴⁰ We also interpolated the relevant BBB+ (Industrials) debt risk premium, and calculated the BBB+ debt risk premium appropriate to the remaining term on the CSX bond.²⁴¹ The results in Figure C.1 show that the CSX bond has traded at a premium to the interpolated BBB+ benchmark bond, and confirms that the debt risk premium of CSX increased materially between January 2015 and January 2016. However, there is no evidence to link this appreciation in the debt risk premium to a 'coal premium'. On the contrary, the debt risk premium differential (CSX vs BBB+) behaves in the opposite manner to what would be expected if the differential was caused by the business's coal operations.

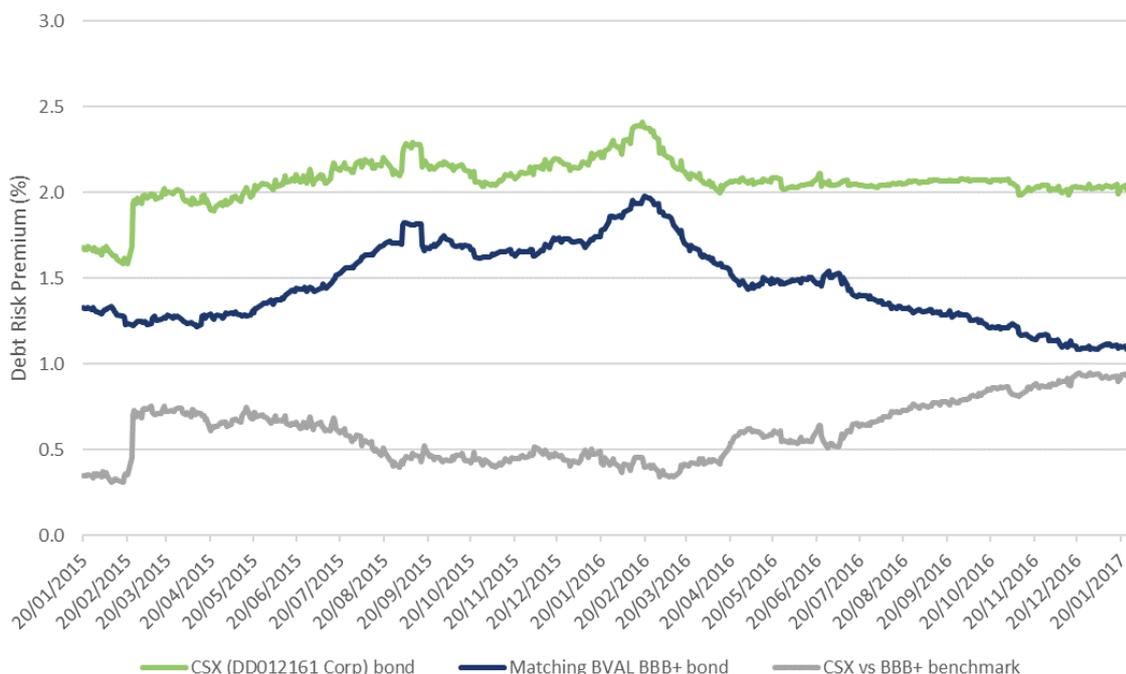
Over the past two years CSX has suffered large falls in coal revenue due to the fall in gas prices, and consequent substitution of natural gas for coal power generation. It has also suffered falls in intermodal traffic. If coal were the primary driver of the CSX bond's yield premium over the BBB+ benchmark we would not expect this premium to have risen during the last two quarters of 2016, during which time CSX's coal shipments were recovering substantially. We have noted in our discussion of asset beta that the equity cushion of companies with coal-mining operations has also improved over the last two quarters of 2016.

²³⁹ The bond's identifier is DD012161 Corp.

²⁴⁰ The US Treasury bonds used for the interpolation were BV100082 Index and BV150082 Index.

²⁴¹ The US BBB+ (Industrial) benchmarks interpolated were IGUUA10 Index and IGUUA15 Index.

Figure C.1: CSX bond – debt risk premium vs BBB+ (Industrial) debt risk premium



Source: Bloomberg

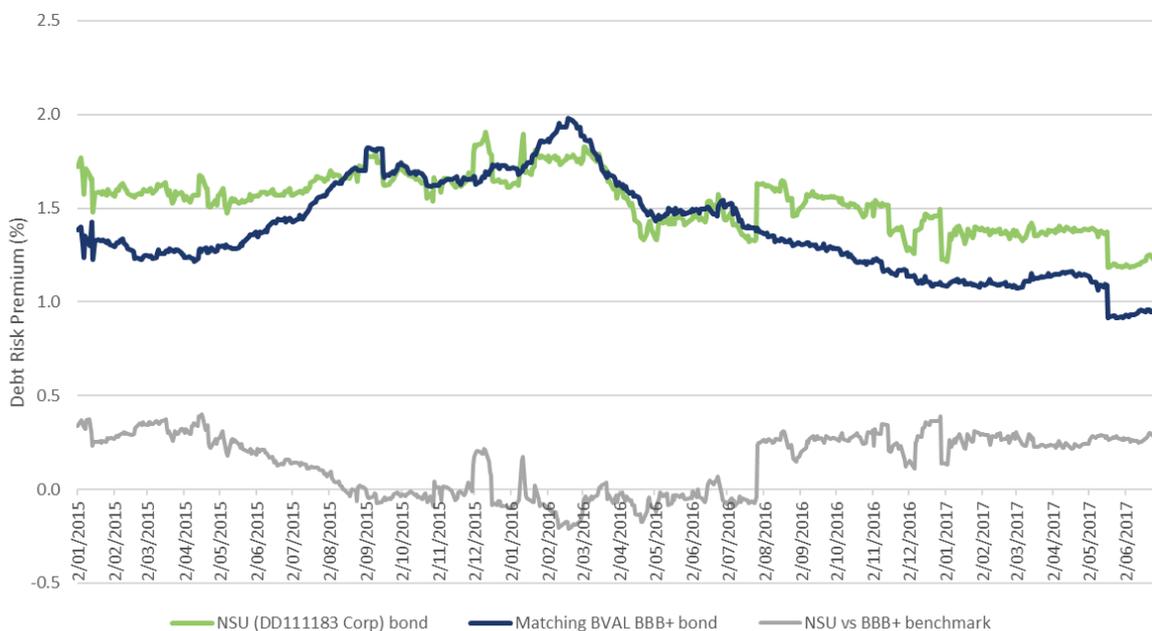
In summary, while CSX’s debt risk premium increased between January 2015 and January 2016, it did not increase materially relative to the BBB+ benchmark. CSX’s experience bears no relationship to Aurizon Network, which has not experienced large falls in coal-related revenue. While specific North American issues that impact domestic thermal coal railings traffic can have a material impact on CSX, the vast majority of its traffic is not coal-related, and it is therefore not plausible that the consistently higher yield on its bond is due to a permanent ‘coal premium’.

Norfolk Southern (NSU)

Figure C.2 below displays the recent relative debt risk premium experience of Norfolk Southern (NSU) railway compared with the US BBB+ (Industrial) benchmark. Again, we find an increase in the debt risk premium between January 2015 and January 2016, consistent with CEG’s report, but there is no evidence of a ‘coal premium’ that is relevant to Aurizon Network’s circumstances. Between January 2015 and January 2016, NSU’s debt risk premium actually fell relative to the BBB+ benchmark.

Between August 2015 and July 2016 NSU’s debt risk premium was at or slightly below the interpolated BBB+ benchmark. This was the period in which North American coal railings were falling. After July 2016, NSU’s debt risk premium developed a premium of 20-30bp relative to the benchmark, but this was during a period when North American coal railings were increasing again, as were the seaborne export metallurgical and thermal coal prices.

Figure C.2: NSU bond – debt risk premium vs BBB+ (Industrial) debt risk premium

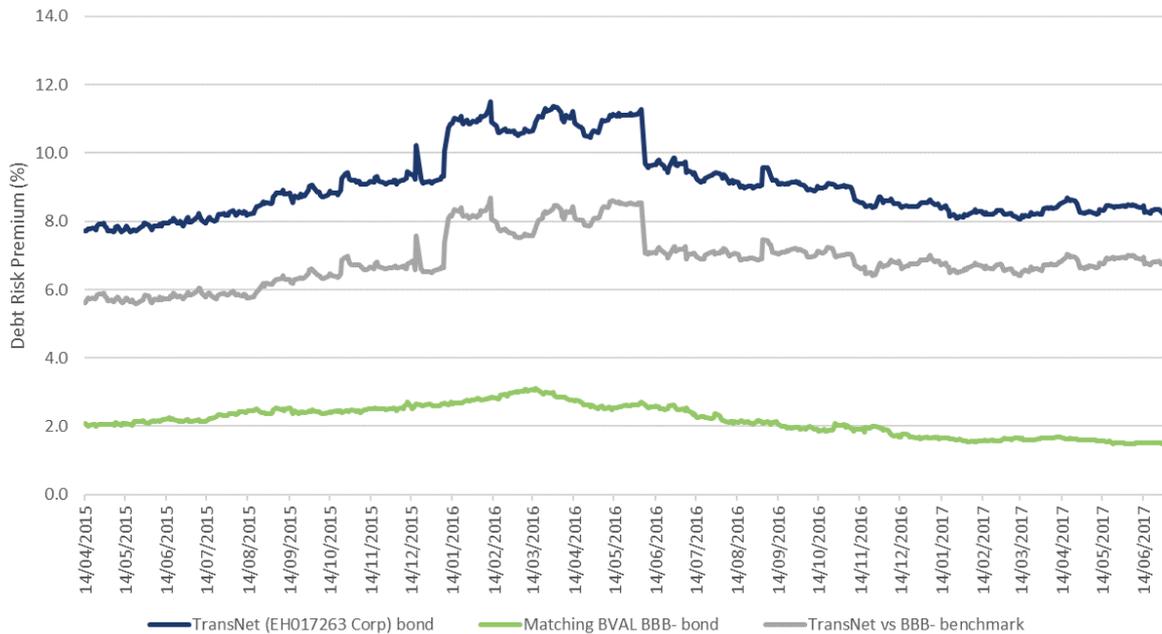


Source: Bloomberg, and Incenta analysis

Transnet Soc Ltd

Apart from Aurizon Network, South Africa’s Transnet Soc Ltd is the most coal traffic-intensive of the group of coal-carrying railways identified by CEG, and its coal operations are most comparable to those of Aurizon Network, since both are dependent on export. In Figure C.3 below we show the debt risk premium of one of the two USD denominated bonds that Transnet Soc Ltd issued in the US private placement market. Prior to December 2015, Transnet Soc Ltd’s bond traded at a 650 basis points premium to the interpolated US BBB- (Industrials) benchmark. Given that this is a South African business that is subject to a degree of sovereign risk, and that Transnet Soc Ltd is engaged in ports, liquids pipelines and rail engineering, it not surprising that such a premium exists. We consider it likely that the spike in the debt risk premium differential during December 2015 was due to falling export coal prices. However, as coal prices began to recover in the second half of calendar 2016, in June-July 2016 the Transnet Soc Ltd bond’s premium fell back to the pre-spike level of approximately 650 basis points above the BBB- benchmark. Since then the price of coal has continued to increase, but there has been some continuing upward drift in the debt risk premium differential. Given the circumstances, it is not likely that this drift has been caused by Transnet Soc Ltd’s coal operations.

Figure C.3: Transnet Soc Ltd (USD bond) - Debt risk premium vs interpolated BBB- benchmark



Source: Bloomberg, and Incenta analysis

In summary, the Transnet Soc Ltd case does provide evidence that the fall in coal prices caused a spike in its bond’s debt risk premium in January, 2016, which occurred when coal prices reached their lowest point. However, this effect was short-lived, since the higher debt risk premium dissipated once coal prices began to move upwards in June 2016. The premium throughout 2017 has been at approximately the level it was prior to the temporary spike. Hence, the case provides no evidence of a permanent ‘coal premium.’

D. Bond sample

Selection of bonds

The process used to select bonds was as follows:

- The Bloomberg bond search criteria was first set to “consolidate duplicate bonds”;
- For each of the three credit rating agencies, Standard & Poor’s, Moody’s and Fitch, a search was conducted using Bloomberg’s bond search facility (SRCH), with the following requirements:
 - Security Status – include: active bonds
 - Country of Risk – include: Australia
 - [Credit rating agency] – between: A- and BBB (or equivalent)
 - Currency – include: AUD or USD or GBP or EUR
 - Maturity – greater than or equal to 30 June 2018
 - Maturity Type – exclude: Perpetual
 - Security Type – exclude: Inflation Linked Note
 - BIS Classification – exclude: Banks or Commercial Finance or Consumer Finance or Diversified Banks or Financial Services or Funds & Trusts or Life Insurance or Property & Casualty Insurance or Real Estate
- For each of the three credit rating agencies, Standard & Poor’s, Moody’s and Fitch, an additional search was conducted using Bloomberg’s bond search facility (SRCH), with the same requirements as above except:
 - BIS Classification – include: Real Estate
- The 6 groups of selected bonds (i.e. for the three credit rating agencies with and without real estate bonds) were then aggregated, and:
 - Bonds not rated by one or more credit rating agencies were eliminated;
 - Bonds with a remaining term to maturity less than 1 year or greater than 20 years (measured from 16 June 2017) were eliminated;
 - Bonds whose maturity designation was not either “At maturity”, “Call” or “Put” were eliminated; and
 - Bonds issued into the European market by Coca-Cola Amatil denominated in AUD were eliminated.

Members of the bond sample

Issuer Name	Credit rating	Currency	Bloomberg ID	Industry
AUD denominated bonds without options issued in the Australian market				
AusNet Services Holdings Pty Ltd	A-	AUD	AM4028255 Corp	Utilities
AusNet Services Holdings Pty Ltd	A-	AUD	EJ2512352 Corp	Utilities
AusNet Services Holdings Pty Ltd	A-	AUD	EJ2514606 Corp	Utilities
AusNet Services Holdings Pty Ltd	A-	AUD	EI6263145 Corp	Utilities
AusNet Services Holdings Pty Ltd	A-	AUD	EJ5424159 Corp	Utilities
Australia Pacific Airports Melbourne Pty Ltd	A-	AUD	QZ9328522 Corp	Transportation & Logistics
Australia Pacific Airports Melbourne Pty Ltd	A-	AUD	QJ5397360 Corp	Transportation & Logistics
Australia Pacific Airports Melbourne Pty Ltd	A-	AUD	UV8008012 Corp	Transportation & Logistics
Australia Pacific Airports Melbourne Pty Ltd	A-	AUD	EJ6958775 Corp	Transportation & Logistics
BWP Trust	A-	AUD	EK2774488 Corp	Real Estate
DEXUS CPA Trust	A-	AUD	EJ4653428 Corp	Real Estate
DEXUS CPA Trust	A-	AUD	EJ4653378 Corp	Real Estate
DEXUS Finance Pty Ltd	A-	AUD	QJ5397659 Corp	Real Estate
DEXUS Finance Pty Ltd	A-	AUD	EJ3477605 Corp	Real Estate
ETSA Utilities Finance Pty Ltd	A-	AUD	EI6011817 Corp	Utilities
General Property Trust	A-	AUD	EJ3202615 Corp	Real Estate
General Property Trust	A-	AUD	EI9634433 Corp	Real Estate
ICPF Finance Pty Ltd	A-	AUD	AN1618205 Corp	Real Estate
ICPF Finance Pty Ltd	A-	AUD	EJ2419541 Corp	Real Estate
New Zealand Milk Australasia Pty Ltd	A-	AUD	EJ2023566 Corp	Food & Beverage
QIC Finance Shopping Center Fund Pty Ltd	A-	AUD	EJ5223155 Corp	Real Estate
SGSP Australia Assets Pty Ltd	A-	AUD	LW4748379 Corp	Utilities
SGSP Australia Assets Pty Ltd	A-	AUD	EK1048710 Corp	Utilities
SGSP Australia Assets Pty Ltd	A-	AUD	EJ5984160 Corp	Utilities
Stockland Trust	A-	AUD	EI4751000 Corp	Real Estate
Stockland Trust	A-	AUD	EJ8128716 Corp	Real Estate
Victoria Power Networks Finance Pty Ltd	A-	AUD	EI6011379 Corp	Utilities
Victoria Power Networks Finance Pty Ltd	A-	AUD	EI6010694 Corp	Utilities
Wesfarmers Ltd	A-	AUD	EK8989288 Corp	Supermarkets & Pharmacies
Wesfarmers Ltd	A-	AUD	EJ5679471 Corp	Supermarkets & Pharmacies
Wesfarmers Ltd	A-	AUD	EJ1021298 Corp	Supermarkets & Pharmacies
Wesfarmers Ltd	A-	AUD	EK9024770 Corp	Supermarkets & Pharmacies
APT Pipelines Ltd	BBB	AUD	EI3253362 Corp	Pipeline
Brisbane Airport Corp Pty Ltd	BBB	AUD	EI6204404 Corp	Transportation & Logistics
Brisbane Airport Corp Pty Ltd	BBB	AUD	EJ8798880 Corp	Transportation & Logistics
ConnectEast Finance Pty Ltd	BBB	AUD	EJ8026167 Corp	Industrial Other
Crown Group Finance Ltd	BBB	AUD	EK5876389 Corp	Casinos & Gaming
Downer Group Finance Pty Ltd	BBB	AUD	EJ6876910 Corp	Industrial Other
Global Switch Property Australia Pty Ltd	BBB	AUD	EJ9875117 Corp	Real Estate
Perth Airport Pty Ltd	BBB	AUD	EJ7588209 Corp	Transportation & Logistics
Perth Airport Pty Ltd	BBB	AUD	EK1306886 Corp	Transportation & Logistics
Perth Airport Pty Ltd	BBB	AUD	JK8897114 Corp	Transportation & Logistics
QPH Finance Co Pty Ltd	BBB	AUD	EJ7646361 Corp	Industrial Other
QPH Finance Co Pty Ltd	BBB	AUD	EK3554137 Corp	Industrial Other
Sydney Airport Finance Co Pty Ltd	BBB	AUD	EI6849026 Corp	Transportation & Logistics
Sydney Airport Finance Co Pty Ltd	BBB	AUD	EG0640763 Corp	Transportation & Logistics
Sydney Airport Finance Co Pty Ltd	BBB	AUD	EG0219857 Corp	Transportation & Logistics

Issuer Name	Credit rating	Currency	Bloomberg ID	Industry
Woolworths Ltd	BBB	AUD	EJ0949291 Corp	Supermarkets & Pharmacies
AquaSure Finance Pty Ltd	BBB+	AUD	EJ9637749 Corp	Waste & Environment Services & Equip.
Aurizon Network Pty Ltd	BBB+	AUD	EJ8893137 Corp	Transportation & Logistics
Australian Gas Networks Vic 3 Pty Ltd	BBB+	AUD	EK6519434 Corp	Utilities
Caltex Australia Ltd	BBB+	AUD	EI8834174 Corp	Refining & Marketing
Coca-Cola Amatil Ltd	BBB+	AUD	EJ4333419 Corp	Food & Beverage
Mirvac Group Finance Ltd	BBB+	AUD	EJ8671962 Corp	Real Estate
Mirvac Group Finance Ltd	BBB+	AUD	QZ3305039 Corp	Real Estate
AUD denominated bonds with options issued in the Australian market				
Airport Motorway Trust	A-	AUD	EJ9571450 Corp	Industrial Other
BWP Trust	A-	AUD	AN2895786 Corp	Real Estate
DEXUS Finance Pty Ltd	A-	AUD	AN3181293 Corp	Real Estate
DEXUS Finance Pty Ltd	A-	AUD	QJ4034261 Corp	Real Estate
GPT Wholesale Office Fund No 1	A-	AUD	AM4186863 Corp	Real Estate
GPT Wholesale Office Fund No 1	A-	AUD	EK9073694 Corp	Real Estate
QIC Finance Shopping Center Fund Pty Ltd	A-	AUD	UV5159297 Corp	Real Estate
QIC Finance Shopping Center Fund Pty Ltd	A-	AUD	EJ9349006 Corp	Real Estate
Stockland Trust	A-	AUD	QJ7681795 Corp	Real Estate
WSO Finance Pty Ltd	A-	AUD	AM6441365 Corp	Transportation & Logistics
WSO Finance Pty Ltd	A-	AUD	AN0014679 Corp	Transportation & Logistics
WSO Finance Pty Ltd	A-	AUD	LW3418610 Corp	Transportation & Logistics
AGL Energy Ltd	BBB	AUD	EK5737813 Corp	Utilities
Ale Direct Property Trust	BBB	AUD	EK3042315 Corp	Real Estate
Ale Direct Property Trust	BBB	AUD	AM6596648 Corp	Real Estate
APT Pipelines Ltd	BBB	AUD	QZ8701372 Corp	Pipeline
ConnectEast Finance Pty Ltd	BBB	AUD	EK7582084 Corp	Industrial Other
DBNGP Finance Co Pty Ltd	BBB	AUD	EJ4265850 Corp	Utilities
Downer Group Finance Pty Ltd	BBB	AUD	EK7841308 Corp	Industrial Other
Energy Partnership Gas Pty Ltd	BBB	AUD	EK9545295 Corp	Renewable Energy
QPH Finance Co Pty Ltd	BBB	AUD	LW2393780 Corp	Industrial Other
Transurban Queensland Finance Pty Ltd	BBB	AUD	EK6279310 Corp	Industrial Other
Transurban Queensland Finance Pty Ltd	BBB	AUD	QZ7667723 Corp	Industrial Other
Investa Office Fund	BBB+	AUD	AM9021743 Corp	Real Estate
Shopping Centres Australasia Property Retail Trust	BBB+	AUD	EK8553381 Corp	Real Estate
Shopping Centres Australasia Property Retail Trust	BBB+	AUD	AN6454895 Corp	Real Estate
United Energy Distribution Pty Ltd	BBB+	AUD	QZ4475534 Corp	Utilities
Bonds issued in foreign markets without options				
AusNet Services Holdings Pty Ltd	A-	EUR	EK7552160 Corp	Utilities
AusNet Services Holdings Pty Ltd	A-	AUD	EK3489227 Corp	Utilities
AusNet Services Holdings Pty Ltd	A-	EUR	EK0554445 Corp	Utilities
AusNet Services Holdings Pty Ltd	A-	EUR	EJ7525219 Corp	Utilities
Australia Pacific Airports Melbourne Pty Ltd	A-	EUR	EJ8457800 Corp	Transportation & Logistics
Dexus Diversified Trust / Dexus Office Trust	A-	USD	EI6075044 Corp	Real Estate

Issuer Name	Credit rating	Currency	Bloomberg ID	Industry
SGSP Australia Assets Pty Ltd	A-	USD	LW9385011 Corp	Utilities
SGSP Australia Assets Pty Ltd	A-	USD	EJ3849779 Corp	Utilities
SGSP Australia Assets Pty Ltd	A-	EUR	EK3157451 Corp	Utilities
SGSP Australia Assets Pty Ltd	A-	GBP	EI5615311 Corp	Utilities
Transurban Finance Co Pty Ltd	A-	USD	EI1592290 Corp	Industrial Other
Wesfarmers Ltd	A-	EUR	EJ2973612 Corp	Supermarkets & Pharmacies
Wesfarmers Ltd	A-	EUR	EK5233391 Corp	Supermarkets & Pharmacies
AGL Energy Ltd	BBB	USD	JK0121299 Corp	Utilities
AGL Energy Ltd	BBB	USD	JK0123196 Corp	Utilities
Amcors Ltd/Australia	BBB	EUR	EI6030205 Corp	Containers & Packaging
Amcors Ltd/Australia	BBB	EUR	EJ5962760 Corp	Containers & Packaging
APT Pipelines Ltd	BBB	EUR	EK8055148 Corp	Pipeline
APT Pipelines Ltd	BBB	USD	EJ3906165 Corp	Pipeline
APT Pipelines Ltd	BBB	GBP	EJ4508010 Corp	Pipeline
APT Pipelines Ltd	BBB	EUR	EK8055387 Corp	Pipeline
APT Pipelines Ltd	BBB	GBP	EK8055262 Corp	Pipeline
CIMIC Finance Ltd	BBB	USD	EI1562293 Corp	Industrial Other
CIMIC Finance USA Pty Ltd	BBB	USD	EI7021476 Corp	Industrial Other
Sydney Airport Finance Co Pty Ltd	BBB	USD	EI4214900 Corp	Transportation & Logistics
Sydney Airport Finance Co Pty Ltd	BBB	USD	EJ4068577 Corp	Transportation & Logistics
Sydney Airport Finance Co Pty Ltd	BBB	EUR	EK1561159 Corp	Transportation & Logistics
Woolworths Ltd	BBB	USD	EI4044356 Corp	Supermarkets & Pharmacies
Woolworths Ltd	BBB	USD	EI6348474 Corp	Supermarkets & Pharmacies
Aurizon Network Pty Ltd	BBB+	EUR	EK4685294 Corp	Transportation & Logistics
Aurizon Network Pty Ltd	BBB+	EUR	LW0777554 Corp	Transportation & Logistics
Brambles USA Inc	BBB+	USD	EI2000491 Corp	Containers & Packaging
GAIIF Bond Issuer Pty Ltd	BBB+	USD	QZ5613174 Corp	Real Estate
Goodman Australia Finance Pty Ltd	BBB+	GBP	EH4421333 Corp	Real Estate
Goodman Funding Pty Ltd	BBB+	USD	EI4595803 Corp	Real Estate
Goodman Funding Pty Ltd	BBB+	USD	EI6215608 Corp	Real Estate
Goodman Funding Pty Ltd	BBB+	USD	EJ0971972 Corp	Real Estate
Transurban Finance Co Pty Ltd	BBB+	USD	EI1592092 Corp	Industrial Other
Transurban Finance Co Pty Ltd	BBB+	AUD	EI1608021 Corp	Industrial Other
Woodside Finance Ltd	BBB+	USD	EH7350695 Corp	Exploration & Production
Bonds issued in foreign markets with options				
Australia Pacific Airports Melbourne Pty Ltd	A-	EUR	EK5369849 Corp	Transportation & Logistics
Stockland Trust	A-	EUR	EK5645834 Corp	Real Estate
Amcors Finance USA Inc	BBB	USD	JK8498749 Corp	Containers & Packaging
APT Pipelines Ltd	BBB	USD	EK8078215 Corp	Pipeline
APT Pipelines Ltd	BBB	USD	AM7968663 Corp	Pipeline
APT Pipelines Ltd	BBB	USD	EK8078397 Corp	Pipeline
Sydney Airport Finance Co Pty Ltd	BBB	USD	EK8787450 Corp	Transportation & Logistics
Sydney Airport Finance Co Pty Ltd	BBB	USD	JK8763837 Corp	Transportation & Logistics
Brambles Finance Ltd	BBB+	EUR	EK3156859 Corp	Transportation & Logistics
Brambles USA Inc	BBB+	USD	QJ2217868 Corp	Containers & Packaging

Issuer Name	Credit rating	Currency	Bloomberg ID	Industry
Transurban Finance Co Pty Ltd	BBB+	EUR	EJ8616397 Corp	Industrial Other
Transurban Finance Co Pty Ltd	BBB+	EUR	EK4655081 Corp	Industrial Other
Transurban Finance Co Pty Ltd	BBB+	EUR	EK9118226 Corp	Industrial Other
Transurban Finance Co Pty Ltd	BBB+	USD	QJ4132016 Corp	Industrial Other
Transurban Finance Co Pty Ltd	BBB+	USD	QZ4183500 Corp	Industrial Other
WEA Finance LLC	BBB+	USD	AN0704733 Corp	Real Estate
WEA Finance LLC / Westfield UK & Europe Finance PLC	BBB+	USD	EK4866613 Corp	Real Estate
WEA Finance LLC / Westfield UK & Europe Finance PLC	BBB+	USD	QJ0166893 Corp	Real Estate
WEA Finance LLC / Westfield UK & Europe Finance PLC	BBB+	USD	EK4866795 Corp	Real Estate
Westfield America Management Ltd	BBB+	GBP	AM9809360 Corp	Real Estate
Westfield America Management Ltd	BBB+	GBP	AM9809428 Corp	Real Estate
Woodside Finance Ltd	BBB+	USD	EI6641167 Corp	Exploration & Production
Woodside Finance Ltd	BBB+	USD	EK7758478 Corp	Exploration & Production
Woodside Finance Ltd	BBB+	USD	QZ3723793 Corp	Exploration & Production