Synergies
ECONOMIC CONSULTING

2018 WACC methodology review for WA railway networks

Response on behalf of Arc Infrastructure to the Economic Regulation Authority's Consultation Paper

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Executive Summary

Synergies has been engaged by Arc Infrastructure (Arc) to respond on its behalf to the Economic Regulation Authority's (the ERA's) Consultation Paper on the method for determining the weighted average cost of capital for railway networks. The following sections provide an overview of our recommendations for each of the WACC parameters, having regard to both the ERA's commentary in the Consultation Paper, as well as its 2015 Final Decision for the previous WACC review.

Gearing

In the 2015 WACC review, the ERA adopted a gearing ratio of 25% for Arc. Empirical evidence from the ERA's 2015 benchmark sample of listed entities shows little change in gearing. As such, we recommend no change to Arc's gearing ratio.

Return on equity

The ERA calculates the return on equity using the SL CAPM (Sharpe-Lintner Capital Asset Pricing Model). This requires the estimation of the following three parameters.

Risk-free rate

The ERA currently calculates the risk-free rate based on a short-term average (40 days) of the observed yield on 10-year Commonwealth Government Security bonds. The risk-free rate is updated annually.

Our recommendation is that the ERA retain its current approach to the calculating the risk-free rate, as it accurately reflects the long-term investment horizon associated with railway infrastructure, as required by the Code.

Beta

The ERA currently adopts an asset beta of 0.7 for Arc. Our recommendation is that there is sufficient evidence for an increase to at least 0.75. Arc's prevailing risk profile is characterised by increasing contract uncertainty and exposure to commodity risk. We also present a range of evidence that the ERA's previous comparisons between Arc and Aurizon are no longer appropriate.

Market risk premium

Since the previous WACC review, the ERA has used the Ibbotson MRP, Wright MRP, and Dividend Growth Model (DGM) approaches to inform its MRP estimate. In the

Consultation Paper, the ERA proposes to now rely only on the Ibbotson MRP and DGM, in part motivated by criticism of the ERA's MRP estimation approach by Partington and Satchell in their reports to the AER. We demonstrate that Partington and Satchell's concerns about the ERA's unit root and cointegration testing do not preclude the use of the Wright MRP. In addition, we have also recommended that the ERA provide more guidance as to the weights it applies to the various methods it uses to inform its MRP estimate.

Return on debt

Debt risk premium

We present evidence that the estimated debt risk premiums resulting from the ERA's in-house approach and Synergies' preferred approach have been largely similar since the 2015 Final Decision was handed down. Nevertheless, we maintain the view that a transparent and readily replicable method is preferable to that used by the ERA.

Debt raising costs

We endorse the ERA's proposal to adopt debt raising costs of 10 basis points per annum (bppa).

Gamma

The ERA currently adopts a gamma value of 0.4 from a range of 0.3 to 0.5. This range is defined by the following approaches:

- The equity ownership approach (gamma = 0.40) [non-market approach]
- The taxation statistics approach (gamma = 0.30) [non-market approach]
- Dividend drop off approach (0.30-0.50) [market approach]

The ERA has stated that it places the most weight on the equity ownership approach.

In light of more recent dividend drop off study evidence, as well as support for a gamma of zero from finance theory and financial practitioners, we have proposed a modified range for gamma informed by the following approaches:

- The equity ownership approach (gamma = 0.40) [non-market]
- The taxation statistics approach (gamma = 0.30) [non-market]
- Dividend drop-off studies (gamma = 0.25) [market]

- Finance theory and financial practitioner evidence (gamma = 0.00) [market]

As a result, our recommended value for gamma is 0.25, which is the average of these four approaches (rounded to the nearest 0.05).

Inflation

An estimate of expected inflation is required in order to convert the nominal WACC into a real WACC. The ERA calculates inflation based on the yield differential between Treasury bonds and Treasury indexed bonds.

Whilst this approach is not without its limitations, in our view it provides a reasonable basis for the estimation of the rate of inflation.

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Figures and Tables

1 Introduction

Synergies has been engaged by Arc Infrastructure (Arc) to respond on its behalf to the Economic Regulation Authority's (the ERA's) Consultation Paper on the method for determining the weighted average cost of capital for railway networks.

The remainder of this report is structured as follows:

- Chapter 2 - Gearing
- Chapter 3 – Return on equity (including the risk-free rate, beta and the market risk premium)
- Chapter 4 – Return on debt
- Chapter 5 – Gamma (the value of imputation credits)
- Chapter 6 – Inflation
- Chapter 7 - Conclusion

2 Gearing

2.1 Introduction

This section identifies an appropriate long-term target gearing ratio for Arc based on domestic and international entities with comparable risks, and having regard to relevant regulatory precedent.

In a perfect capital market, finance theory provides that the valuation of a firm is unaffected by its capital structure. However, in practice, the assumptions underpinning a perfect capital market do not hold and as such capital structure can have valuation impacts. Clearly, this is relevant to a consideration of the capital structure applying to Arc.

The assessment of capital structure (or gearing) in the WACC calculation is therefore based on an assessment of an 'optimal' long-term target capital structure for Arc given its risk profile and the industry within which it operates. In practice, we see numerous and sometimes disparate factors affecting the capital structure adopted by firms within the same industry (for example, different financing strategies, investment needs, owner preferences, tax treatments).

Of all the WACC parameters, determining the optimal benchmark capital structure is especially imprecise. In theory, we would expect to observe the gearing levels of firms in the same industry to cluster within a range, although in practice this range could be quite wide. The capital structure assumption is similarly based on establishing what the maximum efficient long-term gearing level for the business might be. It is not based on the firm's actual gearing. This also ensures that the firm is not rewarded for maintaining an inefficient capital structure.

Over time, we tend not to observe material changes in benchmark gearing levels, particularly in a regulated context.

2.2 Gearing estimates for listed comparators

Table 1 displays the gearing estimates for each of the firms in the comparator set previously adopted by the ERA in the 2015 Final Decision.[1] We provide a more detailed discussion of the comparator set in Section 3. The average (and median) gearing ratio for the comparator sample is 19%, a reduction of only 1 percentage point from 2015, even

[1] ERA (2015). Review of the method for estimating the weighted average cost of capital for the regulated railway networks – Final decision, 18 September.

with the removal of Asciano and Toll from the sample due to delisting. Gearing estimates range from 11% for Port of Tauranga, up to 32% for Genessee & Wyoming Inc.

Table 1 Gearing ratios for benchmark sample

	ERA 2014 estimate	ERA 2015 estimate	Synergies 2018 estimate
Genesee & Wyoming Inc.	22%	23%	32%
Union Pacific Corporation	14%	11%	12%
Norfolk Southern Corporation	24%	22%	22%
Kansas City Southern	20%	15%	17%
CSX Corporation	26%	24%	22%
Canadian Pacific Railway	24%	18%	19%
Canadian National Railway	16%	14%	13%
Aurizon Holdings	17%	18%	22%
Port of Tauranga	13%	11%	11%
Toll Holdings Limited	20%	23%	Delisted
Asciano	38%	36%	Delisted
Average	**22%**	**20%**	**19%**

Note: Gearing estimates are expressed as debt-to-value ratios, and have been measured over a five-year timeframe. Equity is measured as current market capitalisation, while debt is measured as net debt, consistent with the previous approach of the ERA.

Source: ERA analysis, Bloomberg, Synergies analysis

Another source of evidence on gearing is from regulatory precedent. In the previous review, the ERA did acknowledge that higher gearing ratios have been applied in other regulatory decisions (e.g. 50% in the case of the Interstate network for ARTC,[2] and 55% in the case of Aurizon Network). However, the ERA considered that this evidence was not determinative, and opted to place more weight on evidence from its chosen comparator set. Particularly in the case of Aurizon, it was observed that the benchmark sample that underpinned the estimate was substantially different from the sample of firms the ERA deemed relevant for Arc.

2.3 Synergies' recommendation for gearing

Considering this evidence, there does not appear to have been a significant change in the average gearing of the comparator sample to warrant an adjustment to Arc Infrastructure's current benchmark gearing level of 25%.

[2] 50% was the gearing ratio applied in the 2008 decision. The 2018 decision is currently under assessment, but ARTC has applied for 52.5% gearing.

3 Return on equity

This chapter presents our recommended approach for estimating the various parameters in the SL CAPM (Sharpe-Lintner Capital Asset Pricing Model). The SL CAPM is expressed as follows:

$$Re = R_f + \beta_e * [E(R_m) - R_f]$$

Where:

Rf = the risk-free rate of return

E(Rm) = the expected return on the market

[E(Rm) – Rf] = the market risk premium

βe = equity beta (measures systematic risk)

The SL CAPM states that an asset's return is determined by its correlation with the market (as measured by the entity's beta). Although it is widely acknowledged as a poor predictor of actual returns, the SL CAPM continues to be implemented by regulators due its relative simplicity and intuitive appeal. In private sector financial practice though, adjustments are frequently made to CAPM estimates, resulting in higher WACC estimates than those implied by the conventional model.

To ascertain the prevalence of ad-hoc adjustments to the conventional SL CAPM, the Connect 4 database (provided by Thomson Reuters) contains independent expert reports for companies listed on the ASX and the WACC methodologies that are employed. Synergies has investigated 344 independent expert reports relating specifically to acquisitions, takeovers, divestments, demergers and merger schemes over the last five years since the beginning of 2013.[3] Of these 344 reports, only 151 (44%) made explicit reference to the use of a WACC or discount rate, and of these only 113 (33%) provide a detailed description of their WACC methodology.

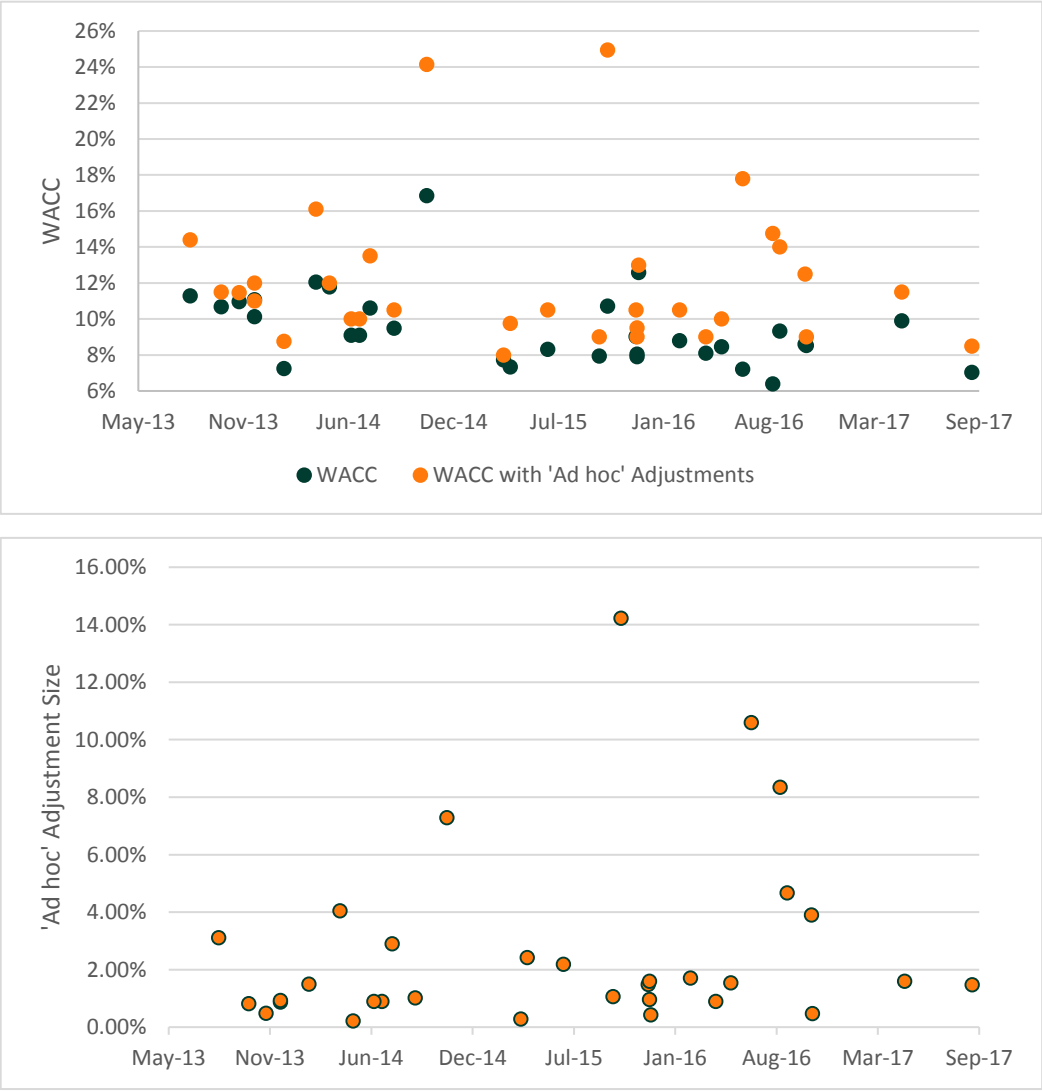
Of the 113 reports with detailed WACC calculations, we have identified 32 independent expert reports that make ad hoc adjustments to the conventional SL CAPM formulation. We have uncovered evidence that independent experts routinely apply size and other premiums (such as for growth prospects, product execution risk and market-imposed hurdle rates).

In cases where size and other risk premiums are applied, the consequences for the resulting WACC are far from immaterial. Figure 1 illustrates the divergence between the

[3] To facilitate an efficient interrogation of the database, we restricted our analysis to acquisitions with a deal size greater than $AUD10 million.

actual WACC estimates used in independent expert reports and the WACC estimates in the absence of any ad hoc adjustments for risk premiums. In the upper panel, the orange points denote the WACC estimates after incorporating the ad hoc premium adjustments, while the dark green points denote the resulting WACC estimates in the absence of any such adjustments. In the lower panel of Figure 1, we present the magnitude of the ad hoc adjustment, which is in effect the difference between the orange and green points for each report in the upper panel.

Figure 1 Comparison of WACC estimates with and without ad hoc adjustments



Data source: Connect 4, Synergies calculations

Across the sample, the average premium adjustment was 2.65%, while the median was 1.49%. In proportional terms, this causes the ad hoc adjusted WACC estimates to be on

average almost a third larger than the unadjusted WACC estimates implied by the CAPM.

While we are not contesting the use of the SL CAPM for the purpose of this review, it is worth bearing in mind that financial practice frequently departs from the regulatory practice of applying the CAPM by making additional adjustments that increase the cost of capital.

The three parameters requiring estimation in the SL CAPM are as follows:

- Risk-free rate
- Beta
- Market risk premium

We discuss each of these parameters in the following subsections.

3.1 Risk-free rate

The risk-free rate is used in estimating both the return on equity and debt. There are three key considerations when determining an appropriate estimate:

- the proxy used
- the term to maturity
- the averaging period.

3.1.1 Proxy

The Commonwealth Government bond yield is most commonly used as a proxy for the risk-free rate in Australia, including by the ERA.

Concerns have been expressed as to whether it remains the best proxy during highly volatile or uncertain market conditions, where a 'flight to quality' is often observed reflecting increased demand for Commonwealth Government bonds as a safe haven for investors, resulting in a compression of the yield.

However, the Commonwealth Government bond yield remains the best proxy for the risk-free rate in an Australian context. In our view, the downward compression of WACC values that have emerged due to its application in recent years relate more to the rigidity of Australian regulators estimation of the market risk premium than to the risk-free rate itself.

3.1.2 Term to maturity

In an Australian context, the term to maturity most commonly applied for investors in infrastructure with long economic lives is ten years. This is consistent with the long-term forward-looking horizon over which it is assumed investors are forming their return expectations under the SL CAPM.

In Australia, the ten year bond is the longest liquid maturity currently available. This is also the most commonly used proxy for the risk-free rate in regulatory decisions, including by the ERA for its rail WACC decisions given the long-term WACC described in the Code. We have therefore assumed a ten year term to maturity, balancing the liquidity of available long term bond instruments in the Australian market, and Arc's long-term investment horizon.

3.1.3 Averaging period

The length of averaging period for the risk-free rate will depend amongst other things on whether a contemporary rate reflecting current market expectations is preferred to a longer-term average rate that will also incorporate the effects of historical market expectations.

In general, Australian and international corporate finance, academic and regulatory practice uses short averaging periods close to the commencement of each regulatory period.

This is intended to mitigate problems that may occur if there is a spike in yields on the day that the rate is applied. It is therefore common practice to average the rate over a short horizon, which typically ranges from between ten and forty days (as is the case for the ERA), noting that over such a short horizon the choice of averaging period is likely to be of little consequence. The Independent Pricing and Regulatory Tribunal (IPART) in NSW is the only Australian regulator that takes into consideration longer-term averages, which it does in conjunction with short-term estimates.

3.1.4 Synergies' recommendation for the risk-free rate

The ERA currently calculates the risk-free rate based on a short-term average (40 days) of the observed yield on 10-year Commonwealth Government Security bonds. The risk-free rate is updated annually.

Our recommendation is that the ERA retain its current approach to the calculating the risk-free rate, as it accurately reflects the long-term investment horizon associated with railway infrastructure, as required by the Code.

Using a 40-day average to 31 May 2018, we calculate the risk-free rate to be 2.79% (annual effective rate).[4]

3.2 Beta

There are three key sources of information for the assessment of an entity's systematic risk, namely:

- Benchmark results from comparable entities
- First principles analysis
- Regulatory precedent.

In undertaking an empirical analysis of beta estimates, reference needs to be made to an appropriate set of listed comparators for whom equity betas can be estimated. Using share price information for these companies, their equity betas are estimated using regression analysis. As the companies will have different gearing levels (and hence different levels of financial risk), these equity betas must be 'de-levered' to produce an asset beta. This approach is generally applied for the assessment of asset betas under the SL CAPM.

The comparator analysis will typically produce a range of estimates for beta, necessitating an assessment of where Arc's asset beta might sit relative to these other comparators. This assessment is facilitated by a first principles analysis, which is a qualitative assessment of Arc's systematic risk profile. This approach analyses the key factors that impact the sensitivity of the firm's returns to movements in the economy or market.

We begin by providing an overview of the ERA's current approach to beta and present updated beta estimates for the benchmark comparator sample, before proceeding to a first principles analysis of Arc's current risk profile.

3.2.1 The ERA's current approach to beta

In its 2015 review of the WACC method relevant to Arc (then Brookfield Rail), the ERA estimated the asset beta to be 0.7.

In forming this view, the ERA selected a sample of comparator firms and made judgements about how to apply and interpret beta estimates from these firms.[5] The

[4] Annual effective rate = (1+ semi-annual rate/2)^2 -1

[5] ERA (2015).

Consultation Paper does not present a specific view as to the sample of comparators the ERA proposes to use for the purposes of estimating beta in this review, but does restate many of the general principles it articulated in 2015 regarding the selection of comparator firms. As regards the ERA's likely approach to interpreting the results of its analysis, the Consultation Paper provides relatively little indication and hence we have based our submission on the ERA's 2015 review.

Sample of comparators

The ERA noted that choosing a relevant benchmark sample for Brookfield Rail (as it was then) was difficult due to the lack of close comparators of rail infrastructure trading on the Australian Stock Exchange (ASX). Only one publicly listed company was available in Australia that the ERA regarded as directly comparable, Aurizon, which was floated on the ASX in November 2010 as QR National.[6] The ERA considered that additional comparators were required, stating that a "single comparable firm leaves the Authority with an insufficient sample on which to estimate regulated cost of capital parameters".[7] (This hypothesis appears to have been verified by the fact that Aurizon's asset beta has declined significantly from 0.69 to 0.55 since the previous review as indicated in Table 2.)

To expand its sample, while ensuring it remained suitable for the purposes of estimating beta, the ERA considered that two features of a benchmark entity were relevant. First, estimates of asset beta from the benchmark sample should provide some relevance to the economy in which the benchmark efficient entity is operating (in this case, the Australian economy). Second, these estimates should also provide some relevance to the industry/sector in which the efficient benchmark entity is operating (in this case, the rail industry). It restated this point in its Consultation Paper.[8]

Given empirical estimates are the only viable option for estimating the asset beta for rail businesses, the Authority formed the view that a benchmark sample including both Australian and developed countries in Europe and America was appropriate.

In identifying the appropriate set of comparators for Brookfield Rail (as it was then), the ERA considered the nature of Brookfield Rail's business: a freight rail network operating in Australia that primarily transports commodities such as iron ore, grain, coal, alumina and interstate freight that is subject to regulation but without the relative confidence

[6] This remains the only publicly listed Australian rail comparator.

[7] ERA (2015), p.25.

[8] ERA (2018). Method for Determining the Weighted Average Cost of Capital for Railway Networks: Consultation Paper, p.17.

concerning revenue offered by a binding revenue cap model. The ERA then applied the following filters in its search for comparators, requiring that the businesses:

- operate in an OECD country that has similar political, economic and geographical similarities to Australia;
- belong to the ICB (Industry Classification Benchmark) Subsector: Railroads; and
- provide sufficient pricing data to allow calculation of its equity beta and gearing.

In addition, the Authority included comparator companies that were included in its previous WACC determinations for the Brookfield Rail network.

The ERA's beta comparators are presented in Table 2, with updated asset beta estimates for 2018. This sample of 11 comparators is reduced from the 15 comparators used in its rate of return decisions prior to 2015. The ERA removed Auckland Airports and Infratil (a NZ investment fund with investments in energy, transport and social infrastructure businesses) from the pre-2015 benchmark sample, as well as Macquarie Infrastructure Group. Aurizon Holdings was added to the sample for the 2015 review. Since then, Asciano and Toll have been delisted, which means that current asset beta estimates are no longer available.

Table 2 shows that the average asset beta for the sample has decreased from 0.91 to 0.86 since the 2015 review.[9] Previously, the ERA has placed less weight on the overall, instead concentrating more on where Arc sits within the benchmark sample range.

[9] Consistent with the ERA, we have measured beta using weekly returns, and used the Brealey-Myers formula for de-levering and re-levering.

Table 2 Comparator companies for Brookfield Rail

Company Name	Country	Ticker	Company Description	2015 asset beta estimate	2018 asset beta estimate	Known issues bearing on current review
Genesee & Wyoming	United States	GWR US Equity	Genesee & Wyoming Inc., through its subsidiaries, owns and operates short line and regional freight railroads and provides related rail services. The company also provides railroad switching and related services to United States industries with extensive railroad facilities within their complexes. Genesee operates in the United States and Australia.	1.11	1.04	None identified
Union Pacific Corporation	United States	UNP US Equity	Union Pacific Corporation is a rail transport company. The Company's railroad hauls a variety of goods, including agricultural, automotive, and chemical products. Union Pacific offers long-haul routes from all major West Coast and Gulf Coast ports to eastern gateways as well as connects with Canada's rail systems and serves the major gateways to Mexico.	1.05	0.91	None identified
Norfolk Southern Corporation	United States	NSC US Equity	Norfolk Southern Corporation provides rail transportation services. The Company transports raw materials, intermediate products and finished goods primarily in the Southeast, East and Midwest and, via interchange with rail carriers, to and from the rest of the United States. Norfolk Southern also transports overseas freight through several Atlantic and Gulf Coast ports.	0.93	0.90	None identified
Kansas City Southern	United States	KSU US Equity	Kansas City Southern, through its subsidiary, is the holding company for transportation segment subsidiaries and affiliates. The Company operates a railroad system that provides shippers with rail freight services in commercial and industrial markets of the United States and Mexico.	1.36	0.88	None identified
CSX Corporation	United States	CSX US Equity	CSX Corporation is an international freight transportation company. The Company provides rail, intermodal, domestic container-shipping, barging, and contract logistics services around the world. CSX's rail transportation services are provided principally throughout the eastern United States.	1.00	1.00	None identified
Canadian Pacific Railway	Canada	CP CN Equity	Canadian Pacific Railway Limited is a Class I transactional railway, providing freight and intermodal services over a network in Canada and the United States. The Company's mainline network serves major Canadian ports and cities from Montreal to Vancouver, and key centres in the United States Midwest and Northeast.	0.76	1.07	None identified

Company Name	Country	Ticker	Company Description	2015 asset beta estimate	2018 asset beta estimate	Known issues bearing on current review
Canadian National Railway	Canada	CNR CN Equity	Canadian National Railway Company operates a network of track in Canada and the United States. The Company transports forest products, grain and grain products, coal, sulphur, and fertilizers, intermodal, and automotive products. Canadian National operates a fleet of locomotives and rail cars.	0.62	0.83	None identified
Toll Holdings Limited	Australia	TRH NZ Equity	Toll NZ Ltd. provides freight transport and distribution services. The Company offers transportation, long-haul bulk freight, warehousing and freight forwarding services. Toll NZ also operates passenger and freight transport vehicles that provides relocation and priority delivery services. Toll NZ conducts its business in New Zealand and Internationally.	0.93	Delisted	Now delisted
Aurizon Holdings	Australia	AZJ AU Equity	Aurizon Holdings Ltd. is a rail freight company. The Company provides coal, bulk and general freight haulage services, operating on the Central Queensland Coal Network (CQCN) and including specialised track maintenance and workshop support functions.	0.69	0.55	Significant differences between Arc and Aurizon Holdings with regard to risk profile, as detailed in the first principles analysis
Asciano Limited	Australia	AIO AU Equity	Asciano Limited is a provider of essential transport services in the rail and ports and stevedoring industries in Australia and New Zealand. The Company operates container terminals, bulk export facilities and container and bulk rail haulage services.	0.64	Delisted	Now delisted
Port of Tauranga	New Zealand	POT NZ Equity	Port of Tauranga Limited activities include the provision of wharf facilities, back up land for the storage and transit of import and export cargo, berthage, cranes, tug and pilotage services for exporters, importers and shipping companies and the leasing of land and buildings. The Group also operates a container terminal and has bulk cargo marshalling operations.	0.60	0.53	Not a rail business, but nevertheless an Australasian transport comparator with some freight exposure
			Average	**0.91**	**0.86**	

Note: For the 2015 asset beta estimates, the ERA relied upon four different estimators: Ordinary Least Squares (OLS), Least Absolute Deviations (LAD), the robust regression methodology (MM) and the Theil-Sen methodology. For the purpose of this analysis, we have used only the conventional OLS, but we note that the estimates in 2015 were broadly similar across the different techniques.

Source: Bloomberg, ERA Analysis, Synergies analysis.

ERA comments on comparators and range

The ERA considered that the benchmark sample range provides relevant information for Brookfield Rail's asset beta.[10] Using the 2015 regression results, the ERA reported the asset beta for the benchmark sample as having a range of 0.58 (New Zealand) to 1.40 (US), with a sample average of 0.91. The ERA did not accept the average of this range as adequately representative of Brookfield Rail's systematic risk and instead emphasised the results for particular comparator firms.

The ERA placed greater weight on the average beta of the Australian assets in the sample (0.75) and placed particular weight on Aurizon's observed asset beta of 0.69, which has since declined to 0.55. These asset betas were considerably lower than the observed asset betas for the North American rail comparators in the sample.

The ERA's views and supporting reasoning for how it interpreted the asset beta comparators are summarised in Table 3. Taken together, these views all appear to explain why the ERA has employed significant regulatory discretion in estimating the asset beta for the Arc network – concluding on a qualitative comparison that its beta will sit below that of most of the overseas railway comparators and is likely to be best estimated by reference to Aurizon Holding's asset beta.

Table 3 ERA's previous views regarding interpretation of beta comparators

ERA's view	Reasoning / evidence	Countervailing factors acknowledged by the ERA
The Australian rail company Aurizon provides the closest comparator	Aurizon operates in Australia and transports commodity based freight (para 172)	The regulatory regime differs between Brookfield and Aurizon in that Brookfield is subject to a negotiate-arbitrate regulatory regime, while the Aurizon network is subject to a revenue cap under an access arrangement (para 166).
Non-rail comparators provide limited information	Non-rail businesses are less relevant proxies than rail businesses (para 170)	The Authority took advice from Allen Consulting Group in 2007[11] that led to it including Australian and New Zealand transport companies in its sample The small sample size was a factor in the Authority's decision to retain these firms again in 2015 (para 170).
Overseas rail operators face higher risks due to greater competition	The Authority has an *a priori* expectation that overseas rail operators will possess a higher level of risk, relative to an Australian railway operator, due to greater	N/A

[10] ERA (2015), pp.164-165.

[11] The Allen Consulting Group (2007). Railways (Access) Code 2000: Weighted Average Cost of Capital 2008 WACC determinations, October.

ERA's view	Reasoning / evidence	Countervailing factors acknowledged by the ERA
	competition, such as from road freight. (para 714)	
Brookfield is likely to have a lower beta than the (international) comparators due to the predominance of bulk grain and minerals freight (para 707)	The Authority relied on advice from Allen Consulting Group to the effect that intermodal (container) traffic is associated with higher levels of non-diversifiable risk compared with the bulk transport of grain and mineral products.[12] (para 706)	Acknowledged submissions that the high operating leverage (ratio of variable to fixed costs) of the freight-network business may contribute to a relatively high sensitivity to changes in levels of demand. (para 707)

Source: ERA (2015)

As noted, in its 2015 decision, the ERA gave considerable weight to the asset beta estimate for Aurizon Holdings. While it also gave weight to estimates from other Australian transport companies, these other comparators are no longer available to the ERA due to delisting. If the ERA adopts the same approach as in 2015 to interpreting its available comparators, there is a risk this would simplify in practice to the direct adoption of the asset beta calculated for Aurizon Holdings as the ERA's estimate for Arc. Given that Aurizon's observed asset beta has decreased from 0.69 to 0.55 in less than three years (see Table 2), such a practice would clearly lead to instability in the beta applied to Arc, as well as an excessive reliance on a comparator whose relevance to Arc is limited.

In the next section, we set out the relevant findings from our first principles analysis, which casts doubt on the direct transferability of the asset beta of Aurizon Holdings and highlights the pronounced systematic risk to which Arc is exposed.

3.2.2 First principles analysis

Following Lally (2004), a first principles analysis is a qualitative assessment, the aim of which is to develop a profile of the firm's systematic risks and assess their likely impact on beta.[13] Systematic risks are those risks that tend to be sensitive to the state of the domestic economy. Thus, a first principles analysis aims to understand the extent to which the firm's net cash flows (revenues less costs) are likely to be correlated with domestic economic activity.

Lally identifies a number of factors to be considered, many of which provide a useful basis for distinguishing between Arc's network and those of relevant comparators. These relate to:

[12] The Allen Consulting Group (2007), p.28.

[13] Lally, M. (2004). The Cost of Capital for Regulated Entities, Report prepared for the Queensland Competition Authority, p.75.

- Nature of the product or service and nature of the customer
- Duration of contracts
- Nature of regulation
- Market power
- Growth options
- Operating leverage

Given the emphasis placed on Aurizon Holdings by the ERA in its 2015 decision, we draw frequent comparisons between Arc and Aurizon Holdings in our discussion below. We also explore similarities and differences with North American Class I railroads, which form the majority of the sample.

Nature of the product or service and nature of the customer

Arc's freight tasks comprise varied services that will be associated with different degrees of systematic risk.

Arc's customers are diverse, but include some major exporters such as CBH Group, Alcoa, BHP Billiton Nickel West and South32.[14] According to the ERA, roughly 85 per cent of Arc freight tasks relate to transporting export commodities or inputs to export commodities[15], with the remainder general freight.[16] We agree with the ERA and the advice from the Allen Consulting Group that general freight (including intermodal freight) is likely to have significant exposure to changes in domestic demand. However, we believe that the ERA's apparent characterisation of the remaining freight tasks (i.e. transporting export commodities or inputs to export commodities) as having low systematic risk warrants reconsideration.

The ERA correctly points to grains as an example of a category of freight from which returns and earnings are driven to a lesser degree by economic conditions but rather by fluctuating supply, in this case grain output in WA's Wheat Belt.[17] However, this fluctuating supply is itself driven by a range of domestic factors, including exchange rates and production cost (driven by, amongst other things, labour cost and availability).

[14] Retrieved from www.arcinfra.com

[15] An example of supplying inputs is the supply of chemicals for the Leonora nickel producer.

[16] ERA (2015), p.31.

[17] ERA (2015), p.31.

The fact that the majority of Australian exporters have elevated asset betas is consistent with this point.

Moreover, this analysis clearly does not hold for most of the mineral commodities transported on the Arc network. Production volumes of iron ore, alumina and nickel all have significant potential to fluctuate to some degree with global prices and demand for these commodities, with implications for Arc's revenues.[18] Arc is clearly susceptible to macroeconomic factors that are beyond its control. This point is well illustrated by the recent mothballing of a large iron ore mine near Southern Cross, partly due to reduced iron ore prices, which we discuss further below.

Other evidence can be found in the form of past projects that have not come to fruition as initially expected. When Brookfield rebadged its WestNet Rail business as Brookfield Rail in 2011, it announced plans to expand and upgrade the network to meet expected demand from a wide variety of new mining and industrial projects. These included a urea plant near Collie (Perdaman Chemicals), iron ore mines in the mid-West (Mt Gibson) and Goldfields (Mineral Resources) and an alumina refinery (BHP Billiton).[19] Brookfield informed the market that it anticipated a 45 per cent increase in freight volumes over the coming 18 months. The status of these projects is instructive:

- The coal to liquid urea plant in Collie proposed by Perdaman Chemicals now appears unlikely to proceed due to the Dampier-to-Bunbury gas pipeline not being extended to Collie, causing the company to shelve the project.[20] Instead the company is now planning for a urea plant to be built within three years on the Burrup Peninsula (not within Arc's network), and has signed an MOU with Woodside to supply at least 20 years of gas to feed to plant.
- Mount Gibson's mid-West iron ore mining operations are winding down as production at Extension Hill was completed in late 2016 and the nearby Iron Hill expected to conclude late 2018.[21]
- Mineral Resources' Carina mine is soon to close but the company will take control of the Koolyanobbing iron ore operation near Southern Cross after US company

[18] National Australia Bank (2018). Minerals and Energy Outlook, February.

[19] Burrell, A. (2011). "Brookfield to expand rail network in WA", The Australian, 18 August.

[20] Harvey, B. (2018). "Gas deal boosts $4.3b urea factory in Pilbara", Perth Now, 26 April.

[21] Retrieved from www.mtgibsoniron.com.au, Operations.

Cliffs announced its exit from its Australian operations.[22] Mineral Resources aims to continue the operation for the next five to six years.[23]

- The BHP Billiton Worsley alumina refinery expansion was officially completed in 2014.[24] The project included expansion of Worsley's mining operations near Boddington, an increase in capacity at its Collie refinery and the upgrade of Bunbury port facilities.

The varied outcomes for these particular projects roughly seven years after the expansion announcements illustrate well that expansion options are attended by significant uncertainty and exposure to broader economic conditions.

At this point, it is worth contrasting these aforementioned risks with those of Aurizon. Aurizon Holdings consists of Aurizon Network (below rail) and Aurizon Haulage (above rail).

Aurizon Network's operates and manages Australia's largest and most complex export rail network, the Central Queensland Coal Network (CQCN), with its operations governed by a 99-year lease arrangement with the State of Queensland. Its below rail assets are almost entirely dedicated to servicing the coal industry in the CQCN.

Whilst we do not agree with the Queensland Competition Authority's assessment of Aurizon Network's systematic risk, it is true that Aurizon Network operates within a regulatory regime with highly regulated revenues that enhance levels of confidence around revenue generation for at least its most heavily trafficked corridors. Arc does not enjoy this level of stability or confidence for its revenue levels.

Further, the majority of Aurizon Haulage's revenue is generated through its haulage of coal from mines in Queensland and New South Wales to end customers and ports.[25] Taking 2017 as an example (and noting that Aurizon has since signalled that it will or has ceased its intermodal freight operations), and using the simplifying assumption that 100% of Aurizon Network's revenues derive from coal,

Figure 2 illustrates how coal accounts for nearly three quarters of Aurizon Holdings' revenues.

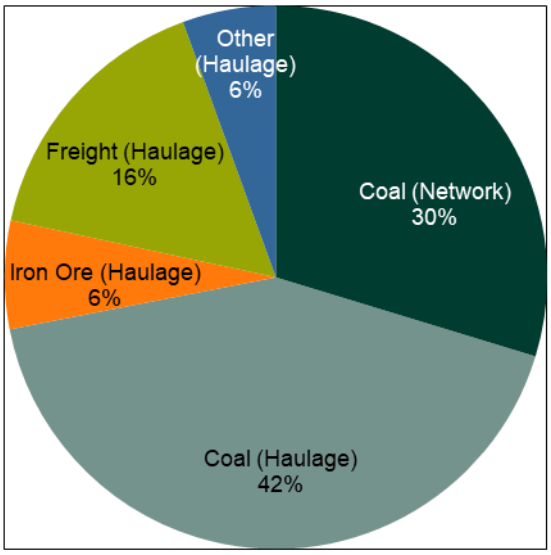
[22] McKinnon, S. (2018). "Mineral Resources deal to buy Cleveland-Cliffs Koolyanobbing mine to save hundreds of mine and port jobs", The West, 13 June.

[23] ASX Announcement (2018). "Acquisition of Cliffs' Yilgarn Iron Ore Assets", 13 June.

[24] Collie Mail (2014). "Worsley's reaches milestone", 10 February.

[25] Aurizon Annual Report (2016-17), pp.54-55.

Figure 2 Contributions to Aurizon Holdings 2017 revenue by sector / freight type



Note: Assumes all Network services are sold for the purposes of coal haulage
Data source: Aurizon Annual Report (2016-17)

Aurizon's above rail operations are characterised by long term contracts with average unexpired life of more than 10 years. Its haulage contracts include high fixed capacity charges, which, in the case of coal contracts, cover more than 70% of its revenues.[26] As Aurizon itself notes to investors, these haulage contracts provide the operation with a strong financial position and ratings stability.[27]

On balance, these observations indicate that seeking to draw a direct comparison between Arc and Aurizon Holdings may lead to a significant underestimation of Arc's beta. Arc's network does not benefit from the relative stability of revenue generation offered by Aurizon Network's traffic density and revenue cap regulatory environment. Indeed, Arc's revenues have been shown in recent times to be increasingly volatile and more aligned to the Pilbara rail networks - the low grade ores that it hauls for more marginal mining operations effectively expose Arc to commodity pricing risk. Further evidence on the volatility of these cashflows is apparent through recent developments in Arc's contractual arrangements, which are the focus of the following section.

[26] Aurizon Debt Investor Roadshow (December 2016). Based on Synergies modelling, avoidable above rail costs include fuel, locomotive and wagon maintenance and labour and typically account for between 33-37% of above rail costs.

[27] Aurizon Debt Investor Roadshow (December 2016)

Duration of contracts

Since the 2015 decision, Arc has seen major long-term contracts roll off or be terminated, increasing its exposure to the economic cycle. All other things equal, the end of these major contracts should increase Arc's asset beta.

Take-or-pay contracts are intended to mitigate revenue volatility. However, experience has shown that take-or-pay contracts can actually have the unintended effect of compounding volatility by crystallising renewal events. Synergies understands that most of the contracts into which Arc enters are multi-year in nature, however, a number of iron ore operations have recently ceased, or are expected to cease in the near future. [redacted]

Most recently announced is the closure of Cliffs Natural Resources' Koolyanobbing iron ore complex. On 13 June 2018, Mineral Resources announced that it had entered into an agreement to acquire Cliffs' operations. The following passage from its announcement to the ASX highlights the challenges mentioned above:[28]

> The company also extends its appreciation to Arc Infrastructure for agreeing to a track access framework that assists with the economics of a continued Yilgarn-to-Esperance iron ore operation [a contract with Arc] at a time of challenging market conditions for producers of lower-grade iron ire.

Moreover, Arc has advised that the sensitivity of commodity operations to market conditions means this outcome is not uncommon. Arc's alternative is to require more stringent clauses in its take-or-pay contracts. If a customer is unwilling or unable to commit to more stringent obligations though, the availability of substitutes will divert the customer to other modes of transportation, or else they may elect to forgo the project entirely. Neither of these are efficient outcomes, and both are to the detriment of WA's economic output. The marginal nature of many of the operations that Arc serves means that it is efficient and commercially necessary for Arc to be exposed to greater risk than is common for Australian rail network providers.

[redacted]

[28] ASX Announcement (2018). "Acquisition of Cliffs' Yilgarn Iron Ore Assets", 13 June, p.1.

[redacted]

In addition, Arc is often likely to be limited in the minimum tonnage that it can specify in a take-or-pay contract, without jeopardising the feasibility of the customer's freight task. In some cases, this may mean that the tonnage commitments provide Arc with cover only for incremental costs. This leaves Arc with considerable exposure, especially when capital works are committed but customers terminate prematurely. To ensure network safety and efficiency, Arc has no option but to perform maintenance and capital works on a forward-looking basis; these investment decisions must be made independently of a given customer's counterparty risk.

[redacted]

Synergies understands that a very large proportion of Aurizon Holdings' business is covered by long-term contracts – both on the below rail and above rail sides of the business. Incenta observed in 2013 that Aurizon Network contracts are typically long term take-or-pay contracts, ranging from 10 to 15 years, which are staggered and much longer than the typical economic cycle.[31] The Aurizon Holdings 2016-2017 annual report provides updates on some contracts suggesting terms of up to 10 years.[32]

Moreover, whilst Aurizon Network's business is not without systematic risk, relative to Arc it benefits from very substantial traffic density, particularly on the Goonyella and Blackwater corridors (which collectively carry approximately 200 million tonnes of coal per annum) that alleviates the level of revenue volatility in its Central Queensland below rail coal services. It is this traffic density that results in a revenue cap form of regulation being applied to Aurizon Network's business.

In contrast, the evidence on contract duration indicates that Arc is increasingly exposed to events in commodities markets, and is thereby forced to take on the risk faced by its customers in its own operations. In several respects, Arc's risk profile is becoming more similar to that of the Pilbara railways, given its exposure to iron ore. Holding all else constant, this implies that Arc's optimal beta is situated closer towards the upper bound of the comparator range than has been determined in previous reviews.

[redacted]

[31] Incenta Economic Consulting (2013). Review of Regulatory Capital Structure and Asset/Equity Beta for Aurizon Network, Report to the Queensland Competition Authority, p.6.

[32] Aurizon Annual Report (2016-2017), p.16.

Nature of regulation

The ERA has defined the benchmark entity as:[33]

> A 'pure-play' regulated rail facility operating within Australia without parental ownership, with a similar degree of risk as that which applies to the service provider in respect of the provision of the rail services.

While we of course agree that Arc is a regulated entity, it is also necessary to point out that there are several elements of the freight network's risk profile that impart on Arc the risks of an unregulated business. Recent volatility in minerals-related contracts has shown that Arc does not enjoy the same level of confidence around revenue stability provided by other regulatory regimes, such as those subject to a revenue cap form of regulation.

In evaluating the distinguishing characteristics for freight rail infrastructure, the ERA rightly re-affirms in the Consultation Paper that:[34]

> Freight services are not regulated and are open to competition from road transport.

In relation to the Pilbara railways though, the ERA then goes on to say that:[35]

> The expectation that there would be some increased risk for stand-alone ore-carrying railways given their reliance on a small number of mining customers creates an expectation that the asset beta would be higher than that of general freight.

This is certainly true of the Pilbara railways, but it is imperative not to discount the applicability of this expectation to Arc as well, even if the consideration does not apply as strongly to Arc as it might to certain Pilbara railways. As we demonstrate throughout the first principles analysis, Arc's exposure to closing iron ore operations has led to a substantial deterioration in its contract profile, which is not and cannot be mitigated by the regulatory regime.

As the ERA has previously acknowledged, the distinct forms of regulation applying to Arc and Aurizon Network, respectively, afford much less insulation from the effects of the economic cycle for Arc.[36]

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[33] ERA (2018), p.7.

[34] ERA (2018), p.8.

[35] ERA (2018), p.8.

[36] Queensland Competition Authority (2017). Aurizon Network's 2017 draft access undertaking, p.121.

The Western Australian rail access regime is established by the *Railways (Access) Act 1998* and the *Railways (Access) Code 2000* (the Code) and is a negotiate-arbitrate regime.[37] The ERA has reviewed the Code on three occasions (2005, 2011 and 2015). The regime aims to:

- encourage commercial negotiation;
- prevent misuse of market power; and
- promote competition.

Since the regime leaves access terms to be agreed bilaterally, it can be expected to generate diverse pricing and revenue outcomes and diverse risk allocations between the service provider and rail users. Critically, it provides no mechanism to adjust access prices to remove the effects of higher or lower than forecast levels of overall demand for Arc's services. This means that Arc can be exposed to both price and volume risk.

By contrast, Aurizon Network operates under a revenue cap regime, where any over (under) recovery of its approved revenues in any given year is returned (recouped) through a reference tariff adjustment two years later.[38] The Queensland Competition Authority notes that this regulatory regime provides Aurizon Network (below rail operations) with stable regulatory returns and allows it to operate in a framework which contains various risk allocation, mitigation and compensation mechanisms.[39] Whilst we do not agree with the Queensland Competition Authority's assessment of Aurizon's systematic risk, it is nevertheless noteworthy that Arc is relatively more exposed to systematic risk than Aurizon Network.

It must be acknowledged that Aurizon Haulage is not subject to economic regulation and therefore has potential for greater revenue volatility compared with Aurizon Network. We note that some of this difference in expected revenue volatility should be eliminated in practice by the fact that Aurizon Haulage also protects its revenues through extensive use of long-term contracts (see above) with a high proportion of fixed costs covered by take or pay commitments, noting that approximately 30% of above rail costs are avoidable.[40]

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[37] Government of Western Australia, Department of Treasury (2017). Review of the Western Australian Rail Access Regime, Issues Paper.

[38] Retrieved from www.qca.org.au, *Revenue Cap Adjustments*.

[39] Queensland Competition Authority (2017). Aurizon Network's 2017 draft access undertaking, p.12.

[40] Based on Synergies modelling, avoidable above rail costs include fuel, locomotive and wagon maintenance and labour and typically account for between 33-37% of above rail costs.

Market power

Arc is expected to have less market power than Aurizon Holdings in many areas and thus less leverage with which to mitigate revenue volatility by contractual means.

First, it is clear that Arc does not benefit from the traffic densities of Aurizon Network's major corridors. Moreover, recent history has confirmed that several of Arc's customers are relatively high cost providers in their markets, vulnerable to changes in market conditions. This in turn highlights Arc's exposure to commodity risk.

Commodity risk empowers customers to seek relief when market conditions are unfavourable, or may otherwise seek to place assets on care and maintenance. In these instances, customer leverage arises from the relatively low traffic density on many route sections and the absence of alternative uses of Arc's network. In these circumstances, it is economically efficient and commercially imperative that Arc assumes greater risk, such as lower take or pay commitments or even in some instances price risk.

Second, many of Arc's customers have the option of utilising road freight which does not exist for users of the CQCN. A good example of the ability to use road arises in relation to grain. CBH splits its traffic task more or less equally between road and rail and as such is an important example of the countervailing market power of some of Arc's customers.

CBH is by no means the only Arc customer with countervailing market power. Virtually all of Arc's customers possess options in the form of alternative modes of transport and supply chains that are competitive with rail, thereby setting a ceiling for access charges. This competitive pressure is being further accentuated by emerging road based options, particularly in the grain industry, as new marketers integrate into the supply chain. In stark contrast to Arc, Aurizon has no prospect of competition from road haulage for coal.

Growth options

Growth options refer to the potential to undertake significant new investment, particularly in new areas or products or to otherwise increase revenue from existing operations.

It is argued that businesses that have a number of valuable growth opportunities, in addition to their existing assets (or 'assets in place'), will tend to have higher systematic risk compared to firms that do not have these opportunities. 'Growth' opportunities are defined as opportunities that can generate a return in excess of the firm's WACC or hurdle rate.

Growth options may affect the systematic risk of the business. Consider two firms of the same value. One business has few growth opportunities, so that the value of the business will largely reflect the expected cashflows from the assets in place. The other business has the same value, however has fewer assets in place but a number of growth opportunities which have some value.

Of the two firms, the one that would be most affected by economic shocks is the one that has the greater portion of its value represented by growth opportunities. This firm would therefore have the higher equity beta. A number of studies have supported this.[41]

The expected cash flows with the growth opportunities will be naturally volatile, given the probability that investments will proceed will be constantly reassessed as economic conditions change. To the extent that the value of the business reflects these options, it will also be more sensitive to changes in market conditions compared to a firm with no or fewer growth options.

Arc is a rail network asset that covers an economically diverse region and thus has the potential to serve diverse commodity projects. The potential future opportunities associated with these projects have long been recognised as a significant component of the asset's value.

There are a number of new projects emerging that present opportunities that Arc would seem likely to explore. These represent significant potential expansion options that will be an important component in Arc's future prospects as a rail business.

Some examples of potential growth options that would be expected to feature in a potential investor's valuation of Arc today include the following projects.

- Australian Potash Ltd (ASX: APC) is undertaking studies to begin producing and exporting 150,000 tonnes per annum of Sulphate of Potash (SOP) fertiliser in the next two years.[42] Lake Wells in the Eastern Goldfields of Western Australia is Australia's largest indicated SOP resource.[43] APC has two Memoranda of Understanding in place with China's largest agricultural company and a Chinese

[41] For example, refer: Chung, K. and Charoenwong, C. (1991). Investment Options, Assets in Place and the Risk of Stocks. Financial Management, Vol.3; Myers, S. & Turnbull, S. (1977). Capital Budgeting and the Capital Asset Pricing Model: Good News and Bad News. The Journal of Finance, Vol.32, No.2, Papers and Proceedings of the Thirty-fifth Annual Meeting of the American Finance Association, Atlantic City, New Jersey, September 16-18, 1976; Anderson, C. & Garcia-Feijoo, L. (2006). Empirical evidence on Capital Investment, Growth Options, and Security Returns. The Journal of Finance, Vol.LXI, No.1.

[42] Gill, M. (2018). "Fert tipped to be major export from port", Farm Weekly, 13 May.

[43] Australian Potash Limited (2018). Investor Presentation.

provincial company for up to 200,000 tonnes per annum. Rail is the most likely mode of overland transport[44].

- BHP Billiton Nickel West, a key Arc customer, plans to potentially double capacity to 200,000 tonnes at its nickel sulphate operations, Nickel West, in Kalgoorlie[45]. BHP is also looking at cobalt output as well, both minerals critical ingredients for lithium ion batteries and are expected to see a boom in demand as global automakers transition into producing electric vehicles.

As China's appetite for lithium continues to drive a boom in lithium exports, numerous lithium projects are in the pipeline in Western Australia. Western Australia ranks first in global lithium production[46] and fourth globally in lithium resources[47] and to capitalise on the current lithium outlook[48] the Western Australia State Government has recently established a taskforce to help further develop the industry.

- Western Australian lithium miner NeoMetals revealed plans to build a $200 million processing plant in Kalgoorlie-Boulder, with initial production capacity of 10,000 tonnes per annum. Key players in the lithium industry are forecasting another decade of export demand. NeoMetals CEO sees the already established mining town as ideal due to the proximity to critical rail and power infrastructure.

- Chinese company Tianqi's lithium mine in Greenbushes is the biggest lithium mine on the planet and is now set to double in size by next year.[49] (On 25 June 2018, it was reported that a dispute between mineral rights owners at the mine is now headed to the WA Supreme Court, which could potentially have adverse implications for these expansion plans).[50] The company is also building the world's largest lithium processing plant in Kwinana (within Arc's network) to support the growing North Asian demand.

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44 Australian Potash Limited (2017). Scoping Study. Available from: https://www.australianpotash.com.au/site/PDF/1067_0/RRSPresentation

45 Reuters (2018). "BHP eyeing battery boom", Australia China Business Review, 19 April.

46 Refer: https://minerals.usgs.gov/minerals/pubs/commodity/lithium/mcs-2015-lithi.pdf; https://investingnews.com/daily/resource-investing/energy-investing/lithium-investing/lithium-producing-countries/

47 Western Australian Department of Jobs, Tourism, Science and Innovation, (2018). Prospect Magazine, March – May Edition.

48 Lucas, J & Daly, J. (2018). "Lithium booms shows no sign of slowing as new refinery announced for WA", ABC News, 6 June.

49 Catanzaro, J. (2018). "Lithium expansion: Tianqi's mine set to double in size as processing plant is built in Kwinana", The West Australian, 6 March.

50 Thompson, B. (2018). "War over WA lithium mine heads to trial", The Australian Financial Review, 25 June.

- Last year, Kidman Resources and SQM announced a joint venture to develop the Mt Holland lithium project near Southern Cross to produce lithium concentrate.[51]
- In March, production commenced at the Bald Hill Lithium and Tantalum Mine, a joint venture between Tawana Resources and Alliance Mineral. First shipment of lithium concentrate was completed in May 2018 through the Esperance Port (within Arc's network), with monthly shipments expected to follow[52].

If these projects reach fruition and global demand supports long term production, it could provide Arc Infrastructure with valuable long-term contracts which could provide some security against systematic risk. However, the key consideration is that in the present economic climate, cashflows from these growth opportunities are far from ensured. In this sense, the uncertainty of these future cashflows presents Arc with risks akin to those of an unregulated business.

However, the key point for the assessment of beta relates to the fact that much of Arc's network does not threaten the ceiling. In practice, this means that any additional net revenue it receives from additional volumes or new contracts reflects realisation of growth options for the purposes of assessing systematic risk.

Operating leverage

Arc is exclusively a below rail business and thus has a very high operating leverage – higher, Synergies contends, than Aurizon Holdings. The ERA has previously acknowledged that this higher operating leverage for a freight-network business "may, all other things being equal, contribute to a relatively high sensitivity of profits to changes in levels of demand and a higher beta value for the freight network business."[53] This characteristic also increases Arc's similarity to Class I railroads, which have also been observed to have high operating leverage.

A very high proportion of Arc's costs are fixed and it has almost no scope to redeploy assets in response to reductions in demand for any of its services. In this respect it is very similar to Aurizon Network, but somewhat different from Aurizon Haulage – the other side of Aurizon Holding's business.

[51] ASX Announcement and Media Release (2017). Kidman, SQM execute $US110m Mt Holland lithium Joint Venture Agreement; Development work under way.

[52] Tawana Resources (2018). Bald Hill Mine, Western Australia.

[53] ERA (2015), p.147.

While Aurizon Haulage has a capital-intensive business, it also has significant variable operating costs. We estimate that approximately 33-37% of diesel coal haulage costs are avoidable.

A second aspect of Aurizon Haulage's business that distinguishes it from a pureplay below rail operation is its greater scope to redeploy assets in response to changes in demand. While this does not directly reduce its costs, it does allow the business to mitigate some of the effect that a reduction in demand would normally have on a business with high operating leverage. For instance, if Aurizon Haulage loses business on one line or area, it can redeploy rolling stock to other areas to match demand. Even if the business has to offer the use of this equipment at below the long run marginal cost, it can still bring in revenues that offset the loss of business from an existing customer and hence dampen the impact of systemically driven changes in haulage demand.

Following the logic set out above, Synergies believes that Aurizon Holdings has lower effective operating leverage than Arc, which would be expected to translate into somewhat reduced vulnerability to changes in the business cycle. Despite the importance of operating leverage as a determinant of systematic risk exposure, we acknowledge that the intensity of this factor in the first principles analysis has not necessarily changed since the 2015 rail decision was handed down.

3.2.3 Synergies' recommendation for beta

The findings of the first principles analysis strongly suggest that Arc faces a level of risk almost akin to that of an unregulated business. One needs to look only at recent occurrences with contracts to find verification of this. At the same time though, we acknowledge that some of the issues raised here (such as operating leverage) are not new. As such, the only factors that can contribute to an uplift in Arc's beta are those factors that have either emerged or intensified since the 2015 WACC review, such as those pertaining to contract renewal and commodity risk. That being said, the first principles analysis indicates that Arc's exposure to systematic risk has almost certainly not decreased since the previous review was conducted and that recent events have highlighted the higher systematic risk to which it has always been exposed.

Importantly, the various categories of the first principles analysis illustrate considerable differences between Arc and Aurizon Holdings. Aurizon, especially Aurizon Network, is more likely to possess market power, owing to the lack of competition for coal from road freight. The regulatory setting also differs, with Aurizon Network operating under a heavy-handed revenue cap, providing greater cashflow certainty relative to Arc. Furthermore, Aurizon Holdings is also likely to have lower levels of operating leverage.

In light of increasing uncertainty around contracts, there is clearly support for an uplift in Arc's asset beta of at least 0.05 relative to the 2015 final decision (that is, from 0.70 to 0.75, if not higher). This represents an adjustment further towards the upper bound of the range defined by the ERA's comparator set. In other words, Arc's risk profile has become more akin to the competitive pressures and uncertainty of cashflows encountered by the North American Class I Railroads (whose asset betas range between 0.83 and 1.07). Retaining the current gearing assumption of 25%, the revised asset beta of 0.75 equates to an equity beta of 1.00.

3.3 Market risk premium

The market risk premium (MRP) is the amount an investor expects to earn from a diversified portfolio of investments (reflecting the market as a whole) that is above the return earned on a risk-free investment. The key difficulty in estimating the MRP arises from it being an expectation and therefore not being directly observable.

Whilst the MRP is an inherently forward-looking parameter, the difficulty with observing or inferring it from market data means that there is valuable information about its value in historical data (historical averages of excess returns from the market above the relevant risk-free rate).

3.3.1 MRP approaches

Ibbotson MRP

The Ibbotson approach reflects the long term historical average of the difference between the return on the market and the risk-free rate (and has been the preferred method of certain Australian regulators). It assumes that the MRP remains relatively constant through time.

Wright MRP

The Wright approach assumes that the overall return on equity remains reasonably stable over time rather than the MRP. It therefore estimates the MRP as the difference between a long-term average of the (real) return on the market and the current risk-free rate. Since the GFC, this approach has gained greater regulatory acceptance.

Dividend Growth Model (DGM)

DGMs are based on the premise that the value (or price) of a stock is determined solely by the cashflows (usually in the form of dividends) that it provides to shareholders. As a consequence, it is possible to solve for the discount rate that equates this cashflow

stream with the current stock price. Likewise, this reasoning can be extended to a market index, the All Ordinaries in the case of the ERA's model. The ERA uses its own two-stage DGM, which allows for a finite period based on actual dividend forecasts, before making an assumption about the terminal long-run growth rate for periods beyond the available forecast horizon.

3.3.2 The ERA's current approach to the MRP

In past determinations, the ERA has had regard to the Ibbotson, Wright and DGM approaches.

In the case of the Ibbotson MRP, the data used is based on the longest available dataset, annual Australian observations dating back to 1883. This is an approach that we continue to support for this review.

As discussed above, the ERA uses a two-stage DGM, but it has also had regard to contemporary DGM studies by other economic regulators and consultants. The ERA now contends that fewer recent DGM studies are now available, such that it has signalled its intention to rely solely on its two-stage model. We do not object to this change in approach. However, to the extent that the evidence comes from robust and reliable sources, evidence from other DGM studies can be useful as a cross-check for the output from the two-stage model. In particular, we would note that IPART updates its estimate of the short-term MRP biannually.

The results from DGMs can be sensitive to the assumptions underpinning the models, especially assumptions about long-run growth rates, and the rate of convergence towards these long-run growth rates. However, we accept that the ERA has previously clearly stated the assumptions that it uses in its DGM, and has provided the rationale for its chosen parameter values. We consider that any residual risks associated with DGM assumptions are best mitigated when the ERA uses its DGM in conjunction with Ibbotson and Wright MRP estimates. Even Partington and Satchell advise against the use of the DGM in isolation.[54]

The inclusion of the Wright MRP was initially motivated by empirical analysis undertaken by the ERA for the Rate of Return Guidelines for gas pipelines.[55] These studies investigated the relationship between the risk-free rate, MRP and overall market return.

[54] Partington, G. & Satchell, S. (2016). Report to the AER: Cost of equity issues – 2016 electricity and gas determinations, April.

[55] ERA (2013). Appendices to the Explanatory Statement for the Rate of Return Guidelines, Appendix 16, December.

In its 2015 rail decision, the ERA considered that the Wright MRP provided a strong indicator for the likely return on equity for the next 50 years.[56] This was based on statistical evidence in support of mean reversion for the return on equity. Using Dickey-Fuller and Engle-Granger statistical tests for unit roots and cointegration, the results indicated that:

- The market return on equity was a stationary series
- Bill and bond yields were non-stationary
- The MRP was likely to be non-stationary, although the evidence was mixed.

In essence, this implied that the return on equity was observed to be constant over time, while the risk-free rate was not, leaning to the conclusion that the MRP must vary over time. These findings offered empirical support for the Wright MRP and led to its subsequent use in ERA decisions.

In the Consultation Paper, the ERA now proposes to rely only on Ibbotson and DGM estimates as its only sources for informing the MRP. The proposal not to continue using the Wright MRP is attributable in part to analysis by Partington and Satchell for the AER.

In their 2017 report, Partington and Satchell considered that the MRP is likely to be lower than its long run historic mean.[57] They contend that the cost of equity in the Australian market has decreased since 2013, but that the MRP has remained constant. In reviewing the empirical evidence, Partington and Satchell did not find it compelling that the MRP should be estimated as the long run mean return on the market less the current risk-free rate (i.e. the Wright approach), as opposed to simply calculating the long run average MRP (the Ibbotson approach).

In reviewing the ERA's analysis, Partington and Satchell identified a series of issues:

- A random walk, as indicated by the findings of a unit root test, is not the only notion of non-stationarity, such that there are time series that are non-stationary, yet not random walks.
- The non-stationarity detected for bill and bond yields was possibly attributable to high inflation between 1973 and 1986, and therefore real yields may have been a more suitable candidate for unit root and cointegration testing.

[56] ERA (2015), p.145.

[57] Partington, G. & Satchell, S. (2017). Report to the AER: Discussion of estimates of the return on equity, 12 April.

- It may have been more ideal to perform the econometric analysis on all of the variables in levels (i.e. prices) rather than on first differences (i.e. the change in prices).

Specifically, Partington and Satchell remark that if the conclusions relied upon by the ERA "did not apply, then it would substantially weaken the ERA case for using the mean return on equity rather than the mean MRP."[58]

In principle, we do not disagree with Partington and Satchell's technical appraisal of the ERA's econometric analysis. The high inflation in the 1970s and 1980s may well have led to the detection of a random walk, and it is more conventional to test for cointegration using variables in levels rather than in first differences (i.e. returns).

Synergies supported the ERA's adoption of the Wright MRP in the previous review, but not exclusively based on the ERA's unit root testing. In other words, we consider that the evidence in support of the Wright MRP approach is in no way conditional on whether or not the MRP is found to be stationary through unit root and cointegration testing.

In essence, the argument being put forward by Partington and Satchell and the ERA is that the recommended refinements to the unit root and cointegration testing may ultimately reveal that the MRP is a stationary series. Such a finding, however, would not necessarily be inconsistent with the application of the Wright MRP. Specifically, what stationarity implies is that a time series is mean-reverting.[59] This does not stipulate that a time series must take the exact same value in each and every time period. For instance, GDP growth is typically a stationary series for most countries, but annual growth rates can still vary significantly from year to year in proportional terms. Shocks may cause a stationary series to deviate in the short run from its long-run average. Shocks may also be prolonged by the tendency for economic cycles to not be perfectly correlated; for example, there may be a lack of synchronisation between cycles in equity market valuations, observed returns and risk-free rates in the short term. With the property of stationarity though, the impact of such shocks on the series will eventually die down, allowing the variable to revert to its long-run mean.

Applying this rationale to the context of the MRP, the return on the market less the risk-free rate may well be stationary in the long run. However, in response to macroeconomic shocks (such as the persistently low interest rates in the aftermath of the GFC,

[58] Partington & Satchell (2017), p.41.

[59] Partington & Satchell note that "stationarity and mean reversion are not necessarily the same thing and compatibility between them requires the imposition of various assumptions on the behavior of the time series under consideration." We accept this, but consider that these assumptions are not likely to be contentious in the present context.

particularly in the context of the current macroeconomic environment in Australia, which will see accommodating monetary policy for some time), the MRP may deviate from a long-run average, until such a time as these shocks begin to dissipate. Consequently, the potential stationarity of the MRP does not preclude the use of the Wright approach.

If the risk-free rate is sufficiently high, estimates from both the Ibbotson and Wright MRP approaches will be similar. This is precisely the purpose of the Wright MRP. It reflects the phenomenon that the MRP tends to increase during periods of low interest rates, but corrects back once interest rates return to conventional levels.

Notably, Partington and Satchell did not rule out the possibility that a decrease in the risk-free rate could be associated with an increase in the MRP, writing that "on occasion, it is entirely possible that the MRP may increase as interest rates fall."[60] At this point in time, we are not recommending that the Wright approach should be the *only* source of information that informs the MRP estimate. Even if the MRP does not move exactly one-for-one with the risk-free rate, there is certainly evidence that there is at least some inverse relationship, as we document in the next section. For this reason, the Wright MRP should be given some weight in the ERA's analysis, in conjunction with the other approaches current in use.

In separate comments, Partington and Satchell claimed in 2016 that:[61]

> Current 10 year Australian bond yields are 40 basis points below the previous minimum, so we have struck a new minimum. However, we do not consider that the magnitude of current interest rates is so dissimilar to the past as to invalidate the historic MRP informing an estimate of the current MRP.

It is not entirely clear to which previous minimum Partington and Satchell are referring. Historical data from the RBA website extends back to July 1969. Prior to December 2008, the lowest recorded MRP over that timeframe was 4.8% in June 2003. As documented in Section 3.1, the current risk-free rate, while no longer at a record minimum, is 2.79%, so the previous minimum being referred to is possibly a post-GFC minimum. If so, the argument above implies that the Wright MRP is not required because the risk-free rate is only marginally lower than it has been post-GFC. Yet the depressed risk-free rates resulting from the GFC are precisely the reason why the Wright MRP is warranted.

[60] Partington & Satchell (2016), p.15.

[61] Partington & Satchell (2016), p.25.

It could instead be the case that Partington and Satchell are referring to interest rate history prior to 1969, but it would be difficult to draw parallels between the methods adopted for determining the MRP then and now.

We respectfully disagree with Partington and Satchell's comments cited by the ERA that the Wright approach has no "well accepted theoretical support", "does not seem to be much used, if at all" and "runs contrary to the well accepted view that asset prices are inversely related to interest rates."[62] The following section presents a wide range of evidence from other economic regulators and financial practitioners that substantiates the principles behind the Wright MRP.

3.3.3 Evidence in support of the Wright MRP

The post-GFC evidence supports the Wright approach to the determination of the MRP. This point was implicitly made by the Governor of the Reserve Bank of Australia in a speech to the Australian American Association:[63]

> But another feature that catches one's eye is that, post-crisis, the earnings yield on listed companies seems to have remained where it has historically been for a long time, even as the return on safe assets has collapsed to be close to zero (Graph 2). This seems to imply that the equity risk premium observed *ex post* has risen even as the risk-free rate has fallen and by about an offsetting amount. Perhaps this is partly explained by more sense of risk attached to future earnings, and/or a lower expected *growth rate* of future earnings.
>
> Or it might be explained simply by stickiness in the sorts of 'hurdle rates' that decision makers expect investments to clear. I cannot speak about US corporates, but this would seem to be consistent with the observation that we tend to hear from Australian liaison contacts that the hurdle rates of return that boards of directors apply to investment propositions have not shifted, despite the exceptionally low returns available on low-risk assets.
>
> The possibility that, *de facto*, the risk premium being required by those who make decisions about real capital investment has risen by the same amount that the riskless rates affected by central banks have fallen may help to explain why we observe a pick-up in financial risk-taking, but considerably less effect, so far, on 'real economy' risk-taking.

The graph the Reserve Bank Governor referred to is reproduced in Figure 3.

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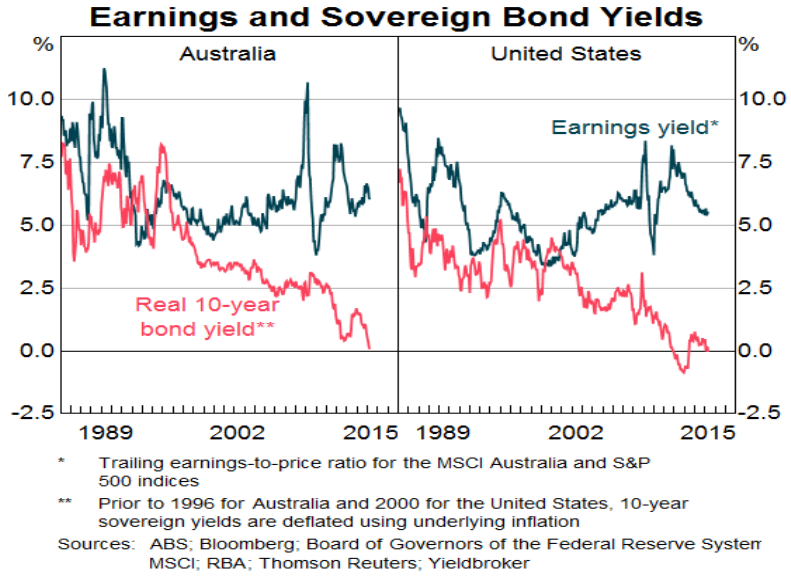
[62] Partington & Satchell (2016), p.31.

[63] Glenn Stevens, Address to The American Australian Association Luncheon, New York, USA – 21 April 2015.

Figure 3 Earnings and sovereign bond yields



Source: RBA

Based on this recent evidence, to the extent that an historical market return informs the MRP (which fundamentally is a forward-looking parameter), the Wright approach should be given more weight than the Ibbotson approach, at least in recent history. Indeed, the fact that the former Governor of the Reserve Bank of Australia has specifically commented favourably on the very premise that underpins the Wright approach lends support to its acceptance.

Evidence from overseas also reinforces the relevance of the Wright approach.

Ofgem's consultants, Wright and Smithers (2014), made the following comments in regard to establishing a value for the MRP:[64]

> … the [UK's Competition Commission] has given at least some weight to a model in which the expected market return is assumed to have been pulled down by falls in the risk-free rate… We argued against this model, pointing to the lack of any historical stability in the risk-free rate, and hence in estimates of the market equity premium. We believe that recent events have simply added to the weight of evidence against this approach.
>
> A counter-cyclical equity premium is consistent with some more recent academic research, and with recent patterns in observable proxies for risk premiums such as corporate bond spreads. It also has the advantage of providing stability in the regulatory process.

[64] Wright, S. and Smithers, A. (2014). The cost of equity for regulated companies: A review for Ofgem, p.2.

> We conclude that there is no plausible case for any further downward adjustment in the assumed market cost of equity based on recent [downward] movements in risk-free rates.

Wright and Smithers conclude:[65]

> Thus both historical and more recent evidence point to the same conclusion: in contrast to the stock return there is no evidence of stability in the risk-free rate, at any maturity. As a direct implication, there is no evidence of stability of the market equity premium. Without such evidence, there is no empirical basis for the assumption that falls in risk-free rates should translate to falls in expected market returns.

The US Federal Energy Regulatory Commission (FERC) has adopted a similar stance. It was previously FERC's practice to adjust the return on equity with a 1:1 correspondence between the return on equity and changes in US Treasury bond yields. However, in light of the GFC, they have decided that this methodology may no longer "produce a rational result":[66]

> The capital market conditions since the 2008 market collapse and the record in this proceeding have shown that there is not a direct correlation between changes in U.S. Treasury bond yields and changes in ROE… U.S. Treasury bond yields do not provide a reliable and consistent metric for tracking changes in ROE.

In support of the Wright approach, the Alberta Utilities Commission acknowledged in 2011 that the market risk premium may be higher than its historic average due to low prevailing interest rates. This decision was supported by regression analysis, which demonstrated that the market return on equity changes by less than changes in the risk-free rate.[67]

Dobbs, Koller and Lund (2014) from McKinsey Inc. have also contributed to the debate about the MRP:[68]

> … a "rational expectations" investor who takes a longer-term view should regard today's ultra-low rates as temporary and therefore likely will not reduce the discount rate used to value future cash flows. Moreover, such investors may assign a higher risk premium in today's environment. Our conversations with management teams and corporate boards suggest that they take a similar approach when they consider

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65 Wright and Smithers (2014), p.15.

66 Opinion 531, Docket EL11-66-001, FERC, June 2014, pp 77-78.

67 Villadsen, B., Vilbert, M.J. and Brown, T. (2012). Survey of Cost of Capital Practices in Canada, 31 May.

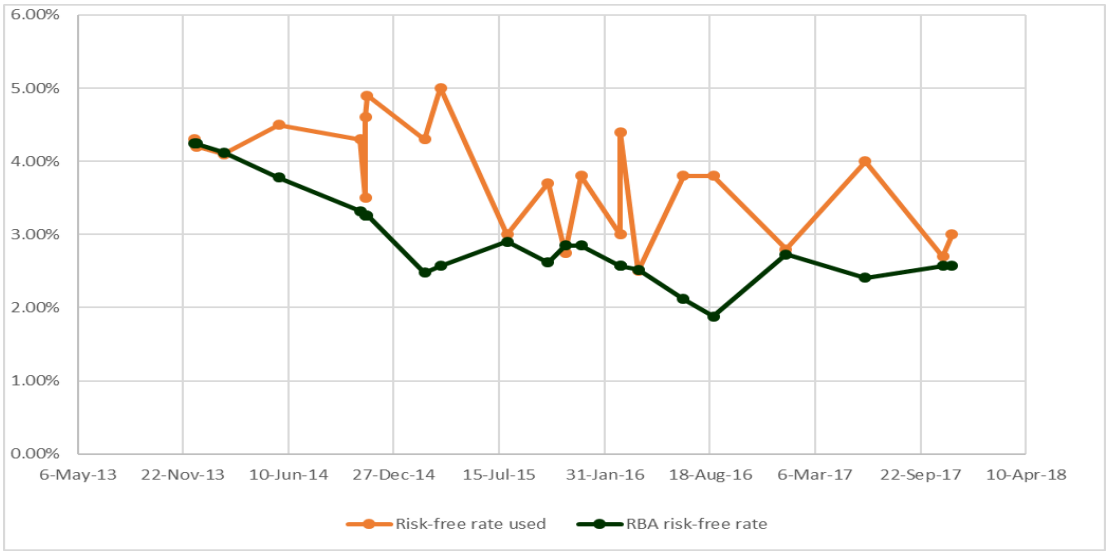
68 Dobbs, R., Koller, T. and Lund, S. (2014). "What effect has quantitative easing had on your share price?" McKinsey on Finance, Winter (49), p.16.

investment hurdle rates. None of those with whom we spoke have lowered the hurdle rates they use to assess potential investment projects, reflecting their view that low rates will not persist indefinitely.

Use of higher risk-free rates

Evidence from independent expert reports for ASX listed firms on the Thomson Reuters Connect 4 database supports the notion that the required return on equity has not decreased due to lower risk-free rates. There is also clear evidence that independent expert reports frequently adopt risk-free rates above the contemporaneous risk-free rate as measured by the RBA. To illustrate this phenomenon, Figure 4 shows the divergence between the risk-free rate adopted in each independent expert report and the prevailing risk-free rate published by the RBA at the time. This is a significant finding, because it shows that industry practice diverges from the regulatory practice of calculating the risk-free rate based on a short averaging period of contemporaneous data. This will inevitably result in higher return on equity (and therefore WACC) estimates than those arising from regulatory processes.

Figure 4 Comparison of risk-free rates with prevailing RBA risk-free rate



Data source: RBA, Connect 4, Synergies calculations

3.3.4 Synergies' recommendation for the MRP

Based on the analysis presented in this chapter, we consider that there are insufficient grounds on which to remove the Wright MRP from consideration. While it is clear that the risk-free rate is below its historical average, there is comprehensive evidence that the return on equity has not followed this pattern to the same extent.

Independent of the approaches that are employed, another priority for the MRP relates to transparency in the weightings that the ERA applies to each of its selected methods. In our view, regulatory certainty would be enhanced (and correspondingly, the risk for infrastructure providers and users decreased) if the ERA were to be more explicit and transparent about the weightings it applies, or whether it has specific weightings for particular methods for the derivation of the MRP. At present, we believe that the ERA relies excessively on discretion in determining whether the MRP sits at the upper or lower end of its designated range. At the same time, we do acknowledge that the ERA has already provided guidance on the weights used within individual approaches, such as in the case of the Ibbotson MRP, where a simple average of the lowest arithmetic and highest geometric means is used.

In the Consultation Paper, the ERA puts forward a number of high level criteria that inform its estimation of the WACC. One of these is to promote "reasoned, predictable and transparent decision making."[69] We maintain that more guidance from the ERA on its weighting approach would advance the realisation of this objective, and would make it easier for stakeholders to predict movements in the MRP going forward.

In the absence of evidence to favour one methodology more heavily over others, we recommend an equal weighting on the Ibbotson, Wright and DGM approaches.

3.4 Synergies' recommendation for the return on equity

A summary of our recommendations for the three return on equity parameters is provided below:

- Risk-free rate: We continue to support the ERA's current approach to the risk-free rate, which is to calculate a 40-day average of the observed yield on 10-year Commonwealth Government Security bonds.
- Beta: We recommend an asset beta of at least 0.75 for Arc, which corresponds to an equity beta of at least 1.00 assuming 25% gearing. This recommendation is driven by the increase in Arc's risk profile since the previous rail WACC review, as demonstrated by the first principles analysis.
- MRP: Our recommendation is that the ERA should retain its regard to the Ibbotson, Wright and DGM approaches, and also consider providing more guidance on the weightings that it uses for these approaches.

[69] ERA (2018), p.26.

4 Return on debt

In simple terms, the return on debt calculation is the sum of the risk-free rate and an estimate of the debt risk premium consistent with the risk profile of the entity in question.

This approach is underpinned by the concept of credit spreads reflecting credit and liquidity risks associated with government and corporate bonds. A credit spread is the difference in yield (return to the investor) between two bonds of similar maturity but with different credit quality due to the different underlying risks associated with each bond. The difference in yields between a long-term government bond (assumed to be the risk-free rate) and an equivalent term corporate bond is an example of the credit spread concept.

The return on debt calculation used by the ERA is expressed as follows:

$$R_d = R_f + DRP + DRC$$

Where:

Rf = risk-free rate

DRP = debt risk premium

DRC = debt raising costs

We have addressed the calculation of the risk-free rate in Section 3.1. The following sections discuss the approach to determining the other two parameters.

4.1 The ERA's current return on debt approach

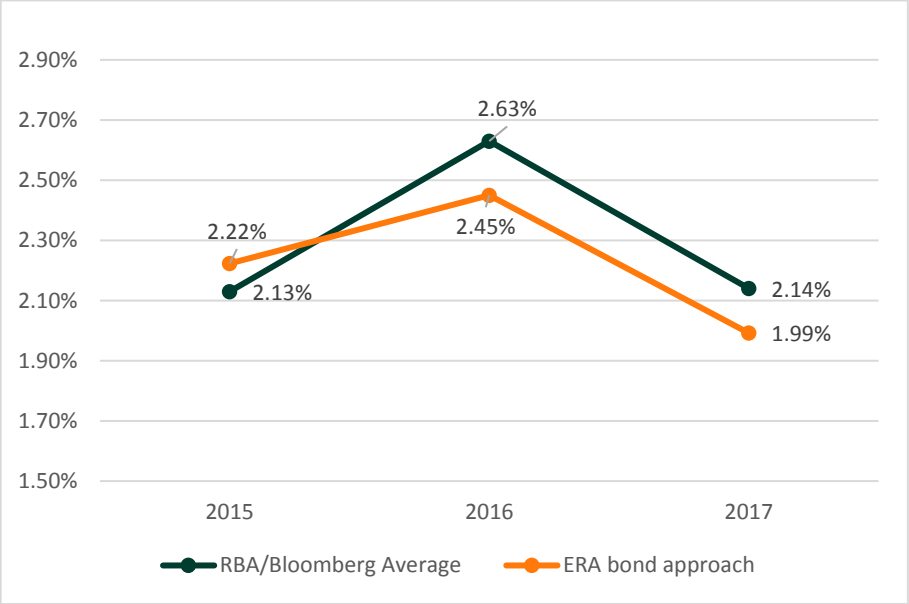
The ERA calculates the debt risk premium (DRP) utilising an in-house method that it refers to as the Revised Bond Yield Approach. This methodology uses the Gaussian Kernel, Nelson-Siegel and Nelson-Siegel-Svennson techniques to derive observed yields of relevant corporate bonds from Bloomberg that meet the ERA's filtering criteria.

In the previous methodology review, Synergies submitted that the bond yield approach was difficult to replicate by stakeholders, without any substantive improvements in accuracy. While we acknowledge that the ERA has provided detail on the parameters and constraints that it uses for its various techniques, we still consider there are residual difficulties with replication. Our preference continues to be for a simple averaging of bond yield estimates provided by two third-party sources, the RBA and Bloomberg. This approach would align with one of the WACC criteria set out in the Consultation Paper,

which "promotes simple approaches to estimating the rate of return over complex approaches, where appropriate."[70]

However, ultimately the main consideration is whether the choice of approach leads to materially different estimates of the cost of debt. Figure 5 demonstrates that, since the Final Decision for the previous review in 2015, the cost of debt estimates generated by the two approaches have been broadly similar. Neither approach has resulted in a consistently higher return on debt estimate. In 2015, the ERA's bond yield approach resulted in a higher cost of debt compared to our preferred approach, while our approach would have led to a modestly higher return on debt estimate in 2016 and 2017. The difference is never larger than 20 basis points. As a result, the effect on the overall WACC is minimal at best.

Figure 5 Comparison of Synergies and ERA return on debt methodologies



Note: Consistent with the ERA's approach, we have assumed a 40-day averaging period up to 30 June of each year.
Data source: RBA, Bloomberg, Synergies analysis, ERA analysis

As a point of reference for the present determination, Synergies' current RBA/Bloomberg DRP estimate (based on a 40-day averaging period as at 31 May 2018) is 1.81%.

[70] ERA (2018), p.26.

4.2 Credit rating assumption

The ERA's assumed credit rating for Arc is BBB+. Previously, this has been justified on the basis of comparable companies' credit ratings. Table 4 indicates that BBB+ is the most common credit rating for the comparator set.

Table 4 Credit ratings for comparable companies

Company	Moody's Credit Rating	S&P Credit Rating
CSX Corporation	Baa1	BBB+
Genesee & Wyoming Inc.	Ba2	BB
Kansas City Southern	Baa3	BBB-
Norfolk Southern Corporation	Baa1	BBB+
Union Pacific Corporation	A3	A
Canadian National Railway Company	A2	A
Canadian Pacific Railway Limited	Not rated	BBB+
Aurizon Holdings	Baa1	BBB+
Port of Tauranga	Not rated	Not rated

Note: A Moody's credit rating of Baa1 is equivalent to an S&P credit rating of BBB+.
Source: Bloomberg

Based on this evidence, there does not appear to be a case for changing Arc's assumed credit rating of BBB+ at this time.

4.3 Debt raising costs

The ERA currently allows for debt raising costs of 12.5 basis points per annum (bppa), but has signalled that it proposes to reduce this allowance to 10bppa (0.10%). This change of approach has been motivated in part by concerns that the current allowance may lead to double counting if swap margins are included. In particular, the ERA cites a report by PwC that was commissioned by the Queensland Competition Authority. The report to which the ERA refers is discussed below.

PwC has undertaken market research of Australian debt raising transaction costs, which have been applied in an Australian energy economic regulation context.[71] Incenta have subsequently applied PwC's findings in recent energy regulatory processes. PWC's study built on earlier work undertaken by Allen Consulting Group.[72] We regard this collective body of work prepared in an Australian regulatory context to provide the most authoritative evidence of debt raising costs for Australian corporates based on surveys

[71] PwC (2013).

[72] Allen Consulting Group (2004). Debt and equity raising transaction costs, Final report, December.

and interviews with legal firms, banks and credit rating agencies that are involved in the corporate bond raising process.

PWC noted that during the past decade a benchmark of 12.5 basis points per annum (bppa), representing direct costs of debt raising, was developed and applied by several Australian regulators. However, from 2004 the AER applied a methodology based on empirical observations of direct debt raising costs, which resulted in lower benchmark values in the range of 8 to 10 bppa depending on the size of the regulated network business.[73]

PwC's breakdown of direct debt transaction costs are as follows:

- Legal counsel – Master program – legal costs for the preparation of a Master Program, which becomes the base document for multiple issuances over 10 years;
- Legal counsel – Issuer's – legal fees for the preparation of documents under the Master Program;
- Credit rating agency – Initial credit rating – a fee to establish the credit rating;
- Credit rating agency – Annual surveillance – a rating agency fee for the maintenance of the credit rating each year;
- Credit rating agency – Up front bond issue – a fee charged by the rating agency when a new bond is issued;
- Registrar – Up front – an initial set-up fee charged by a bond registry organisation;
- Registrar – Annual – the annual fee charged by the registry service; and
- Investment bank's out-of-pocket expenses – the fees charged by the agents of a bank for travel, accommodation, venue hire, printing etc.

We consider this full list is relevant for the total benchmark transaction costs that would be prudently incurred. Using the above cost components, PwC derived an estimate for total debt raising transaction costs for Australian bond issues, based on the standard issue size ($250 million) and benchmark term to maturity (10 years), of 10 bppa. This estimate combines the base arrangement fee with 'other' costs in terms of an equivalent bppa. Accordingly, we support debt raising costs of 10 bppa.

[73] PwC (2013), p.6.

4.4 Synergies' recommendation for the return on debt

Our main conclusions regarding the return on debt are as follows:

- Although we maintain the view that a transparent and readily replicable DRP method is preferable to that used by the ERA, there has not been a significant enough divergence from the notional RBA/Bloomberg method estimates to warrant changing approaches at this point in time.
- Based on evidence from the comparator sample, it appears the assumed BBB+ credit rating for Arc remains appropriate.
- We support the ERA's proposal to assume debt raising costs of 10 bppa.

5 Gamma

Gamma (γ) is the value of imputation credits to investors, where some part of corporate tax paid can be claimed as a tax credit against personal income tax. To the extent it can be accessed by investors, it forms part of the assumed equity return to investors.

Gamma is the product of two inputs which must be estimated:

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

Gamma must take a value between zero and one depending on the assumptions made about the distribution rate and theta.

The determination of gamma has been highly contentious in a regulatory context. The key issue rests on whether gamma has a 'market' interpretation or 'non-market' utilisation interpretation. Market approaches seek to ascribe the actual value that investors place on imputation credits, whereas non-market utilisation approaches focus more on the proportion of credits that are redeemed.

5.1 The ERA's current approach to gamma

The ERA currently adopts a gamma value of 0.4 from a range of 0.3 to 0.5. This range is defined by the following approaches:

- The equity ownership approach (gamma = 0.40) [non-market approach]
- The taxation statistics approach (gamma = 0.30) [non-market approach]
- Dividend drop off approach (0.30-0.50) [market approach]

The ERA has stated that it places the most weight on the equity ownership approach.

The following subsections consider the strengths and weaknesses of each of these approaches in turn. We also examine whether any adjustments will need to be made to the point estimates or ranges that the ERA assigns to each approach.

Our main findings are that while there are shortcomings with the equity ownership and taxation statistics approaches, we do not object to the ERA giving these approaches some weight in determining its gamma range. Previously, the ERA has sought to place less weight on taxation statistics, citing data concerns. We demonstrate below that any data limitations to do not prevent an accurate estimate of gamma.

We also recommend that the existing set of approaches should be augmented with a fourth approach, namely evidence from finance theory and financial practitioners. In addition, the estimate associated with the dividend drop off approach should be updated to 0.25 to reflect the results from more recent studies.

5.1.1 Equity ownership approach

The equity ownership approach assumes that an investor eligible to utilise imputation credits they receive has a utilisation rate of 1 (i.e. they gain 100 percent of the "value" of the imputation credits); whereas an investor that is ineligible to redeem imputation credits has a utilisation rate of 0 (i.e. they gain no "value" from the imputation credits). However, this approach fails to recognise the potential for individual eligible investors to value imputation credits at less than their nominal dollar value, notwithstanding evidence to the contrary. Moreover, the equity ownership approach does not reflect a market based approach despite every other relevant parameter informing the WACC being based on a market proxy.

The equity ownership approach requires two significant assumptions:

- All credits distributed to domestic investors must be redeemed by those investors
- The Australian stock portfolios held by domestic and foreign investors must be identical

Regarding the first assumption, this implies that being an ineligible foreign investor is the only reason why imputation credits cannot be redeemed. In practice though, we observe that there are other reasons why even domestic residents may not redeem imputation credits. A prominent example of this is the 45-day rule. Under this rule, investors are required to hold shares for a period of 45 days during a qualification period around the dividend event (without substantial hedging) in order to be eligible to rebate imputation credits against their tax liabilities.

The importance of the second assumption is that if the portfolio composition of domestic and foreign investors differs, then this may mask the true quantity of franking credits redeemed by eligible investors.

In the 2015 Final Decision, the ERA makes numerous references to a quote from Lally, which defines theta in the following way:[74]

> The required utilization rate is a complex weighted average determined by the value of equity that investors hold and their relative wealth and risk aversion.

[74] ERA (2015), p.180.

This is the essence of non-market approaches to gamma. The issue with this definition is that it disregards the information that can be derived from observed market prices. In efficient capital markets, market prices will reflect all relevant considerations pertaining to the value of an asset. Reliance on a utilisation approach allows for a divergence between the allowance permitted by regulators and the true value of imputation credits in the market.

5.1.2 Taxation statistics approach

The taxation statistics approach employs data from the Australian Tax Office (ATO) to calculate the proportion of imputation credits that are actually redeemed by investors. While also an example of a non-market approach, the advantage of the taxation statistics approach is that it estimates directly the proportion of imputation credits redeemed. On the other hand, the equity ownership approach can only be considered an indirect estimate. It will successfully account for non-resident effects, but will not capture any other reasons why imputation credits may be values at less than their face value. This is likely to be one of the reasons why gamma estimates based on the equity ownership approach tend to be higher than those based on the taxation statistics approach, as is the case for the ERA's current defined range.

Previously, concerns have been raised by the ERA and other regulators regarding the quality of the ATO data. In its Final Decision, the ERA stated that:[75]

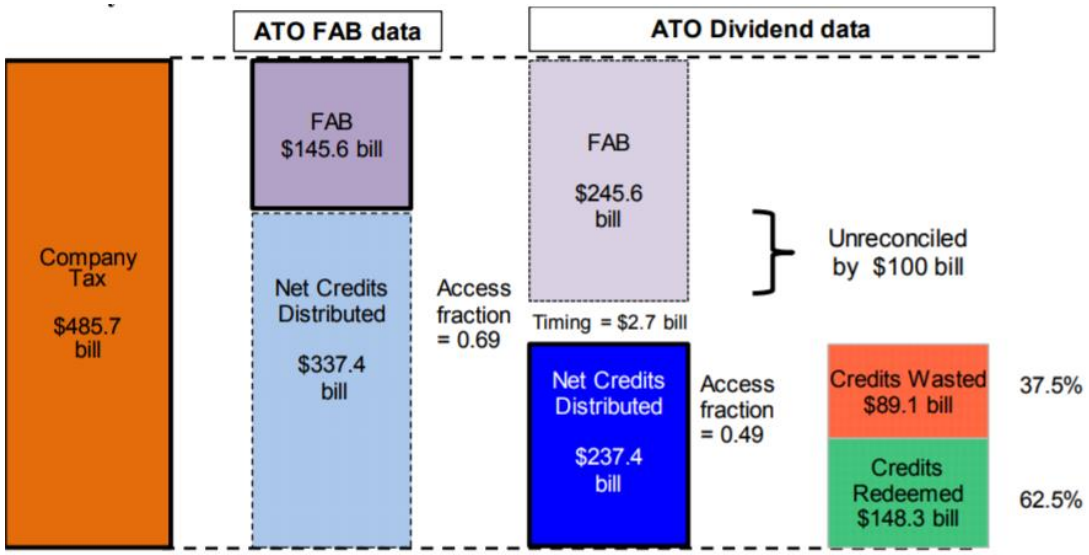
> The Authority does not place much weight on the estimate, or on its ability to inform a point estimate of the utilization rate, given concerns about the robustness of the taxation data used for estimating the utilization rate.

The issue can be observed visually in Figure 6, taken from Hathaway (2014), the most recent report on taxation statistics.[76] What this diagram shows is that the two methods imply materially different distribution rates (or access fractions, to use Hathaway's terminology). As gamma is the product of the distribution rate and the theta, this would suggest that reliance on ATO data is problematic, and regulators such as the ERA would be justified in minimising its emphasis.

[75] ERA (2015), pp.207-208.

[76] Hathaway, N. (2014). Franking credit redemption ATO data 1988 to 2012, Capital Research, October.

Figure 6 Visual representation of ATO tax flows, 2004-2012



Note: FAB stands for Franking Account Balances.
Data source: Hathaway (2014)

However, as far as the determination of gamma is concerned, only the orange section (Company Tax) and the green section (Credits Redeemed) are relevant inputs.

The equation for gamma in terms of credits created, distributed and redeemed is expressed below:

> Gamma = (Credits redeemed/Credits distributed) * (Credits distributed/Credits created)

Mathematically, Hathaway explains that this expression simplifies to:

> Gamma = (Credits redeemed/Credits created)

This means that for the purpose of estimating gamma, the taxation statistics approach does not actually depend on an estimate of the distribution rate, adding to the robustness of the estimate.

In December 2017, Hathaway addressed these concerns, stating that:[77]

> The Company Tax item is the total company tax collected by the ATO during the relevant period and the Credits Redeemed item is the total amount of credits redeemed via the filing of personal tax returns. These two data items are 100% reliable as they are figures that relate directly to ATO collections. There is no reason to

[77] Hathaway, N. (2017). Letter to Energy Networks Australia, 12 December, p.1.

question the ATO's records of the amount of corporate and personal tax it has collected.

As a consequence, a reliable estimate of gamma is provided by the following:

Gamma = (Credits redeemed = $148.3 billion) / (Company tax = $485.7 billion) = 0.31

Because tax statistics from the ATO offer a direct estimate of the actual amount of credits redeemed by taxpayers, an estimate of gamma derived from this approach already provides an upper bound on the estimate of gamma.[78] This is because the taxation approach assumes that all imputation credits are valued at their full face amount. For this reason, the equity ownership approach is actually made redundant; it is, in effect, the upper bound of the upper bound for gamma.

Although we do not endorse the implementation of non-market approaches for estimating gamma, we believe that the taxation statistics approach is the most robust of the non-market methods available. Especially given that the data quality issues previously raised do not preclude the estimation of gamma, there is no reason why the taxation approach should be assigned any less weight compared to the equity ownership approach. The issue remains though that both of these approaches still assume that investors value imputation credits at their face value.

5.1.3 Dividend drop-off approach

The dividend drop-off approach observes changes in stock prices around ex-dividend days and compares them with the magnitude of the cash dividend and any imputation tax credit attached to it. This allows for a market estimate of the value of theta.

In the most recent dividend drop-off study, Cannavan and Gray (2017) employ an extended dataset with improved econometric techniques in order to assess the value of imputation credits.[79] Their results reinforce earlier findings that the market values distributed imputation credits at approximately 35% of the face amount (i.e. theta = 0.35). This estimate of theta is consistent with a value for gamma of 0.25, assuming a distribution rate of 70%.

[78] Frontier Economics (2017). Estimating gamma within the regulatory context – Final report prepared for Aurizon Network, September, p.43.

[79] Cannavan, D. and Gray, S. (2017). Dividend drop-off estimates of the value of dividend imputation tax credits. Pacific-Basin Finance Journal, 46, pp.213-226.

Furthermore, IPART makes specific reference to this paper in substantiating its decision to retain a gamma estimate of 0.25.[80] In its February 2018 WACC methodology review, IPART re-affirmed its support for a gamma value of 0.25. IPART considered that there was not sufficient evidence to suggest a more accurate method of determining gamma stating that:[81]

> Further, we maintain our view that dividend drop-off studies are currently the best method to estimate the market value of gamma. Its advantage is that it measures the observed value of dividends and imputation credits by examining share price changes on ex-dividend days.

Commenting on a 2011 dividend drop-off study by SFG, of which the Cannavan and Gray (2017) study is an updated analysis, the Australian Competition Tribunal concluded in a 2011 decision that that:[82]

> No other dividend drop-off study estimates any claims to given weight vis-à-vis the SFG report value.

As a result, we believe that the assumed value from the dividend drop off approach in the ERA's gamma range should be 0.25, rather than the current 0.3-0.5, which is based in part on older studies. This is not to say that the dividend drop-off studies previously cited by the ERA were not important contributions to the literature at the time. Rather, the availability of more up-to-date and statistically robust data means that earlier studies should be afforded less weight in the current methodology review.

5.2 Finance theory and market evidence

The ERA's current framework overlooks important academic evidence in relation to imputation credits, as well as the perception of gamma by financial practitioners. We provide an overview of this evidence, and its implications for the estimate of gamma.

5.2.1 Academic evidence on gamma

It is well-accepted in the academic literature that the gamma for a security where the marginal investor is foreign should be zero. We turn to a consideration of some of the key findings of this literature.

[80] IPART (2018). Review of our WACC method, Final report research, February.

[81] IPART (2018), p.83.

[82] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 38.

Cannavan et al. (2004) infer the value of imputation tax credits from the prices of derivative securities in Australian retail markets. Their findings are consistent with non-residents being marginal price-setting investors in large Australian firms. They argue that a company's cost of capital is not affected by a dividend imputation system.[83] Thus, if an international investor derives no value from imputation credits a company must produce the same return for a marginal stockholder irrespective of the existence of an imputation system. Feuerherdt et al. (2010) extend the analysis to Australian hybrid securities, also finding evidence consistent with a price-setting investor placing no value on franking credits.[84]

Lajbcygier and Wheatley (2012) test whether equity returns are related to imputation credit yields. They find no evidence that the provision of imputation tax credits lowers the return investors require on equity.[85] Furthermore, using a general equilibrium model, they demonstrate that if the domestic market is small relative to the foreign market, which is the case for Australia, the impact of imputation credits on the domestic equity premium is negligible.

In the SL CAPM, equity markets are presumed to be segmented between domestic and foreign markets to determine the cost of equity for regulated firms. In this sense, imputation-eligible domestic investors make portfolio decisions based on with-imputation credit returns, while ineligible foreign investors make decisions based on without-imputation credit returns. In an open economy, such as Australia, which represents a small proportion of global equity, the returns will be determined largely by the expectations of foreign investors.

Siau et al. (2015) employ discounted cash-flow valuation models to assess whether imputation tax credits are capitalised into Australian stock prices. They uncover no clear evidence that imputation credits influence the level of stock prices.[86] This reinforces the notion that credits are not valued by the marginal investor, who in the context of Australia is likely to be an international investor.

Gray and Hall (2006) explicitly derive the relationship between the value of franking credits (gamma) and the MRP. With a specific emphasis on Australian regulators, they

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[83] Cannavan, D., Finn, F. and Gray, S. (2004). The value of dividend imputation tax credits in Australia. Journal of Financial Economics, 2, pp.167-197.

[84] Feuerherdt, C., Gray, S. and Hall, J. (2010). The value of imputation credits on Australian hybrid securities. International Review of Finance, 10(3), pp.365-401.

[85] Lajbcygier, P. and Wheatley, S.M. (2012). Imputation credits and equity returns. Economic Record, 88(283), pp.476-494.

[86] Siau, K.S., Sault, S.J. and Warren, G.J. (2015). Are imputation credits capitalised into stock prices? Accounting and Finance, 55, pp.241-277.

demonstrate that the typical parameter estimates adopted in practice are incompatible with this mathematical relationship.[87] If internal consistency within the cost of equity model is to be restored, then at least one of the parameter values needs to be modified. To restore internal consistency, the authors propose that setting gamma equal to zero is the most straightforward way of achieving this. The advantage of this approach is that no further assumptions are required about the magnitude of dividend yields. Alternatively, to support a gamma value greater than zero other parameters would have to assume implausible values.

While not necessarily the most reliable of sources, the authors cite two surveys in support of their findings. Firstly, Truong, Partington and Peat (2005) surveyed 356 listed Australian firms on their corporate finance practices: 85 per cent of respondents indicated that they made no adjustment for the value of franking credits.[88]

Additionally, Lonergan (2001) conducted a review of expert valuation reports, finding that 42 of 48 (88 per cent) used the CAPM for their cost of equity calculations without making any adjustments for dividend imputation.[89] Of the six reports that did incorporate it, only one was able to assign any non-negligible value to the company on the basis of franking credits. Although some time has passed since these surveys, there is little indication that these key sentiments have changed.

Academic research analysing market data indicates strong support for a gamma value of zero based on the assumption that in open capital markets like Australia, the marginal investor will be an international investor who gains no value from imputation credits and hence whose expected return on equity is not affected by the operation of the Australian tax imputation system.

5.2.2 Independent expert valuations

There is also substantial evidence that imputation credits are not valued by independent experts. In a review of market evidence on the cost of equity for Aurizon, Ernst and Young find that "there is no evidence that market practitioners (i.e. independent experts)

[87] Gray, S. and Hall, J. (2006). Relationship between franking credits and the market risk premium. Accounting and Finance, 46, pp.405-428.

[88] Truong, G., Partington, G. and Peat, M. (2005). Cost of capital estimation and capital budgeting practice in Australia. AFAANZ Conference, Melbourne, Australia, 3-5 July.

[89] Lonergan, W. (2001). The disappearing returns: Why imputation has not reduced the cost of capital. Journal of the Securities Institute of Australia, Issue 1 Autumn, pp.8-17.

take information on imputation credits into account in estimating required rates of returns."[90]

In response to a 2014 AER draft decision for Transgrid, Grant Samuel wrote that:[91]

> We have always made it clear in our reports that we do not believe that day to day market prices of Australian equities incorporate any particular value for franking credits attached to any future income stream and we have never made any adjustment for dividend imputation (in either the cash flows or the discount rate) in any of our 500 plus public valuation reports.

Furthermore, in a 2015 Independent Expert's Report for Asciano, Grant Samuel puts forward the perspective of financial markets, arguing that:[92]

> The evidence gathered to date as to the value of the market attributes to franking credits is insufficient to rely on for valuation purposes. The studies that measure the value attributed to franking credits are based on the immediate value of franking credits distributed and do not address the risk and other issues associated with the ability to utilise them over the longer term. More importantly, Grant Samuel does not believe that such adjustments are widely used by acquirers of assets at present.

Deloitte points to the lack of conclusive evidence on the value of imputation credits:[93]

> We have not adjusted the cost of capital or the projected cash flows for the impact of dividend imputation due to the diverse views as to the value of imputation credits and the appropriate method that should be employed to calculate this value. Determining the value of franking credits requires an understanding of shareholders' personal tax profiles to determine the ability of shareholders to use franking credits to offset personal income. Furthermore, the observed EMRP already includes the value that shareholders ascribe to franking credits in the market as a whole. In our view, the evidence relating to the value that the market ascribes to imputation credits is inconclusive.

[90] Ernst and Young (2016). Market evidence on the cost of equity, 22 November, p.28.

[91] Grant Samuel (2015). Response to AER draft decision, 12 January, p.5.

[92] Grant Samuel (2015). Independent Expert's Report, Asciano, 30 September, p.315.

[93] Deloitte (2015). Independent Expert's Report, Energy Developments Limited, 3 September, p.63.

5.3 Synergies' recommendation on gamma

Given the need to incorporate the comprehensive evidence from financial practitioners and finance theory, we propose the following augmentation of the ERA's current range for determining gamma:

- The equity ownership approach (gamma = 0.40) [non-market]
- The taxation statistics approach (gamma = 0.30) [non-market]
- Dividend drop-off studies (gamma = 0.25) [market]
- Finance theory and financial practitioner evidence (gamma = 0.00) [market]

Despite the shortcomings that we have identified in the equity ownership and taxation statistic approaches, we have continued to have regard to them in our defined range. The evidence presented in Section 5.2 demands that at least some weight needs to be assigned to financial practice and theory regarding the marginal investor.

The point estimate for the dividend-drop off approach has been updated to 0.25, reflecting the most recent study, which was subsequently cited by IPART in its own WACC review earlier this year.

The average of these four approaches (to the nearest 0.05) is 0.25, which is our recommended estimate of gamma.

6 Inflation

An estimate of expected inflation is required in order to convert the nominal WACC into a real WACC. The ERA calculates inflation based on the yield differential between Treasury bonds and Treasury indexed bonds. The formula for this approach is as follows:

$$\pi = \frac{(1 + R_f)}{(1 + R_{Rf})} - 1$$

Where

R_f is the 10 year nominal risk-free rate of return estimated on Treasury Bonds; and

R_{Rf} is the 10 year real risk-free rate of return estimated on Treasury indexed bonds.

Whilst this approach is not without its limitations, in our view it provides a reasonable basis for the estimation of the rate of inflation.[94]

In the October 2017 WACC update, this resulted in an inflation estimate of 1.91%.

[94] We acknowledge that the method is not without criticism, mainly in regard to liquidity and inflation risk premia. However, it remains the most accurate method available among limited alternatives.

7 Conclusion

This section provides an overview of our recommendations for each of the WACC parameters.

7.1 Gearing

We support the retention of Arc's current gearing level of 25%. This is supported by evidence from the listed comparator sample, which shows virtually no change in gearing since the previous review.

7.2 Return on equity

Although the shortcomings of the SL CAPM are well documented, for the purpose of this review we have not objected to the use of the model for informing the return on equity. We have, however, provided evidence that financial practitioners frequently make ad hoc adjustments to the conventional CAPM as typically applied by economic regulators

7.2.1 Risk-free rate

We continue to support the ERA's determination of the risk-free rate based on a short-term average (40 days) of the observed yield on 10-year Commonwealth Government Security bonds, consistent with the long-term WACC required by the Code.

7.2.2 Beta

Our position is that the substantial increase in Arc's risk profile since the previous review warrants an asset beta increase from 0.70 to at least 0.75, corresponding to an equity beta of at least 1.00 with 25% gearing. Asset beta estimates for the listed comparators range from 0.53 to 1.07. This suggests that Arc's beta should now be somewhat closer to the upper bound of the benchmark sample range.

7.2.3 Market risk premium

Our recommendation is that the ERA retains regard to each of the Ibbotson, Wright and and DGM MRP approaches. We have presented evidence that the concerns raised about the ERA's statistical analysis do not preclude the use of the Wright MRP.

7.3 Return on debt

7.3.1 Debt risk premium

We maintain the view that a transparent and readily replicable method is preferable to that used by the ERA. However, market evidence since the previous WACC review shows that there would have been little difference in the estimated DRP had Synergies' preferred approach been adopted.

7.3.2 Debt raising costs

We endorse the ERA's decision to adopt debt raising costs of 10 basis points per annum.

7.4 Gamma

We propose amending the ERA's current gamma estimate to 0.25 based on the following revised range:

- The equity ownership approach (gamma = 0.40) [non-market]
- The taxation statistics approach (gamma = 0.30) [non-market]
- Dividend drop-off studies (gamma = 0.25) [market]
- Finance theory and financial practitioner evidence (gamma = 0.00) [market]

7.5 Inflation

We continue to support the ERA calculating inflation based on the yield differential between Treasury bonds and Treasury indexed bonds.