Method for Determining the Weighted Average Cost of Capital for Railway Networks

Consultation Paper

May 2018

Economic Regulation Authority
WESTERN AUSTRALIA

This document is available from the Economic Regulation Authority's website at www.erawa.com.au. For further information, contact:

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Contents

Introduction

1. This consultation paper provides a summary of the method used by the Economic Regulation Authority (ERA) to estimate the weighted average cost of capital (WACC) for regulated railways. The ERA invites comment on the WACC framework, the method for estimating WACC parameters or any other matter associated with the ERA's determination of the WACC for 2018.

2. The *Railways (Access) Code 2000* (Code) requires[1] the ERA to determine each year a long-term WACC to be applied in the establishment of capital costs for regulated railways[2] in that year.

3. Clause 3 of Schedule 4 of the Code further requires that, in every fifth year subsequent to 2003, the ERA invite interested parties to make written submissions and have regard to them prior to determining the WACC values for that year.

4. Details of the method currently used by the ERA are provided in the following documents available on the ERA's website:

   - "Review of the Method for estimating the Weighted Average Cost of Capital for the Regulated Railway Networks".[3] This document provides an overview of submissions considered in the finalisation of the current method, and detailed empirical analysis; and
   - "Determination on the 2016 Weighted Average Cost of Capital for the Freight and Urban Railway Networks, and for Pilbara railways".[4]

5. The method indicated in the 2016 determination was used in 2016 and 2017. This method was unchanged from the method used in the 2015 determination, with the exception of the estimation of the inflation parameter which changed from a long-run forward looking estimate[5] in 2015 to an annually updated estimate derived from Treasury Bond rates.

6. For most WACC parameters there has been no material change to the current regulatory method, which reflects the considerations made by stakeholders in submissions in the past. The ERA will continue to use this method for the 2018 determination subject to any written submissions from stakeholders.

7. However, the ERA is considering a variation to the means of choosing a point estimate for the Market Risk Premium from the range of available models. Background to this issue is provided from paragraph 85 of this document.

8. The ERA has consulted on appropriate criteria for applying regulatory discretion in the estimation of WACC parameters.[6] The resulting criteria referred to by the ERA are shown in Appendix 2.

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[1] Clause 3, Schedule 4 of the Railways (Access) Code 2000.

[2] Regulated railways are those cited in schedule 1 to the Code, currently the Public Transport Authority network, the Arc Infrastructure network, and The Pilbara Infrastructure and Roy Hill Infrastructure railways.

[3] http://www.erawa.com.au/cproot/13904/2/150917%20Rail%20WACC%20method%20final%20decision.PDF (Hereafter referred to as "2015 Decision")

[4] https://www.erawa.com.au/cproot/14527/2/Att%201%20Rail%20-%20WACC%20Final%20Determination%20of%20WACC%202016%2061%202017.PDF (Hereafter referred to as "2016 Determination").

[5] Fixed at 2.5 per cent.

[6] See 2015 Decision, paragraphs 27-33.

9. Consistent with the ERA's previous practice, some parameters are updated annually to reflect prevailing market conditions and others are reviewed less frequently, typically coinciding with major reviews of method or a significant change in market conditions. The parameters typically subject to an annual update are the nominal risk free rate, inflation, debt margins and risk premiums.

Invitation to make submissions

The ERA invites comments from interested parties relating to methodological issues identified in this paper, or on any other matter relating to the ERA's 2018 WACC determination.

Interested parties are invited to make submissions on the ERA's consultation paper by 4.00pm Monday, 25 June 2018. Submissions can be made via the ERA website at www.erawa.com.au/consultation or via:

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CONFIDENTIALITY

In general, all submissions from interested parties will be treated as being in the public domain and placed on the ERA's website. Where an interested party wishes to make a submission in confidence, it should clearly indicate the parts of the submission for which confidentiality is claimed, and specify in reasonable detail the basis for the claim.

The publication of a submission on the ERA's website shall not be taken as indicating that the ERA has knowledge either actual or constructive of the contents of a particular submission and, in particular, whether the submission in whole or part contains information of a confidential nature and no duty of confidence will arise for the ERA.

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The Railways (Access) Code 2000

10. The Code does not prescribe a method for determining the WACC.

11. The Code describes[7] the WACC as the "interest rate" to be used in an "equivalent annual cost or annuity" calculation of capital costs.

12. The Code is subsidiary legislation under the *Railways (Access) Act 1998* (Act). The object of the Act is to:

> …establish a rail access regime that encourages the efficient use of, and investment in, railway facilities by facilitating a contestable market for rail operations.[8]

13. The ERA considers it appropriate to estimate the rail WACC consistent with the efficient financing costs of efficient entities with a similar degree of risk to the provision of the rail services. This approach proceeds on the basis that efficient firms with efficient financing provide a 'benchmark' for each regulatory decision. Basing regulatory decisions on efficient input costs and output prices will facilitate contestability in the provision of railway services.

The WACC framework

14. The WACC is the rate that a company is expected to pay on average to all its security holders to finance its assets, and is therefore commonly referred to as the cost of capital. The WACC represents the minimum return that a company must earn on an existing asset base to satisfy its creditors, owners, and other providers of capital.

15. The WACC is calculated taking into account the relative weights of each component of the capital structure. The Code does not prescribe the components of capital costs to be assessed, or the means of weighting the components of the sum in the average.

16. The ERA employs a generally-accepted WACC framework, which provides for:

- the cost of equity and the cost of debt as the two components of capital cost; and
- the shares of equity and debt in a benchmark financing portfolio as the weightings of those components.

17. The ERA calculates the WACC on a "pre-tax" basis. The ERA considers that a post-tax approach would involve additional complexity and regulatory cost involved with separately estimating tax cash flows.[9]

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[7] Clause 2, Schedule 4.

[8] *Railways (Access) Act 1998*, section 2A.

[9] See 2015 Decision paragraphs 39-45. Unlike gas pipelines, railways are not required to have WACC calculated on a post-tax basis. In its 2015 decision, the ERA considered that a post-tax approach would require the development of a tax asset base calculated for a standalone entity, which would add considerable complexity to the estimation process. Further, the Code requires the estimation of total costs through an annuity that provides for the return on and of the cost of building a new railway, rather than through a building block approach that is based on a written down asset. For these reasons, the ERA considers it reasonable to retain a pre-tax approach to estimate the rail WACC.

18. The ERA also prefers the pre-tax approach as the estimation of future tax liabilities may not be consistent with the light-handed nature of the Code and the determination of the asset base on a gross replacement valuation basis.

19. In nominal terms, the WACC equation is expressed:

$$WACC_{nom} = R^{e}_{pre} * E + R^{d}_{pre} * D$$

where[10]

$WACC_{nom}$ is the nominal pre-tax weight average cost of capital

R^{e}_{pre} is the pre-tax rate of return on equity, or the cost of equity

R^{d}_{pre} is the pre-tax rate of return on debt, or the cost of debt

E is the proportion of equity in the total financing

D is the proportion of debt in the total financing

20. The pre-tax rate of return on equity is not readily available. Therefore a post-tax rate of return on equity is used, which is more easily observed.

21. It is then necessary to adjust the post-tax rate of return on equity for taxation effects, including recognition of the value of imputation credits (commonly known as gamma).

22. The imputation tax system prevents corporate profits from being taxed twice. The gamma parameter accounts for the reduction in the effective corporate taxation that is generated by the distribution of franking credits to investors. As a general rule, investors who are able to use franking credits will accept a lower required rate of return, before personal tax, on an investment that has franking credits, compared with an investment that has similar risk and no franking credits.

23. This provides a framework[11] for calculation of a nominal pre-tax WACC, as follows:

$$WACC_{nom} = R^{e}_{post} * \frac{1}{\left(1 - T * (1 - \gamma)\right)} * E + R^{d}_{pre} * D$$

where:

R^{e}_{post} is the post-tax rate of return on equity, or cost of equity

T is the tax rate

γ (gamma) is the value of franking credits created (as a proportion of their face value)

24. The real WACC is obtained from the nominal WACC by removing expected inflation (π) from the nominal pre-tax WACC, as follows:[12]

[10] All parameters are expected parameter values.

[11] Known as the "Officer/Monkhouse framework".

[12] This has been referred to as the "Market Transformation Method".

$$WACC_{real} = \frac{(1 + WACC_{nom})}{1 + \pi} - 1$$

25. The resulting WACC for a benchmark efficient entity represents the competitive rate of return that an entity must earn on its existing asset base in order to satisfy its creditors, shareholders and other providers of capital.

The term of the WACC

26. The Code describes the WACC as:

> the target long-term weighted average cost of capital appropriate to the railway infrastructure.[13]

27. A WACC with a term that is consistent with the long economic lives of the assets will best meet the requirements of the Code.[14] This is because the capital cost determinations required by the Code are constructed to apply in perpetuity from a fixed point in time, and not over a defined (shorter) term of an access arrangement.[15]

28. Accordingly, the ERA utilises the longest term for reliable data to inform the rail WACC. Generally, given the availability of data, this is a 10-year term. However, where appropriate, longer-term data may be used to inform the estimates of the component parameters of the WACC.

29. For the return on equity, a term of 10 years is commonly required as a means to estimate the long term return in Australia. The 10-year term allows components of models of the return on equity to be estimated from reliable data, such as the observed yield on 10 year Commonwealth Government Securities.

30. The ERA considers that the long term should also be accounted for in estimating the cost of debt. Again, use of the 10-year term provides reliable data consistent with longer-term financing by the benchmark entities for the components of the cost of debt. The ERA considers that its "revised bond yield approach"[16] provides the best estimate of the long-term return on debt for the Australian finance market.

The benchmark efficient entity and risk

31. A benchmark efficient entity is needed to inform WACC parameters. The allowed rate of return requires a regulator to account for the risks of providing the regulated services.

32. The ERA uses a benchmark entity for rail service providers that are judged to be similar.

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13 *Railways (Access) Code 1998*, Schedule 4, cl. 2.

14 The weighted average economic life of a typical heavy haul rail route may be as high as 50 years.

15 The capital cost determined is a Gross Replacement Value annuity, calculated as payable over the economic life of the asset.

16 See paragraphs 57 to 63 for further description of the 'revised bond yield approach'.

33. The ERA has defined the benchmark entity as:

> A 'pure-play'[17] 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.[18]

34. The ERA bases its estimates of WACC components on domestic financial markets.[19] This meets the guiding principle that the risk for the asset in question should stem from the economy in which the benchmark efficient entity is situated.[20]

- Market risk and systematic risk are the relevant risk consideration for equity markets. The market risk premium quantifies the risk premium for investing in a given economy as if a diversified portfolio of all listed firms in that economy were held. The risk premium is that part of the return that is in excess of the return on a risk free asset in that economy. Systematic risk is commonly quantified for a given economy through observing the covariation between returns on listed equity in firms and the returns on a representative equity market index for the country in which that firm operates.
- In evaluating the cost of equity, Australian regulators have implemented this practice through application of a domestic capital asset pricing model (CAPM) framework. The ERA considers that the regulatory costs of basing its analysis on international markets and the adoption of an international CAPM would be significant, and may not improve accuracy.
- In using the domestic CAPM, Australian regulators have recognised the influence of foreign investors, where they invest domestically and thus contribute to market outcomes within Australia.
- The domestic debt market reflects the influence of international lenders supplying debt finance directly to Australian firms. Australian markets for debt are linked to international markets. Covered interest rate parity asserts that, once the differential between spot and forward exchange rates used for hedging is taken into account, no interest rate arbitrage opportunities (to make profit) between two currencies exist. The implication is that borrowing and lending in different currencies costs the same.

35. To supplement small domestic data sets, the ERA also uses international comparators where underlying risk factors are similar.

36. Rail services differ in their operations and network infrastructure. The WACC benchmark should account for these differences, as they give rise to different risk profiles for different operators. Given the differences in the services provided by the three regulated rail networks, the ERA considers that a single benchmark rail entity will not adequately capture the different risks faced by each network.

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[17] Meaning a company which invests in only one line of business. This type of stock has a performance that correlates highly to the performance of the stock's particular industry.

[18] ERA Revised Corrigenda Draft Decision 28 November 2014 Paragraph 97 https://www.erawa.com.au/cproot/13016/2/141129%20Rail%20WACC%20Method%20REVISED%20Draft%20Decision.pdf

[19] The ERA considers that the regulatory costs associated with basing its analysis on international markets would be significant, with uncertain benefits in terms of improved accuracy.

[20] The country of risk is determined by Bloomberg's methodology. This consists of four factors listed in order of importance: management location, country of primary listing, country of revenue and reporting currency of the issuer. Management location is defined by country of domicile unless location of such key players as CEO, CFO, COO and/or General Counsel is proven to be otherwise.

37. Urban and freight rail infrastructure has been distinguished on the following bases:[21]

- the location of the urban passenger service ameliorates ownership risk due to a low likelihood of asset stranding, obsolescence, regulatory changes, declining demand or volatility in demand forecasting;
- freight services do not receive community service obligation payments; and
- freight services are not regulated and are open to competition from road transport.

38. Relevant classification frameworks exist for railway systems on the basis of their operations and infrastructure. In the United States of America, the Surface Transportation Board classifies rail networks by their operating revenues and whether or not they perform switching services and/or terminal operations. This classification system refers to Class I, Class II and Class III railways.[22]

39. On this basis, dedicated iron-ore railways in the Pilbara[23] are differentiated from the general freight networks[24] in the following ways:

- the 'class II/III type railroad' industry is a better approximation to Pilbara railways than large trans-national railroad networks which share characteristics with the general freight networks; and
- 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.

40. As a consequence, the ERA considers it appropriate to develop separate benchmarks for gearing, equity beta and credit rating specific to each of the regulated rail networks' infrastructure and operations. Utilising the same benchmark for all networks would not adequately capture their different risks, and therefore the efficient financing costs of each of the rail entities.

41. The benchmark comparators for each railway network used in the 2017 determination are shown at Appendix 1.

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[21] Macquarie Bank, *Western Australia Rail Access Regime: Independent Assessment of Maximum Rate of Return on Rail Infrastructure*, 23 August 1999, p. 6.

[22] Class I carriers are those with operating revenues of 250 million dollars or more, Class II those with revenues in excess of 20 million (1991 US) dollars and Class III, those with revenues of up to (1991 US) 20 million dollars. Class II and III lines are known as short lines and regional railroads (Association of American Railroads, 'Class II and Class III' http://freightrailworks.org/network/class-ii-and-class-iii/, 2014, (accessed 23 May 2014)).

All switching and terminal companies are classified as Class III regardless of their operating revenues (US Government Printing Office, 'Electronic Code of Federal Regulations, Title 49: Transportation, Part 1201- Railroad Companies, Instruction 1-1(b)(1)' http://www.ecfr.gov/cgi-bin/textidx?SID=27113a9126de08a7a3eae834b3efcd5e&node=49:9.1.1.1.3&rgn=div5, 2014, (accessed 20 May 2014)). Switching operations involve activities such as the making and breaking up of trains, while terminal operations involve activities connecting freight from larger rail networks to other modes of transport or rail.

The Class II and III railroads often feed traffic to and receive traffic from Class 1 railroads. Genesee and Wyoming owns and operates a significant number of Class III railroads, whereas Kansas City Southern is an example of a Class 1 railroad.

[23] The Pilbara Infrastructure PL and Roy Hill Infrastructure PL.

[24] For example, the Arc Infrastructure network.

Gearing

42. Gearing refers to the proportion of a regulated business's assets assumed to be financed by debt and equity. Gearing is defined as the ratio of the value of debt to total capital (that is, including debt and equity), and is used to weight the costs of debt and equity when the WACC is determined. The relative proportions of debt and equity that a firm has outstanding constitute its capital structure. Capital structures differ across industries, as well as among different companies within the same industry.

43. Different firms have different risk profiles and as a consequence have varying debt capacities.[25] The optimal capital structure is determined by the business risk of firms in an industry and the expected loss if default occurs.[26] Given that a service provider's expected monetary risk is likely to differ from that of the comparable sample, the optimal capital structure of the entity is likely to differ as well. It may be appropriate to adjust any estimate of gearing levels to reflect differences in the level of risk between railway networks.

44. In addition to being used to weight the expected returns on debt and equity to determine the regulated rate of return, the level of gearing of a benchmark efficient business may also be used:

- for the purpose of adjusting the equity betas that are observed from a sample of comparator businesses when their gearing levels differ from the gearing level of the benchmark efficient business; and
- as a factor in determining an appropriate credit rating for deriving the debt risk premium.

45. In its most recent determination of WACC, the ERA considered[27] that, for each regulated railway, the most appropriate gearing levels would be:

- Public Transport Authority (PTA) network - 50 per cent, at the higher end of the observed gearing range;
- Arc Infrastructure network - 25 per cent, consistent with the Australian average; and
- Pilbara Railways - 20 per cent, given the higher risk stemming from broad reliance on a single commodity, and the limited number of potential customers.

Cost of debt

46. The ERA bases its cost of debt estimates on a risk premium over and above the risk-free rate, combined with a margin for administrative costs:

Return on debt = risk free rate + debt risk premium + debt raising costs

47. The risk free rate is the rate of return of a hypothetical investment with no risk of financial loss, over a given period of time.

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[25] Australian Competition & Consumer Commission, *Access Undertaking – Interstate Rail Network*, July 2008.

[26] Brealey, Myers and Allen, *Corporate Finance*, McGraw Hill, 1996, New York, p. 476.

[27] See 2015 Decision paragraphs 196-254 for discussion and comparator analysis.

48. The debt risk premium is the margin above the risk free rate of return, required to compensate holders of debt securities for the risk in providing debt finance. The debt risk premium is compensation for investors who tolerate the extra risk, compared to that of a risk-free asset.

49. The ERA used a debt raising cost margin of 0.125 per cent in previous assessments.[28] The ERA is currently reviewing the value ascribed to this parameter with a view to ensuring that it is not overstated by the inclusion of a dealer swap margin. Recent regulatory practice has identified a possible double count of the margin with the cost of hedging.[29]

50. The ERA does not consider that an allowance for hedging costs is warranted for the rail WACC.[30]

- As the rail regulatory horizon is long-term, rail firms have more certainty about the future and can enter into longer-term funding arrangements, which reduces the need for an efficient entity to hedge. The interest rate risk of the open-ended term of debt is adequately compensated for by the use of a 10-year term for the regulated risk-free rate.[31]
- Unlike some other regulated industries, rail businesses are not subject to periodic (for example, five-year) regulatory resets of the WACC. There is therefore no need to hedge this risk.

51. The ERA will review the debt raising cost margin to ensure that hedging costs are not included.

52. The estimate of the cost of debt is based on prevailing rates on the day just prior to each determination of the annual rail WACC update. The ERA adopts a 40 business days averaging period for estimating the on-the-day risk free rate and the debt risk premium for the rail WACC annual update.[32]

Risk free rate

53. The ERA bases its estimation of the nominal risk free rate on the observed yield of 10-year Commonwealth Government Security bonds. The 10-year term is consistent with the long term of the WACC estimate.

54. The risk free rate is re-evaluated for each annual WACC determination.

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[28] On advice of the ERA's consultant for the 2008 review, the Allen Consulting Group https://www.erawa.com.au/cproot/6134/2/20071030%20ACG%20Report%20to%20the%20ERA%20-%202008%20WACC%20Determinations.pdf

[29] The Queensland Competition Authority had concerns about the inclusion of the swap margin and the age of the 12.5 basis points per annum estimate. Consequently, it engaged PricewaterhouseCoopers to prepare updated advice on debt raising costs. PricewaterhouseCoopers found that debt raising costs were within the range of 9.9 to 10.8 basis points per annum.

[30] Hedging costs relate to the costs involved in undertaking interest rate swaps to hedge the periodic resets of the regulated 'risk free rate'.

[31] See page 172, 2015 Decision.

[32] The ERA employs an on-the-day approach in order to reflect the efficient cost of debt at the time of the decision, consistent with the use of an efficient forward-looking cost of debt. See 2015 Decision paragraphs 265-271.

Debt risk premium

55. The debt risk premium compensates holders of debt securities for the possibility of default by the issuer. It is closely related to the risk of the business. When issuing debt in the form of bonds, a credit rating can be assigned that reflects the probability of default of the issuer, and hence the risk present in the bond.

56. The debt risk premium is estimated consistent with a 10-year term. The ERA considers that this is the longest feasible term that can be reliably estimated from the observed data.

57. The ERA utilises an in-house method developed to estimate the debt risk premium.[33] The debt risk premium is derived from the observed yields of relevant corporate bonds, taken from Bloomberg, that qualify for inclusion in the benchmark sample.

58. To estimate the regulated debt risk premium, the ERA:

- extends the benchmark sample to include Australian corporate bonds and to exclude bonds issued by financial sectors (including banks), duplicates, inflation linked, called and perpetual instruments;
- converts the yields into hedged Australian dollar equivalent yields inclusive of Australian swap rates;
- averages Australian dollar equivalent bond yields across the averaging period for each bond;
- estimates yield curves on this data, using a range of techniques,[34] and derives an estimate of the 10-year cost of debt by averaging these estimates; and
- estimates the regulated debt risk premium.

59. For each of the rail networks, a separate benchmark bond sample is developed, based on the corresponding benchmark efficient credit rating. The ERA uses the Bloomberg data service exclusively in order to construct each benchmark sample. The following criteria apply in order to select bonds to be included in each of the benchmark samples:

- the credit rating of each bond, as rated by Standard & Poor's, must match that determined for the benchmark efficient entity;
- the remaining time to maturity must be two years or longer;
- the bonds must be issued by Australian (non-financial) entities and denominated in Australian dollars, United States dollars, Euros or British pounds;
- fixed bonds and floating bonds are eligible for inclusion;
- both bullet bonds and bonds with callable/putable redemptions are eligible for inclusion; and
- there must be at least 20 yield observations over the required 40 day averaging period.

[33] This method has been referred to as the Revised Bond Yield Approach.

[34] See the 2015 Decision for explanations of the Gaussian Kernel (from paragraph 365), Nelson-Siegel (from paragraph 393) and Nelson-Siegel-Svensson (from paragraph 395) techniques.

60. The most recent WACC determinations by the ERA are based on benchmark efficient rail entities sustaining credit ratings of:

- A for the PTA railway;
- BBB+ for the Arc Infrastructure railway; and
- BBB- for the Pilbara railways.

61. In the 2013 Rail WACC Review the ERA acknowledged stakeholder concerns about insufficient bond sample sizes to produce robust estimates. This led the ERA to expand the samples for each benchmark credit rating by including additional credit rating steps within the broader band. Additional debt risk premium estimates based on these augmented samples were then used as a reference point for evaluation of the debt risk premium estimates based on the pure benchmark credit ratings.

62. The 2017 bond sample sizes for each of the benchmark credit ratings were:

- 36 bonds for the PTA A rated sample;
- 37 bonds for the Arc Infrastructure BBB+ rated sample; and
- 22 bonds for the Pilbara railways (The Pilbara Infrastructure and Red Hill Iron) BBB- rated sample.

63. The samples are augmented as follows:

- the PTA sample is extended from the A benchmark to A+/A/A- increasing the sample from 36 to 68 bonds;
- the Arc Infrastructure sample is extended from the BBB+ benchmark to BBB+/BBB increasing the sample from 36 to 78 bonds; and
- the Pilbara railways sample is extended from the BBB- benchmark to BBB/BBB- increasing the sample from 22 to 63 bonds.

64. The resulting sample of bonds used in the benchmark sample for each railway owner in 2017 is shown at Appendix 1.

65. The debt risk premiums based on the augmented samples benefit from a reduced estimation error around the point estimate. However, introducing a sample of bonds with a credit rating that differs from the target benchmark rating will tend to bias the debt risk premium estimate upward, as lower rated bonds are added, or downward, as higher rated bonds are added.

66. To mitigate this bias, the ERA firstly establishes the direction of the bias. If the bias in an augmented sample-based estimate is likely to be downward, the ERA uses the highest augmented sample-based estimate. This estimate is then averaged with the highest estimate from the original benchmark rated sample.[35]

67. The opposite approach is conducted if the bias is likely to be upward. The ERA considers that this sample augmentation/averaging approach balances bias and estimation error. It mitigates the potential errors that arise given the data limitations.

[35] The highest augmented sample estimate is still likely to be downwardly biased. To offset this bias it is averaged with the highest of the original benchmark sample estimates. This provides for a conservative approach which is intended to limit the bias inherent in expanding the sample away from the target credit rating band. Similar rationale is applied to augmented sample estimates considered upwardly biased - the lower of the augmented sample and original benchmark sample estimates are averaged.

68. The process, as applied to each of the rail networks for the 2017 determination, is illustrated in the following paragraphs.

69. The ERA uses two samples, the original benchmark sample and a second augmented sample that is based on a broader band of credit ratings. High, mid and low debt risk premium estimates are then produced for the two samples. The high, mid or low estimates are then chosen based on identified bias. The chosen debt risk premium estimates from both samples are then averaged.

70. The augmented PTA sample was expanded to allow the inclusion of A- rated bonds.[36] The addition of bonds with a lower credit rating biases the estimates upward. For this reason the lowest of the augmented sample-based estimates was averaged with the lowest A rated sample based estimate.

71. The augmented Arc Infrastructure BBB+ sample was expanded to allow the inclusion of BBB rated bonds. The addition of bonds with a lower credit rating biases the estimates upward. For this reason the lowest of the augmented sample-based estimates was averaged with the lowest BBB+ rated sample-based estimate.

72. The augmented Pilbara railways BBB- sample was expanded to allow the inclusion of BBB rated bonds. The addition of bonds with a higher credit rating biases the estimates downward. For this reason, the highest of the augmented sample-based DRP estimates is averaged with the highest BBB- rated sample-based estimate.

73. The debt risk premium for each benchmark entity rate is re-evaluated for each annual WACC determination.

Cost of equity

74. There are no readily observable proxies for the expected return on equity. Estimating a forward-looking return on equity – sufficient to enable regulated firms to recoup their prevailing equity financing costs – requires the use of models. Generally, these models seek to explain the required return on equity through a relationship with some portfolio of risk factors, or else in terms of the present value of the expected stream of future cash flows.

75. The model most used by Australian regulators for quantifying the return on equity and associated risk has been the Sharpe Lintner CAPM. This form of the CAPM directly estimates the required return on the equity share of an asset as a linear function of the risk free rate and a component reflecting the risk premium that investors would require over the risk free rate:

$$R_i = R_F + \beta_i \, x \, MRP$$

where: R_i = the expected return on asset *i*;

R_F = the risk free rate of return;

β_i = the equity beta; and

MRP = the market risk premium

[36] No A+ rated bond yield data was available on Bloomberg over the period in question.

76. The ERA has retained the Sharpe Lintner CAPM model for estimating the return on equity for the rail WACC, but may also utilise other models to inform its decision in relation to the return on equity.

77. In 2015, the rail decision accepted that the Dividend Growth Model and the Black CAPM may also be used to determine the return on equity.[37] In particular:

- The ERA utilised the estimates of the market return on equity and implied market risk premium from the Dividend Growth Model to inform its forward-looking market risk premium for use in the CAPM.
- The 2015 rail decision noted that the Black CAPM was relevant for estimating the return on equity. However, given it is not reliable and practical to produce a robust estimate of return on equity using this model, the model will not be used directly, but only to inform the point estimate of the equity beta from within its range for input to the Sharpe Linter CAPM.[38]

78. This approach allows the ERA to consider a wide range of material, taking account of relevant models for the return on equity, as well as a range of other relevant information. The ERA gives weight to each piece of information according to its merits at the time of each determination.

79. The three relevant models are retained for estimating the return on equity for each annual WACC determination. At each rail WACC update, the following parameters will be re-estimated for the purpose of developing the updated estimate of the return on equity for input to the Sharpe Lintner CAPM:

- the 10-year risk free rate; and
- the prevailing market risk premium.

Market risk premium

80. The market risk premium is the required return, over and above the risk free rate of return, on a fully diversified portfolio of assets. The market risk premium, a key component of the estimate of the required rate of return on equity, compensates an investor for the systematic risk of investing in the 'market' portfolio.

81. The market risk premium has two components: the market return on equity and the nominal risk free rate. The market risk premium is calculated as follows:

$$MRP = R_M - R_F$$

where

R_M is the expected market return on equity observed in the Australian stock market; and

R_F is the 10-year risk free rate of return.

82. The required rate of return on equity is a forward-looking concept. It is the expected return that is critical when pricing capital in order to attract efficient investment.

[37] See 2015 Decision paragraph 513.

[38] See 2015 Decision paragraphs 505-553 for a description of these models.
See 2015 Decision p. xv.

While estimates of the cost of debt can be obtained by observing debt instruments, the financial markets do not provide a directly observable proxy for the cost of equity for either individual firms or the market as a whole. In order to derive the final point estimate for the forward looking market risk premium, in past determinations the ERA has used the following models:

- Ibbotson;
- the Dividend Growth Model; and
- Wright.

83. The Ibbotson method calculates the average of a series of annual market risk premium observations. The market risk premium is calculated for each calendar year over the longest period of time for which data is available. There are currently 134 annual Australian market risk premium observations dating back to 1883. These observations are derived by deducting the risk free rate in each calendar year from the realised market return on equity in that year. The arithmetic average of these observations is typically employed, but the geometric average is also often quoted. If one believes the risk free rate and market return on equity are related, such that they will not drift too far apart, the Ibbotson method would be emphasised. This is because it is reliant on reversion of the market risk premium, as opposed to market return on equity, to a long run average.

84. The Dividend Growth Model uses forecast cash flows (dividends) based on growth expectations and solves for a discount rate which equates this stream of cash flows to the current stock price. This forward-looking discount rate is the implied market return on equity.

85. In past determinations, the ERA has calculated a range for the dividend growth model estimates of the market risk premium from:

- the ERA's two-stage dividend growth model; and
- recent dividend growth model studies

86. As fewer dividend growth model studies are available, the ERA proposes to simplify the calculation of the dividend growth model estimate through relying on its own estimate. The ERA's preferred construction of the dividend growth model is the two-stage dividend growth model set out in past determinations.

87. The Wright method is an alternative specification of the Sharpe Lintner CAPM. In the Wright approach, the market risk premium is not an individual parameter, rather it is defined as the difference between the return on equity estimate and the prevailing risk free rate. The relevance of the Wright approach depends on whether there is an inverse relationship between the market risk premium and the risk free rate.

88. In the 2015 rail decision, the ERA considered that the Wright estimate provided a strong indicator for the likely return on equity for the next 50 years, given the statistical evidence for the mean reversion of the return on equity.

89. The statistical evidence that supported the use of the Wright approach was an ERA analysis of the long run average market return on equity, the yield on bonds and the

market risk premium.[39] The ERA analysis used the Dickey-Fuller statistical test[40] to test for a random walk[41] and therefore draw conclusions on the stationarity of the long-term data. The results:

- found the market return on equity is stationary (not a random walk);
- found that yields on bills and bonds are non-stationary (a random walk);
- found mixed evidence on a stationary market risk premium, with it likely being non-stationary (a random walk); and
- provided empirical support for the Wright approach in establishing an upper bound of a market risk premium range.

90. This analysis informed the ERA's position on the Wright approach for subsequent decisions made by the ERA.

91. The ERA is now aware of new information from a Partington and Satchell review of the ERA's statistical analysis.[42] The Partington and Satchell analysis raised the following concerns with the ERA's analysis:

- Following a random walk is not the only notion of non-stationarity. For example, a process of market evolution will not meet the criteria of a random walk but will be non-stationary.
- The non-stationary result for yields on bills and bonds may have been the result of very high inflation from 1973 to 1986. Had the analysis used real yields, the results may have been stationary.
- The analysis may have been better done on levels of prices rather than on returns. Partington and Satchell note that, except in very unusual circumstances, returns are stationary. Prices typically behave like random walks. Therefore, it is better to test the linear combinations of random walk variables and whether they are co-integrated (that is, with the resulting error term being stationary).
- The ERA analysis was not supportive of the Wright approach.

92. Further, Partington and Satchell advised that they are unconvinced by the Wright approach for estimating the market risk premium and recommended that it be given little weight. The Wright CAPM has no 'well accepted theoretical support', 'does not seem to be much used, if at all, in practice' and 'runs contrary to the well accepted view that asset prices are inversely related to interest rates'. [43]

93. Based on this information, the ERA considers that there are theoretical and empirical concerns with the Wright approach and will not be using it to estimate the market risk premium.

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[39] ERA, *Appendices to the Explanatory Statement for the Rate of Return Guidelines, Appendix 16*,December 2013.

[40] The Dickey-Fuller statistical test is used to establish whether a time series is non-stationary.

[41] A random walk is where changes in a variable follow no discernible pattern or trend, that is, the path of a variable consists of a succession of random steps.

[42] Partington and Satchell, *Report to the AER: Discussion of estimates of the return on equity*, April 2017.

[43] Partington and Satchell, *Report to the AER: Cost of equity issues–2016 electricity and gas determinations*, April 2016, p. 31.

94. The ERA now proposes to set the market risk premium from within a range bounded by the Ibbotson approach and the Dividend Growth Model.

Equity beta

95. Under the CAPM, the total risk of an asset is divided into systematic risk and non-systematic risk. Systematic risk is a function of broad macroeconomic factors (such as economic growth rates) that affect all assets and cannot be eliminated by diversification of the investor's asset portfolio.

96. The key insight of the CAPM is that the contribution of an asset to the systematic risk of a portfolio of assets is the correct measure of the asset's risk (known as beta risk) and the only systematic determinant of the asset's return, over and above the return on a risk free asset.

97. In contrast, non-systematic risk reflects the attributes of a particular asset. The CAPM assumes that this risk can be managed by portfolio diversification. Therefore, the investor in an asset does not require compensation for this risk.

98. In the CAPM, the equity beta value is a scaling factor applied to the market risk premium, to reflect the relative risk for the return to equity of the firm in question. Two types of risks are generally considered to determine a value of equity beta for a particular firm:

    i. the type of business, and associated capital assets, that the firm operates; and

    ii. the amount of financial leverage (gearing) employed by the firm.

99. The ERA considers that empirical evidence must be used to inform its judgment for equity beta, as no *a-priori* expectation exists for the equity beta of regulated railway networks, or the corresponding benchmark efficient rail entity.

100. As a consequence, estimates of equity beta using historical data are required in order to inform an appropriate range for the equity beta of the benchmark entity.

101. Estimates of asset beta based on benchmark samples should ideally be relevant to the regulated rail businesses in Western Australia, in two respects:

- estimates of asset beta from the benchmark samples should provide some relevance to the economy in which the efficient benchmark entity is operating (in this case, the Australian economy); and
- estimates should also provide some relevance to the industry/sector in which the efficient benchmark entity is operating (in this case, the rail industry).

102. There are not enough rail business comparators operating in Australia to adequately inform such an approach. A benchmark sample including both Australian and developed countries in Europe and America is therefore used.

Debt raising costs

103. Debt raising costs are the administrative costs and other charges incurred by businesses in the process of raising or refinancing debt. The ERA proposes to apply a premium of 0.1 per cent to cover debt raising costs.[44]

104. The ERA considers that debt raising costs should be incorporated as a component in the rate of return on debt. However, these debt raising costs should only include the direct cost components of debt raising, not the indirect costs. The direct costs will be recompensed in proportion to the average annual issuance, and will cover:

i. gross underwriting fees;

ii. legal and roadshow fees;

iii. company credit rating fees;

iv. issue credit rating fees;

v. registry fees; and

vi. paying fees.

Value of imputation credits

105. The value of imputation credits ("gamma") is the parameter in the WACC that takes into account the value generated by the distribution of franking credits to investors. This parameter is used in the "Officer/Monkhouse" equation shown at paragraph 23 for the purpose of converting a post-tax cost of equity to a pre-tax cost of equity.

106. As a general rule, investors will accept a lower required rate of return on an investment that has franking credits compared with an investment that has similar risk and no franking credits.

107. Gamma is commonly estimated as the product of the distribution rate (F) and the market value of imputation credits, theta (θ), as follows:

$$\gamma = F * \theta$$

108. The distribution of franking credits by companies differs, primarily as a result of differences in shares of profit that are liable for taxation and the proportion of profits paid as dividends. As a consequence of this variability, the value of gamma required for use in the rail WACC is difficult to identify.

[44] The Queensland Competition Authority had concerns about the inclusion of the swap margin and the age of the 12.5 basis points per annum estimate. Consequently, it engaged PricewaterhouseCoopers to prepare updated advice on debt raising costs. PricewaterhouseCoopers found that debt raising costs were within the range of 9.9 to 10.8 basis points per annum.

109. The ERA bases its estimate of gamma on the following:[45]

- the equity share ownership approach gives an estimate of gamma of 0.4;[46]
- the taxation statistics approach gives an estimate of gamma of 0.3;[47] and
- the dividend drop off approach gives a range for the estimate of gamma of 0.3 to 0.5.[48]

110. The resulting range for the ERA's estimate of gamma is 0.3 to 0.5. The ERA places most reliance on the equity share ownership approach. Taking all relevant information into account, a point estimate for gamma of 0.4 has been adopted.

Inflation

111. Inflation is defined as the rate of change in the general level of prices of goods and services. A nominal WACC incorporates the 'real' rate of return, as well as a component rate that reflects expectations of inflation.

112. An estimate of the forecast rate of inflation is important for the rail WACC, as it allows conversion of nominal observed values to real values for input to the real pre-tax WACC calculation.

113. The ERA estimates the inflation rate implied from Treasury Bonds and Treasury Indexed Bonds using the equation below:[49]

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

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.

[45] Please see 2015 Decision paragraphs 841-1008 for a comprehensive canvasing of available techniques identified to estimate gamma.

[46] The equity ownership approach can provide for an estimate of the utilisation rate that is consistent with Officer CAPM. This is because the majority of domestic investors will be eligible to redeem imputation credits (with an implied utilisation rate of 1), while foreign investors will not be eligible (with an implied utilisation rate of 0). The proportion of domestic ownership of capital investments therefore provides a simple and transparent estimate of the utilisation rate. See 2015 Decision from paragraph 895.

[47] Taxation statistics estimate the utilisation of imputation credits, which is a measure of the imputation credits redeemed by shareholders. The method uses Australian Taxation Office statistics to observe the proportion of distributed imputation credits that have been used by investors to reduce their personal taxation liabilities. The approach implicitly assumes that the value of a redeemed franking credit is equal to its face value, whilst an unredeemed franking credit has no value. It follows that the average value of a franking credit is equal to the proportion of franking credits redeemed. See 2015 Decision from paragraph 912.

[48] The dividend drop-off approach is a statistical technique that estimates theta directly by observing the change in stock prices around ex-dividend events (days when dividend and imputation credit separate from the share). See 2015 Decision from paragraph 930.

[49] Known as the "Fisher Equation". See 2016 Determination Appendix 4.

Appendix 1 International bond sample

Public Transport Authority Sample

Ticker	Issuer (Short name)
EI6011817 Corp	ETSA UTILITIES FINANCE
EI0055331 Corp	OPTUS FINANCE PTY LTD
EJ5424159 Corp	AUSNET SERVICES HOLDINGS
EJ5681071 Corp	AUSNET SERVICES HOLDINGS
EJ5679471 Corp	WESFARMERS LTD
EI1892617 Corp	TELSTRA CORP LTD
EJ5984160 Corp	SGSP AUSTRALIA ASSETS
EK8757206 Corp	BHP BILLITON FINANCE LTD
EJ6958775 Corp	AUSTRALIA PACIFIC AIRPOR
EI2917587 Corp	TELSTRA CORP LTD
EJ7525219 Corp	AUSNET SERVICES HOLDINGS
EI4007098 Corp	OPTUS FINANCE PTY LTD
EJ3721366 Corp	BHP BILLITON FINANCE LTD
EK9024770 Corp	WESFARMERS LTD
EK8989288 Corp	WESFARMERS LTD
EI5615311 Corp	SGSP AUSTRALIA ASSETS
EK1048710 Corp	SGSP AUSTRALIA ASSETS
EI4432049 Corp	TELSTRA CORP LTD
EI6263145 Corp	AUSNET SERVICES HOLDINGS
AN1491306 Corp	TELSTRA CORP LTD
AN1290245 Corp	TELSTRA CORP LTD
EI6010694 Corp	VICTORIA POWER NETWORKS
EK5233391 Corp	WESFARMERS LTD
EI6383935 Corp	TELSTRA CORP LTD
EI8810216 Corp	BHP BILLITON FIN USA LTD
EI6011379 Corp	VICTORIA POWER NETWORKS
EJ0387146 Corp	BHP BILLITON FIN USA LTD
EI8731610 Corp	TELSTRA CORP LTD
EJ2023566 Corp	NEW ZEALAND MILK PTY LTD
EK9698532 Corp	OPTUS FINANCE PTY LTD
EK9664815 Corp	OPTUS FINANCE PTY LTD
EJ2512352 Corp	AUSNET SERVICES HOLDINGS
EJ2514606 Corp	AUSNET SERVICES HOLDINGS
EK3157451 Corp	SGSP AUSTRALIA ASSETS
EJ2973612 Corp	WESFARMERS LTD
UV8008012 Corp	AUSTRALIA PACIFIC AIRPOR
UV8270729 Corp	TELSTRA CORP LTD

Ticker	Issuer (Short name)
EJ0952857 Corp	TELSTRA CORP LTD
EK8757560 Corp	BHP BILLITON FINANCE LTD
EJ3849779 Corp	SGSP AUSTRALIA ASSETS
LW4748379 Corp	SGSP AUSTRALIA ASSETS
EJ5831940 Corp	TELSTRA CORP LTD
EJ8457800 Corp	AUSTRALIA PACIFIC AIRPOR
EJ8553962 Corp	BHP BILLITON FIN USA LTD
EI9022241 Corp	TELSTRA CORP LTD
EI9023967 Corp	TELSTRA CORP LTD
EK0554445 Corp	AUSNET SERVICES HOLDINGS
EJ2120461 Corp	BHP BILLITON FINANCE LTD
EK3489227 Corp	AUSNET SERVICES HOLDINGS
EJ3722562 Corp	BHP BILLITON FINANCE LTD
EK5369849 Corp	AUSTRALIA PACIFIC AIRPOR
EK8353493 Corp	TELSTRA CORP LTD
QJ5397360 Corp	AUSTRALIA PACIFIC AIRPOR
DD1056769 Corp	BHP BILLITON FINANCE
JK7301761 Corp	TELSTRA CORP LTD
LW9385011 Corp	SGSP AUSTRALIA ASSETS
QZ9328522 Corp	AUSTRALIA PACIFIC AIRPOR
DD1091428 Corp	WMC FINANCE USA LTD
EK7552160 Corp	AUSNET SERVICES HOLDINGS
AN1290252 Corp	TELSTRA CORP LTD
AO1476404 Corp	SGSP AUSTRALIA ASSETS
AM4028255 Corp	AUSNET SERVICES HOLDINGS
EJ3721465 Corp	BHP BILLITON FINANCE LTD
EK8757685 Corp	BHP BILLITON FINANCE LTD
EJ6510642 Corp	BHP BILLITON FINANCE LTD
ED1042677 Corp	WMC FINANCE USA LTD
EJ0387187 Corp	BHP BILLITON FIN USA LTD
EJ3722414 Corp	BHP BILLITON FINANCE LTD
EJ8554085 Corp	BHP BILLITON FIN USA LTD

Arc Infrastructure Sample

Ticker	Issuer (Short name)
EJ4265850 Corp	DBNGP FINANCE CO PTY LTD
EJ4333419 Corp	COCA-COLA AMATIL LTD
EK5876389 Corp	CROWN GROUP FINANCE LTD
EI0704078 Corp	INCITEC PIVOT FIN LLC
EI1608021 Corp	TRANSURBAN FINANCE CO PT
EI1592092 Corp	TRANSURBAN FINANCE CO PT
EI2000491 Corp	BRAMBLES USA INC
EJ6899243 Corp	COCA-COLA AMATIL LTD
EK9545295 Corp	ENERGY PARTNERSHIP GAS
EK9580078 Corp	ENERGY PARTNERSHIP GAS
EI7021476 Corp	CIMIC FINANCE USA PTY LT
EI3253362 Corp	APT PIPELINES LTD
EJ7588209 Corp	PERTH AIRPORT PTY LTD
EJ7646361 Corp	QPH FINANCE CO PTY LTD
EI4044356 Corp	WOOLWORTHS LIMITED
EK5107249 Corp	DBNGP FINANCE CO PTY LTD
EJ8616397 Corp	TRANSURBAN FINANCE CO
EJ8798880 Corp	BRISBANE AIRPORT CORP LT
EJ8893137 Corp	AURIZON NETWORK PTY LTD
EJ9225768 Corp	COCA-COLA AMATIL LTD
EJ9637749 Corp	AQUASURE FINANCE PTY LTD
EI4214900 Corp	SYDNEY AIRPORT FINANCE
EK1306886 Corp	PERTH AIRPORT PTY LTD
EI6348474 Corp	WOOLWORTHS LIMITED
EI6641167 Corp	WOODSIDE FINANCE LTD
EK2622026 Corp	COCA-COLA AMATIL LTD
EK3554137 Corp	QPH FINANCE CO PTY LTD
EI7486208 Corp	COCA-COLA AMATIL NZ LTD
EK4152378 Corp	COCA-COLA AMATIL LTD
EI8144731 Corp	COCA-COLA AMATIL LTD
EG0640763 Corp	SYDNEY AIRPORT FINANCE
EK6279310 Corp	SUN GROUP FINANCE
AM6765136 Corp	COCA-COLA AMATIL LTD
EK8055148 Corp	APT PIPELINES LTD
EJ2714362 Corp	COCA-COLA AMATIL LTD
LW8323849 Corp	COCA-COLA AMATIL LTD
EJ3906165 Corp	APT PIPELINES LTD
EG0219857 Corp	SYDNEY AIRPORT FINANCE
EJ4317107 Corp	CIMIC FINANCE USA PTY LT

Ticker	Issuer (Short name)
EJ4068577 Corp	SYDNEY AIRPORT FINANCE
EJ5962760 Corp	AMCOR LTD
LW2393780 Corp	QPH FINANCE CO PTY LTD
QZ4475534 Corp	UNITED ENERGY DISTRIBUTI
UV3027009 Corp	DBNGP FINANCE CO PTY LTD
QZ7667723 Corp	TRANSURBAN QLD FINANCE
QZ8701372 Corp	APT PIPELINES LTD
EK1561159 Corp	SYDNEY AIRPORT FINANCE
AN2611019 Corp	COCA-COLA AMATIL LTD
EK3156859 Corp	BRAMBLES FINANCE LIMITED
EK4655081 Corp	TRANSURBAN FINANCE CO
EK4685294 Corp	AURIZON NETWORK PTY LTD
EJ4508010 Corp	APT PIPELINES LTD
EK6424791 Corp	SUN GROUP FINANCE
EK7758478 Corp	WOODSIDE FINANCE LTD
EK8078215 Corp	APT PIPELINES LTD
EK8787450 Corp	SYDNEY AIRPORT FINANCE
EK9118226 Corp	TRANSURBAN FINANCE CO
UV8551672 Corp	COCA-COLA AMATIL LTD
QJ2217868 Corp	BRAMBLES USA INC
JV3204296 Corp	COCA-COLA AMATIL LTD
QJ4132016 Corp	TRANSURBAN FINANCE CO
JK8763837 Corp	SYDNEY AIRPORT FINANCE
JK8498749 Corp	AMCOR FINANCE USA INC
JK9360021 Corp	COCA-COLA AMATIL LTD
LW0777554 Corp	AURIZON NETWORK PTY LTD
QZ3723793 Corp	WOODSIDE FINANCE LTD
EK8055387 Corp	APT PIPELINES LTD
QZ4183500 Corp	TRANSURBAN FINANCE CO
AM7968663 Corp	APT PIPELINES LTD
EK8055262 Corp	APT PIPELINES LTD
EK8078397 Corp	APT PIPELINES LTD
QJ1896811 Corp	BHP BILLITON FIN USA LTD
QJ1928531 Corp	BHP BILLITON FIN USA LTD
JV5237112 Corp	AUSNET SERVICES HOLDINGS
QJ1906909 Corp	BHP BILLITON FINANCE LTD
QJ1910778 Corp	BHP BILLITON FINANCE LTD
QJ1908806 Corp	BHP BILLITON FINANCE LTD

The Pilbara railways Sample

Ticker	Issuer (Short name)
EJ4265850 Corp	DBNGP FINANCE CO PTY LTD
EJ3879651 Corp	ORIGIN ENERGY FINANCE
EK5876389 Corp	CROWN GROUP FINANCE LTD
EI0704078 Corp	INCITEC PIVOT FIN LLC
EJ6468916 Corp	QANTAS AIRWAYS LTD
EK2849330 Corp	ADANI ABBOT POINT TERMIN
EK9545295 Corp	ENERGY PARTNERSHIP GAS
EK9580078 Corp	ENERGY PARTNERSHIP GAS
EI7021476 Corp	CIMIC FINANCE USA PTY LT
EI3253362 Corp	APT PIPELINES LTD
EJ7588209 Corp	PERTH AIRPORT PTY LTD
EJ7646361 Corp	QPH FINANCE CO PTY LTD
EI4044356 Corp	WOOLWORTHS LIMITED
EI4098048 Corp	ASCIANO FINANCE LTD
EK5107249 Corp	DBNGP FINANCE CO PTY LTD
EJ8798880 Corp	BRISBANE AIRPORT CORP LT
EJ6371623 Corp	ORIGIN ENERGY FINANCE
EI4214900 Corp	SYDNEY AIRPORT FINANCE
EK1306886 Corp	PERTH AIRPORT PTY LTD
EI6348474 Corp	WOOLWORTHS LIMITED
EK3117976 Corp	QANTAS AIRWAYS LTD
EK3554137 Corp	QPH FINANCE CO PTY LTD
EJ8598074 Corp	ORIGIN ENERGY FINANCE
EI8364461 Corp	ORIGIN ENERGY FINANCE LT
EI8703494 Corp	NEWCREST FINANCE PTY LTD
EG0640763 Corp	SYDNEY AIRPORT FINANCE
EK6279310 Corp	SUN GROUP FINANCE
EK8777964 Corp	FMG RESOURCES AUG 2006
EK8055148 Corp	APT PIPELINES LTD
EK2690916 Corp	QANTAS AIRWAYS LTD
EJ3784331 Corp	NEWCREST FINANCE PTY LTD
EJ3906165 Corp	APT PIPELINES LTD
EG0219857 Corp	SYDNEY AIRPORT FINANCE
EJ4317107 Corp	CIMIC FINANCE USA PTY LT
EJ4068577 Corp	SYDNEY AIRPORT FINANCE
EJ5962760 Corp	AMCOR LTD
EJ6105286 Corp	ORIGIN ENERGY FINANCE
EI6307918 Corp	ASCIANO FINANCE LTD
LW2393780 Corp	QPH FINANCE CO PTY LTD

Ticker	Issuer (Short name)
EJ8324406 Corp	ASCIANO FINANCE LTD
UV3027009 Corp	DBNGP FINANCE CO PTY LTD
QZ5121780 Corp	QANTAS AIRWAYS LTD
QZ7667723 Corp	TRANSURBAN QLD FINANCE
QZ8701372 Corp	APT PIPELINES LTD
EK1561159 Corp	SYDNEY AIRPORT FINANCE
EJ4508010 Corp	APT PIPELINES LTD
EK6424791 Corp	SUN GROUP FINANCE
EK8078215 Corp	APT PIPELINES LTD
EK8787450 Corp	SYDNEY AIRPORT FINANCE
EK9072910 Corp	ASCIANO FINANCE LTD
JK8763837 Corp	SYDNEY AIRPORT FINANCE
JK8498749 Corp	AMCOR FINANCE USA INC
QZ7279925 Corp	QANTAS AIRWAYS LTD
EK8055387 Corp	APT PIPELINES LTD
AN1919132 Corp	ASCIANO FINANCE LTD
AN4412705 Corp	ASCIANO FINANCE LTD
AM7968663 Corp	APT PIPELINES LTD
EK8055262 Corp	APT PIPELINES LTD
EK8078397 Corp	APT PIPELINES LTD
EJ3049461 Corp	CALTEX AUSTRALIA LTD
EI8704930 Corp	NEWCREST FINANCE PTY LTD
JV5237112 Corp	AUSNET SERVICES HOLDINGS

Appendix 2: Criteria

The ERA's estimation of the WACC is driven by the high level principles detailed below:

- Estimates are driven by economic principles and based on a strong theoretical foundation, informed by empirical analysis.
- The WACC method is fit for purpose, including being:
  - able to perform well in estimating the return on debt and the return on equity over the regulatory years of the access time horizon; and
  - implemented in accordance with best practice.
- Estimates are supported by robust, transparent and replicable analysis that is derived from available and credible datasets. This includes analysis being based on quantitative modelling that:
  - is robust enough to not be unduly sensitive to small changes in the input data; and
  - avoids arbitrary filtering or adjustment of data, which does not have a sound rationale.
- Estimates are capable of reflecting changes in market conditions and able to incorporate new information as it becomes available.
- The WACC method is supportive of specific regulatory aims, and thereby:
  - recognises the desirability of consistent approaches to regulation across industries, so as to promote economic efficiency;
  - seeks to achieve rates of return that would be consistent with the outcomes of efficient, effectively competitive markets;
  - as far as possible, ensures that the net present value of returns is sufficient to cover a service providers' efficient expenditures (the 'NPV=0' condition);
  - provides incentives to finance efficiently;
  - promotes simple approaches to estimating the rate of return over complex approaches, where appropriate;
  - promotes reasoned, predictable and transparent decision making; and
  - enhances the credibility and acceptability of a decision.