Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network

Appendix 5 Return on Regulated Capital Base

20 September 2018

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Appendix 5 Return on regulated capital base

1. This appendix sets out the ERA's considerations on the return on the regulated capital base.

1 Access Code requirements

2. Section 6.4 of the *Electricity Networks Access Code 2004* (Access Code) requires that the price control in an access arrangement must (among other things) provide the service provider with an opportunity to earn revenue sufficient to cover its forward-looking and efficient costs of providing covered services, including a return on investment commensurate with the commercial risks involved.

3. The rate of return, based on a Weighted Average Cost of Capital (WACC), provides a service provider with a return on the capital it has invested in its business. It is calculated as a return on the regulatory asset base.

4. Section 6.64 of the Access Code requires that an access arrangement set out the WACC for a covered network.

5. Under section 6.65 of the Access Code, the ERA may from time to time publish a determination of its preferred methodology for calculating the WACC in access arrangements. If such a determination is in effect at the time of an access arrangement review, the WACC must be determined using that methodology unless the service provider can demonstrate that an alternative methodology would better achieve the objectives set out in section 6.4 and the Access Code objective. Otherwise, the WACC must be calculated in a manner consistent with section 6.66 of the Access Code.

6. As no determination is in effect, the WACC must be estimated in a manner consistent with section 6.66 of the Access Code.

7. Section 6.66 of the Access Code requires that a WACC calculation:

   - Must represent an effective means of achieving the Access Code objective and the objectives in section 6.4.
   - Must be based on an accepted financial model such as the Capital Asset Pricing Model (CAPM).

2 Western Power's overall initially proposed rate of return

8. Western Power stated that it based its proposed WACC on the ERA's method used in its 2016 access arrangement decision for the Dampier to Bunbury Natural Gas Pipeline (DBNGP):[1, 2]

> Our estimate adopts broadly the same method for determining the cost of equity and debt that the ERA applied to the DBNGP, updating individual debt and equity parameters to reflect contemporary data. We will, however, continue to monitor ongoing limited merits and judicial reviews, and modify our proposal to reflect appeal outcomes where appropriate.
>
> Western Power's estimate of WACC is 6.09 per cent, comprising a nominal post tax cost of equity of 7.24 per cent and a nominal cost of debt of 5.32 per cent.

9. Western Power used 2017/18 data to calculate the proposed WACC. In Western Power's initial proposal it used placeholder values, as at 30 June 2017, with the intent that these be replaced with the most current values at the time of the ERA's final decision.[3]

10. Western Power's proposed WACC parameters for the fourth access arrangement period (AA4) are set out in Table 1, and are compared to the approved WACC parameters in the 2016 DBNGP decision and the third access arrangement period (AA3).

[1] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. xxvii.

[2] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return,* 30 June 2016.

[3] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 191.

Table 1 Approved AA3 WACC, 2016 DBNGP approved WACC and proposed AA4 WACC

Parameter	Western Power's approved WACC for AA3[4]	DBNGP approved WACC[5]	Western Power's proposed WACC for AA4[6]
Cost of equity parameters			
Nominal risk free rate (per cent)	2.52%	1.80%	1.99%
Equity beta	0.65	0.70	0.70
Market risk premium (per cent)	6.0%	7.40%	7.5%
Nominal after tax return on equity (per cent)	**6.42%**	**6.98%**	**7.24%**
Cost of debt parameters			
Five-year interest rate swap (effective yield) (per cent)	n/a	2.100%	2.29%
Debt risk premium (per cent)	2.708%	2.716%	2.790%
Benchmark credit rating	BBB/BBB+/A-	BBB-/BBB/BBB+	BBB-/BBB/BBB+
Term of debt for debt risk premium	5 years	10 years	10 years
Debt issuing costs (per cent)	0.125%	0.24% (including debt issuing cost of 0.125% and hedging cost of 0.114%)	0.24% (including debt issuing cost of 0.125% and hedging cost of 0.114%)
Nominal cost of debt (return on debt) (per cent)	**5.35%**	**5.06%**	**5.32%**
Other parameters			
Debt proportion (gearing)	60%	60%	60%
Forecast inflation rate (per cent)	2.10%	1.43%	1.64%
Franking credits (gamma) (per cent)	0.25	0.4	0.4
Corporate tax rate (per cent)	30%	30%	30%
Weighted Average Cost of Capital			
Nominal after-tax WACC (per cent)	**5.78%**	**5.83%**	**6.09%**
Real after tax-WACC (per cent)	**3.60%**	**4.33%**	**4.38%**

[4] ERA, *Further final decision on proposed revisions to the access arrangement for the Western Power network*, 29 November 2012, p. 21.

[5] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020*, 30 June 2016, p. 221.

[6] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, pp. 188-189.

3 ERA's draft decision

11. In its draft decision, the ERA did not approve Western Power's proposal in relation to the nominal after-tax rate of return of 6.09 per cent.

12. In its draft decision, the ERA determined that a nominal after-tax rate of return of 6.00 per cent met the requirements of the Access Code. The reasons for this determination are detailed in the following sections.

13. The ERA's determination reflected changes from Western Power's proposal to the:

- market risk premium
- debt risk premium
- debt issuing costs
- gearing.

14. In the draft decision the ERA used Western Power's final averaging period ending on 29 March 2018 for market observations.

4 Western Power's response to the draft decision

15. Western Power has not accepted the ERA's required amendments and has put forward a revised proposal.

16. Western Power accepted most of the ERA's approach to calculating the WACC parameters, except for the market risk premium.

17. The value of the input parameters in the determination of the WACC for both the ERA's draft decision and Western Power's revised Access Arrangement are summarised in Table 2 below.

Table 2 AA4 draft decision WACC, Western Power's revised AA4 WACC

Parameter	Draft decision[7]	Western Power's revised WACC[8]
Averaging period	29 March 2018	29 March 2018
Cost of equity parameters		
Nominal risk free rate (per cent)	2.37	2.37
Equity beta	0.7	0.7
Market risk premium (per cent)	6.2	6.6
Nominal after tax return on equity	**6.71**	**6.99**
Cost of debt parameters		
Five-year interest rate swap (effective yield) (per cent)	2.590	2.590
Debt risk premium (per cent)	2.613	2.613
Benchmark credit rating	BBB+	BBB+
Term of debt for debt risk premium	10 years	10 years
Debt issuing costs (per cent)	0.100	0.100
Debt hedging costs (per cent)	0.114	0.114
Nominal cost of debt (return on debt)	**5.42**	**5.42**
Other parameters		
Debt proportion (gearing)	55	55
Forecast inflation rate (per cent)	1.84	1.84
Franking credits (gamma) (per cent)	40	40
Corporate tax rate (per cent)	30	30
Weighted Average Cost of Capital		
Nominal after-tax WACC (per cent)	**6.00**	**6.12**
Real after tax-WACC (per cent)	**4.08**	**4.21**

18. In the revised proposal to the access arrangement, Western Power has proposed a nominal after-tax rate of return of 6.12 per cent.

19. Western Power derived this WACC estimate on the basis of a change in approach to the market risk premium, discussed further in Section 8.

[7] ERA, *Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network – Appendix 5 – Return on Regulated Capital Base,* 2 May 2018.

[8] Western Power, *Revised AA4 proposal – Response to the ERA's draft decision*, 14 June 2018.

5 Public submissions in response to the draft decision

20. Of the 15 submissions received on the ERA's draft decision, three submissions commented on the WACC:

- ATCO Australia (ATCO)
- Summit Southern Cross Power Holdings Pty Ltd (Summit)
- Western Australian Major Energy Users (WAMEU)

21. ATCO's submission focussed on two specific parameters: the market risk premium and the value of imputation credits (gamma). ATCO's position on gamma was informed by a report prepared for it by Frontier Economics.

22. Summit's submission briefly addresses the concept of the Market Risk Premium and the development of the WACC in general.

23. The WAMEU's detailed submission covered a broad range of WACC-related matters. The WAMEU's submission:

- Addressed all of the WACC parameters, including the benchmark efficient entity, risk free rate, market risk premium, equity beta, return on debt, gearing, inflation and gamma.
- Presented a view on the need to review the profitability and Regulatory Asset Base (RAB) multiples of energy transport businesses.
- Used the Major Energy Users submission to the Australian Energy Regulator (AER) and work carried out by the AER's Consumer Reference Group (CRG).

6 Considerations of the ERA

24. The ERA considers that the objectives set out in section 6.4 of the Access Code and the Code objective are satisfied by Western Power's revised proposed revisions to:

- risk free rate (for the cost of equity estimate)
- equity beta
- risk free rate (for the cost of debt estimate)
- the credit rating
- the term of debt
- annual update of the debt risk premium
- debt-raising and hedging costs
- forecast inflation
- the gearing ratio.

25. The ERA considers three parameters set out in Western Power's proposed revisions do not satisfy section 6.4 of the Access Code and the Code objective. Therefore, in its final decision the ERA has applied different values to:

- the debt risk premium
- the market risk premium
- the value of imputation credits (gamma).

26. The ERA considered all available information and regulatory practices to inform its positions and determine whether any changes were required. This included public submissions on the draft decision and more recent consultation processes, and associated expert views for the AER's review of the rate of return applied to regulated electricity networks and gas pipelines, under the National Electricity Rules and National Gas Rules.

27. The ERA considers:

- The Access Code and National Electricity Rules/National Gas Rules are similar, which means the general rate of return method can be applied to network service providers in electricity and gas.
- Network service providers in the gas and electricity industry are subject to a similar degree of risk, which means that the same benchmark efficient entity is used.

28. The WAMEU addressed matters of profitability and the regulated asset base in its public submission. The ERA addresses these matters in Attachment 1.

7 The benchmark efficient entity

29. A benchmark efficient entity is used by regulators to inform the WACC parameters set for a regulated entity. This is consistent with incentive regulation and ensures that a regulator does not compensate a regulated service provider for its actual costs, but compensates it as if it were operating efficiently.

7.1 Draft decision

30. The draft decision adopted a benchmark efficient entity, defined as a pure-play service provider operating within Australia without parental ownership, with a similar degree of risk as that which applies to the service provider in the provision of the electricity services.

31. The allowed rate of return accounts for the commercial risks of providing covered services. The ERA uses a benchmark efficient entity that is the average of a sample of firms that meet the benchmark criterion.

32. The ERA included companies in the benchmark sample that have three characteristics:

- The company is a network service provider in the gas and/or electricity industry in Australia.
- The company is listed so that the market value of its equity can be estimated using available data sources, such as Bloomberg.
- Data on the values of debt and equity are available.

33. Guided by the general principles set out in the ERA's 2013 Gas Guidelines,[9] the ERA determined a benchmark sample of firms.

34. The ERA considered the length of time over which data should be analysed. Data for the analysis needs to be relatively recent so that it informs a view of current market conditions. For this purpose, a five-year period has been used.

35. Four companies satisfy the three criteria:

- APA Group (APA AU Equity)
- Spark Infrastructure (SKI AU Equity)
- Duet Group (DUE AU Equity)
- SP AusNet Group (AST AU Equity).

36. Corporate actions, such as mergers and acquisitions, have reduced the number of listed firms with operations in energy network service provision. The current firms are shown in Table 3.

[9] ERA, *Explanatory Statement for the Final Rate of Return Guidelines*, 16 December 2013.

Table 3 Firms listed on the Australian Securities Exchange with operations in energy network service provision

Previous	2017	Corporate actions
Envestra	-	Acquired by Cheung Kong Group. Delisted on 17/10/2014
APA Group	APA Group	-
DUET Group	DUET Group	Acquired by Cheung Kong Infrastructure. Data up to 28/04/2017
Hastings Diversified Utilities Funds	-	Acquired by APA Group. Ceased trading on 21/11/2012
SP Ausnet	Ausnet	Renamed
Spark Infrastructure Group	Spark Infrastructure Group	-

Source: Bloomberg

37. The benchmark sample has reduced from six to four firms. Although DUET Group is no longer listed, there is still sufficient data on it to which to perform meaningful analysis.

38. The ERA has used the firms in the table above to inform its analysis of the parameters for the benchmark.

39. Western Power's proposal did not update the benchmark sample of firms. Western Power used the method underlying the DBNGP decision, which was in turn based on the 2013 Gas Guidelines' use of the six firms listed in Table 3.

7.2 Public submissions

40. Western Power did not comment on the benchmark efficient entity.

41. In response to the draft decision, the WAMEU commented that the benchmark sample used by the ERA does not represent the most efficient benchmark efficient entity. The WAMEU provided the following reasons to support this argument.

- The small number of network firms provides a significant challenge to the ERA using such data to derive comparators for the benchmark efficient entity.
- There is significant circularity as the performance of the listed firms reflects the decision made previously by the regulator in its earlier decision.
- The reduced number of entities due to merger and acquisition imposes data limitation issues for benchmark efficient entity analysis.
- Due to different characteristics and risk profiles, each of the listed companies would deliver the most efficient outcome for the firm but not for consumers.
- As there are unregulated activities within the existing benchmark efficient entity sample, the market observed level of gearing and equity beta will not reflect that of a "pure-play energy transport network".

42. The WAMEU proposed that the benchmark efficient entity should, at a minimum, have:

- A cost of debt that is at least as low as the cost debt actually incurred by network firms.
- A financial structure that reduces the cost of providing the tax allowance.

7.3 Final decision

43. The ERA considers that firms that share all or most of the key characteristics of a benchmark efficient entity would be used in the benchmark sample to inform estimates of WACC parameters. However, in practice few firms fully reflect this benchmark entity.

44. Therefore, the ERA uses data for domestic businesses that are considered to be reasonable comparators to a benchmark efficient entity with a similar degree of risk as an entity providing regulated services.

45. The ERA recognises that the benchmark data have limitations. However, it considers that there is no better alternative to the benchmark efficient entity based on a sample of Australian energy network service providers.

46. The WAMEU's proposed application of debt costs actually incurred by network firms is discussed in Section 9.2 Debt risk premium.

47. The WAMEU's proposed application of tax allowance is discussed in Section 10.3 Value of imputation credits (gamma).

48. The ERA estimates a benchmark rate of return that is applied to a specific service provider. The ERA does not determine the returns of an individual specific service provider based on all of its specific circumstances, as this would pass a service provider's actual costs to consumers and be in conflict with the provision of regulatory incentives.

49. For the final decision, the ERA adopts a single benchmark efficient entity, defined as a pure-play service provider operating within Australia without parental ownership, with a similar degree of risk as that which applies to the service provider in the provision of the electricity network services.

8 Cost of equity

50. The cost of equity is equal to the return that investors require from a firm to compensate them for the risk they take by investing their capital.

51. Western Power supports the ERA's use of the CAPM as the principal means of determining the return on equity.

52. The ERA will determine a single point estimate for the return on equity using Sharpe-Lintner CAPM.

$$R_i = R_f + \beta_i \left(R_m - R_f \right) \qquad \text{(equation 1)}$$

where

R_i is the required rate of return on equity for the asset, firm or industry in question;

R_f is the risk free rate;

β_i is the equity beta that describes how a particular portfolio i will follow the market which is defined as $\beta_i = \text{cov}\left(R_i, R_m\right) / \text{var}\left(R_m\right)$; and

$\left(R_m - R_f\right)$ is the market risk premium.

53. To estimate the return on equity the ERA will separately estimate:

- risk free rate (cost of equity)
- equity beta
- market risk premium.

8.1 Risk free rate (cost of equity)

54. The risk free rate represents the return an investor would expect when investing in an asset with no risk.

8.1.1 Western Power's initial proposal

55. Western Power proposed adopting the yield of a five-year Commonwealth Government Security as a proxy for the nominal risk free rate.[10] This is consistent with the ERA's approach in its 2016 DBNGP decision,[11] and its final decision for AA3.[12] Using the 20-day averaging period to 30 June 2017 as a placeholder, this approach produced a risk free rate of 1.99 per cent.

8.1.2 Draft decision

56. The ERA considered Western Power's proposed method for determining the risk free rate used to calculate the cost of equity achieves the objectives set out in section 6.4 of the Access Code and the Code objective.

57. The considerations in estimating the risk free rate were:

- the term of the estimate
- the method of estimating the risk free rate
- the averaging period.

58. An important regulatory principle is the present value condition (NPV = 0), which ensures that investors are compensated at a level to encourage efficient investment. This condition means that the present value of the future stream of expected cash flows of a firm is equal to the regulatory asset base. That is, the regulatory asset base maintains its value. In order to ensure that NPV = 0, the ERA determined a term for the risk free rate in the current regulatory setting of five years. The rate of return is reset every five years, consistent with the term of the access arrangement.

59. The return on Commonwealth Government Securities provides an acceptable proxy for the risk free rate, and so may be used to estimate the risk free rate for the return on equity.

60. The ERA has accepted an averaging period of 20 days in recent decisions, and so considered that Western Power's decision to use a 20-day averaging period was appropriate.

61. As a placeholder Western Power used the 20-day averaging period to 30 June 2017. This averaging period provided a risk free rate of 1.99 per cent.

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[10] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 193.

[11] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, p. 50.

[12] ERA, *Final decision on proposed revisions to the access arrangement for the Western Power network*, 5 September 2012, p. 327.

62. For the final decision Western Power nominated a 20-day averaging period to 29 March 2018.

63. In its draft decision, the ERA accepted Western Power's nominated period. This averaging period to 29 March 2018 provided a risk free rate of 2.37 per cent.

8.1.3 Public submissions

64. Western Power accepted the approach for the risk free rate (for cost of equity).[13]

65. The WAMEU agreed with using five-year Commonwealth Government Securities to set the risk free rate.[14]

66. However, the WAMEU proposed an averaging period of three months. The WAMEU referred to the Consumer Reference Group's recommendation to AER that an averaging period of three months was a good balance between limiting volatility and setting a rate of return reflecting a forward looking value.[15]

8.1.4 Final decision

67. The length of the averaging period should be informed by both technical and practical considerations. The ERA's technical analysis indicates that an averaging period of up to 60 trading days, just prior to the commencement of the regulatory period, provides an acceptable predictor of the forward looking estimate of the risk free rate for the subsequent regulatory period.[16] Prediction performance is important for achieving efficiency requirements. If the averaging period is greater than 60 trading days, its predictive performance may be impaired. However, it may not be practically feasible for a service provider to nominate an averaging period 60 trading days ahead of time.

68. In its recent decisions, the ERA has accepted a 20 trading day period.[17]

69. The averaging period of 20-business days to 29 March 2018 has been previously agreed with Western Power in advance of this deadline.

70. Allowing the service provider to nominate a 20-business day period – agreed with the ERA – that falls close to the commencement of the regulatory period meets both the technical requirements of efficiency and acceptable volatility, and is practical for the ERA and service providers.

71. The ERA considers the estimated nominal risk free rate (for cost of equity) should be taken from the yield of five-year Commonwealth Government Securities reported by the RBA, over an averaging period of 20-business days.

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[13] Western Power, *Revised AA4 proposal – Response to the ERA's draft decision,* 14 June 2018, p. 121.

[14] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, p. 33.

[15] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, p. 34.

[16] ERA, *Appendices to the Explanatory Statement for the Rate of Return Guidelines: Appendix 4 – The Diebold Mariano test*, December 2013, pp. 46-55.

[17] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 Rate of Return*, June 2016, p. 49.

72. For this final decision, the ERA has adopted risk free rate of 2.37 per cent for the agreed averaging period of 29 March 2018.

8.2 Equity beta

73. Equity beta is the 'slope' parameter β_i in the Sharpe-Lintner CAPM. The slope parameter β_i correlates the return on the specific asset, in excess of the risk free rate of return, to the rise and fall of the return on the market portfolio.

74. The equity beta is a parameter that measures the systematic risk of a security or a portfolio in comparison to the market as a whole. Systematic risk is that part of total risk in a firm's returns that stems from the economy and markets more broadly. Non-systematic risk is the risk stemming from unique attributes of the firm, which may be eliminated by an investor through diversification. For this reason, only systematic risk is compensated in the return on equity.

8.2.1 Western Power's initial proposal

75. Western Power proposed an equity beta of 0.7.

76. Western Power noted that recent regulatory determinations in Australia have converged on an equity beta of 0.7 and this is consistent with the ERA's decision on DBNGP.

77. The ERA adopted an equity beta of 0.7 for its 2016 DBNGP decision.[18]

8.2.2 Draft decision

78. The ERA uses the methods set out in Henry's advice to the Australian Competition and Consumer Commission (ACCC) in 2009 to define the equity beta estimation approach.[19] Henry's study was updated in 2014, but remained essentially unchanged.[20]

79. Conceptually, the systematic risk of a regulated energy network would be less than the systematic risks of the market average entity, and hence, less than one.

80. There are two main types of systematic risk relevant for conceptual analysis: business risk and financial risk. The AER's assessment of these risks concluded that:

- Business risk of the benchmark efficient entity is low, driven for example by monopoly characteristics and the regulatory regime.
- Though leverage may be relatively high for the benchmark efficient entity, this does not necessarily correspond to high financial risk, given the stability of earnings and its ability to service debt.[21]

[18] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, pp. 102-103.

[19] O, Henry, *Estimation Beta: Advice Submitted to the Australian Competition and Consumer Commission*, 2009.

[20] O. Henry, *Estimating beta: An update*, April 2014.

[21] AER, *Discussion Paper – Equity Beta*, March 2018, pp. 20-23.

81. McKenzie and Partington's conceptual analysis also supports the view that the theoretical beta of the benchmark firm is low.[22]

82. Using the Henry approach, the ERA updated its equity beta estimate for the revised sample of benchmark firms and current market information.

83. Comparable benchmark entities, which are publicly traded and have available data, are chosen. The four available sample companies are APA Group, DUET Group, SP Ausnet and Spark Infrastructure.

84. Price data for all stocks is acquired through the Bloomberg Terminal based on the last daily price provided by the Australian Securities Exchange. Dividend data used in the study were gross dividends including cash distributions, but omitting unusual items such as stock distributions and rights offerings. The dividend was then added to the closing price on the Friday after the ex-dividend dates as this is the first day the price would reflect the payout of the dividend in the data.

85. For the length of the data period, there is a trade-off between relevance of the data and statistical robustness. Longer periods can include behaviour in the data that is no longer relevant due to changing economic and market conditions. However, shorter periods may produce estimates that are less statistically robust. The ERA considered that a period of five years balances these trade-offs.

86. To address the influence of outliers the ERA employs the following methods to calculate beta:[23]

- the Least Absolute Deviations (LAD) method
- the Ordinary Least Squares (OLS) method
- the Maximum Likelihood Robust (MM) method
- the Theil-Sen (T-S) method.

87. All equity betas are de-levered using the sample firm's average gearing ratio over the latest five-year period. These asset betas are then re-levered by the benchmark gearing. The Brealey-Myers formula to de- and re-lever is used.

$$\beta_a = \frac{E}{(D+E)}\beta_e$$

where

β_a is the asset beta;

β_e is the equity beta;

[22] McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.
McKenzie and Partington, *Report to the AER, Part A: Return on equity*, October 2014, pp. 11-12.
McKenzie and Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 31-32.

[23] Detail on the econometric techniques for estimating equity beta can be found in ERA, *Explanatory Statement for the Final Rate of Return Guidelines, Appendix 17*, 16 December 2013.

E is the value of debt; and

D is the value of equity.

88. The beta estimates are then averaged, using both equal and market-weighted averages, to determine a point estimate. Equally-weighted portfolios are simply assigned a weight of ¼ to each of the four firms in the benchmark sample. To calculate a value-weighted portfolio the average market capitalisation was calculated for each firm.[24]

89. Thin trading, which introduces a bias in the estimation of β, was found not to be in evidence during the 2013 analysis through a series of Dimson's tests.[25] For this reason thin trading is not addressed here. Table 4 reports estimates of each firm's beta across the different regression methods, with a data set from April 2013 to March 2018. Equally-weighted and value-weighted portfolios are also reported.

90. The OLS beta estimates are lower than those of any of the other robust estimates. The mean OLS beta across all portfolios and stocks produces a beta of 0.693, which compares to the mean of all robust estimates across all portfolios and stocks of 0.718.

Table 4 Estimates of equity beta for individual firms and the two weighted portfolios in 2018 for different estimation methods

	APA	AST	DUE	SKI	Average of firms estimates	Average of equally weighted portfolios[26]	Average of value weighted portfolios	Average of portfolios estimates	Average of firms & portfolios estimates
Gearing	0.489	0.564	0.608	0.557	**0.554**	0.554	0.544	**0.549**	**0.553**
OLS	0.883	0.786	0.449	0.662	**0.695**	0.618	0.759	**0.689**	**0.693**
LAD	0.947	0.813	0.423	0.698	**0.720**	0.699	0.804	**0.752**	**0.731**
MM	0.939	0.791	0.458	0.738	**0.732**	0.669	0.807	**0.738**	**0.734**
T-S	0.916	0.775	0.445	0.718	**0.714**	0.650	0.779	**0.714**	**0.714**
Average of techniques	**0.921**	**0.791**	**0.444**	**0.704**	**0.715**	**0.659**	**0.787**	**0.723**	**0.718**

91. Bootstrapping is used to assign measures of accuracy to sample estimates. This method relies on random sampling and replacement as outlined in Appendix 23 of the Rate of Return Guidelines.[27]

[24] For each firm in the portfolio, its weight is determined by the ratio between the average of a single firm and the sum of the averages of all firms in each portfolio in terms of market capitalisation.

[25] ERA, *Explanatory Statement for the Final Rate of Return Guidelines*, 16 December 2013, pp. 176-177. Dimson, E. And P. Marsh (1983) "The stability of UK risk measures and the problem in thin trading", *Journal of Finance*, 38 (3) pp. 753 – 784.

[26] The equally weighted mean will be different than the mean of firms. The equally weighted mean approach calculates an equally weighted portfolio at each time period, which is then regressed against market returns. While the mean of firms uses the separate firm betas and takes the mean of these four points.

[27] ERA, *Appendices to the Explanatory Statement for the Rate of Return Guidelines: Meeting the requirements of the National Gas Rules*, December 2013, Appendix 23.

Table 5 Summary bootstrap simulated statistics of OLS estimators (B=10,000, n=261)

Model	Estimator	APA	AST	DUE	SKI	Average of firms estimates	Average of equally weighted estimates	Average of value weighted estimates	Average of portfolios estimates	Average of firms & portfolios estimates
OLS	$\hat{\beta}$	0.883	0.786	0.449	0.662	**0.695**	0.618	0.759	**0.689**	**0.693**
	Standard error $\hat{\beta}$	0.098	0.082	0.114	0.107	**0.100**	0.061	0.084	**0.072**	**0.091**
	Bootstrap $\hat{\beta}$	0.884	0.785	0.449	0.662	**0.695**	0.618	0.759	**0.689**	**0.693**
	Bootstrap S.E. $\hat{\beta}$	0.104	0.086	0.109	0.112	**0.102**	0.068	0.090	**0.079**	**0.095**
	Bootstrap bias	0.001	-0.001	0.000	0.000	**0.000**	0.000	0.000	**0.000**	**0.000**
	Bootstrap LB 2.5%	0.674	0.611	0.241	0.434	**0.490**	0.479	0.574	**0.527**	**0.502**
	Bootstrap median	0.885	0.787	0.446	0.666	**0.696**	0.620	0.762	**0.691**	**0.694**
	Bootstrap UB 97.5%	1.081	0.952	0.666	0.872	**0.893**	0.743	0.930	**0.837**	**0.874**

92. All OLS estimates of β were statistically significant at the 5 per cent significance level, as evidenced by the bootstrapped 95 per cent confidence band excluding the value of zero (Table 5). The bootstrapped upper 97.5 per cent confidence bound was 0.893 when averaged across all four assets, and 0.837 for the mean of the portfolios (Table 5).

93. Given their estimation approaches, standard errors cannot be estimated for the LAD estimator and the T-S estimator. For the LAD and T-S estimators the bootstrapped standard error is therefore used in drawing inference about β. Bootstrapped standard errors of β for the robust estimators (LAD, MM, T-S) were consistently lower than that of the OLS estimator, to within 0.01 of the OLS estimator, when considering the mean β across both the assets and portfolios.

94. The 97.5 per cent upper bound for the robust estimators was greater than for the OLS estimates (Table 6); the upper bound for the bootstrapped OLS β estimate was 0.874 when averaged across all models, compared to 0.939 for the LAD estimate. MM and T-S estimates for this upper bound lay between the OLS and LAD upper bounds.

95. The robust estimates of β were higher than that of the OLS β estimate when averaged across both the assets and the portfolios. This difference between estimators was more pronounced for the portfolio estimates than for the assets themselves. The key reason for this difference appears to be the weight placed on the APA Group asset: it has both the estimate with the lowest gearing and the highest market capital value (with a weight of 38.4 per cent in the variance weighted portfolio).

Table 6 **Summary of bootstrap simulated statistics of robust estimators (B=10,000, n=261)**

Model	Estimator	APA	AST	DUE	SKI	Average of firms estimates	Average of equally weighted estimates	Average of value weighted estimates	Average of portfolios estimates	Average of firms & portfolios estimates
LAD	$\hat{\beta}$	0.947	0.813	0.423	0.698	**0.720**	0.699	0.804	**0.752**	**0.731**
	Standard error $\hat{\beta}$ [1]	-	-	-	-	**-**	-	-	**-**	**-**
	Bootstrap $\hat{\beta}$	0.936	0.825	0.474	0.725	**0.740**	0.685	0.802	**0.744**	**0.741**
	Bootstrap S.E. $\hat{\beta}$	0.096	0.093	0.112	0.106	**0.102**	0.076	0.081	**0.079**	**0.094**
	Bootstrap bias	-0.011	0.013	0.051	0.027	**0.020**	-0.014	-0.002	**-0.008**	**0.011**
	Bootstrap LB 2.5%	0.759	0.649	0.263	0.554	**0.556**	0.510	0.636	**0.573**	**0.562**
	Bootstrap median	0.935	0.817	0.452	0.707	**0.727**	0.703	0.807	**0.755**	**0.737**
	Bootstrap UB 97.5%	1.136	1.031	0.718	0.980	**0.966**	0.796	0.970	**0.883**	**0.939**
MM	$\hat{\beta}$	0.939	0.791	0.458	0.738	**0.732**	0.669	0.807	**0.738**	**0.734**
	Standard error $\hat{\beta}$	0.096	0.083	0.087	0.103	**0.092**	0.059	0.081	**0.070**	**0.085**
	Bootstrap $\hat{\beta}$	0.937	0.790	0.461	0.736	**0.731**	0.669	0.806	**0.738**	**0.733**
	Bootstrap S.E. $\hat{\beta}$	0.094	0.087	0.094	0.096	**0.093**	0.057	0.081	**0.069**	**0.085**
	Bootstrap bias	-0.002	-0.001	0.002	-0.002	**-0.001**	0.000	-0.001	**0.000**	**-0.001**
	Bootstrap LB 2.5%	0.748	0.62	0.273	0.546	**0.547**	0.557	0.642	**0.600**	**0.564**
	Bootstrap median	0.939	0.790	0.462	0.736	**0.732**	0.669	0.808	**0.738**	**0.734**
	Bootstrap UB 97.5%	1.113	0.957	0.645	0.925	**0.910**	0.779	0.962	**0.870**	**0.897**

Table 7 Summary of bootstrap simulated statistics of robust estimators (B=10,000, n=261) (Continued)

Model	Estimator	APA	AST	DUE	SKI	Average of firms estimates	Average of equally weighted estimates	Average of value weighted estimates	Average of portfolios estimates	Average of firms & portfolios estimates
T-S	$\hat{\beta}$	0.916	0.775	0.445	0.718	**0.714**	0.650	0.779	**0.714**	**0.714**
	Standard error $\hat{\beta}$ [1]	-	-	-	-	**-**	-	-	**-**	**-**
	Bootstrap $\hat{\beta}$	0.912	0.775	0.447	0.718	**0.713**	0.649	0.778	**0.714**	**0.713**
	Bootstrap S.E. $\hat{\beta}$	0.099	0.086	0.097	0.105	**0.097**	0.065	0.084	**0.075**	**0.089**
	Bootstrap bias	-0.004	0.000	0.001	0.000	**-0.001**	-0.001	0.000	**-0.001**	**-0.001**
	Bootstrap LB 2.5%	0.713	0.607	0.261	0.514	**0.524**	0.516	0.609	**0.563**	**0.537**
	Bootstrap median	0.916	0.776	0.447	0.719	**0.714**	0.65	0.779	**0.714**	**0.714**
	Bootstrap UB 97.5%	1.096	0.944	0.636	0.923	**0.900**	0.773	0.937	**0.855**	**0.885**

96. This data (Table 5, Table 6 and Table 7) provided the ERA with confidence in the robustness of the β estimates.

97. With reference to the updated dataset to 2018, the ERA has applied an equity beta value of 0.70. This is consistent with the equity beta proposed by Western Power.

98. The ERA's draft decision considered that market evidence supported an equity beta of 0.70 for Western Power.

8.2.3 Public submissions

99. Western Power accepted the equity beta in the draft decision.

100. The WAMEU's submission included discussion on the risks faced by energy networks and the equity beta.[28]

[28] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017.

101. The WAMEU submitted that regulated network firms face a very low risk compared to firms in the competitive sector. It referred to AER analysis on how the regulatory framework limited systematic risks faced by networks. The WAMEU detailed its view on the risks that Western Power does not face.[29]

102. The WAMEU submitted that, in the AER's expert session, the investor expert noted that a lot of investors saw investments in regulated networks as bonds that reset. It agreed that the risk profile of regulated networks should be seen more as a bond than as equity, reflecting the low risk nature of networks.[30]

103. In addressing the equity beta, the WAMEU referred to a CRG paper submitted to the AER. The WAMEU expressed concern that beta was too high and overstated the systematic risks that networks face. Therefore the equity beta needed to be adjusted downwards. The WAMEU's position was informed by the following observations.

- The small number of listed network firms in the benchmark sample are not a close match to the benchmark efficient entity.
- The observed market data used to identify the levels of equity beta are for the entire firm activities, with its mix of regulated and unregulated activities. Therefore, observed market data is not reflective of a "pure play energy transport network".[31] The equity beta for the entire entity will be higher, and the equity beta of the benchmark efficient entity expected to be lower than that observed for the entire entity.[32]
- The volatility in the share prices of the listed network firms is not consistent with the certainty of the cash flows they have from their regulated assets. Regulated network firms have stable risk fundamentals.[33]
- The rate of return developed by the ERA provides only part of the revenue, as Western Power will get additional revenue from the incentives provided for opex and reliability, from unregulated revenue as well as from under-running the allowances for opex, capex and for debt and tax. Applying the CAPM approach, and the equity beta, results in a double counting.[34]

104. The WAMEU considered that CRG provided sufficient evidence that there should be an active bias downward for the point estimate of equity beta. The CRG recommended that adjusting for bias would move the observed range from 0.4 – 0.7 to about 0.2 – 0.5. The WAMEU considered that equity beta should be 0.4 or lower.[35]

[29] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, p. 31.

[30] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp. 31-32.

[31] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, p. 25.

[32] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, p. 33.

[33] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, p. 36.

[34] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp. 32-33.

[35] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp. 36-37.

8.2.4 Final decision

105. The ERA considers that an efficient return for risk should be estimated through a forward-looking rate of return using relevant market data. The ERA has maintained its overall empirical approach to estimating the equity beta parameter.

106. Conceptually, the ERA considers that the overall systematic risk of supplying regulated network services is low. Risk is mitigated through the regulatory framework, including providing more certain cash flows, protecting regulated assets and allowing for cost pass through events. Furthermore, systematic risk is mitigated through the use of a hybrid trailing average debt risk premium, which provides a hedge against movements in interest rates, and the method for accounting for inflation provides compensation for actual inflation.

107. This creates an expectation that the equity beta for the benchmark efficient entity will be below 1.

108. Furthermore, Partington sees little doubt that the AER comparator firms can be considered as bond proxies.[36] Investors also view comparator firms as a bonds that reset.[37] Therefore, there is likely an inverse relationship between a network's share price and interest rates.[38] This would lead to a tendency for energy networks to outperform the market during times of interest rate decreases. This outperformance would drive an increase in equity beta estimates, which measures the riskiness of a firm's return compared with that of the market.

109. The ERA recognises that there is generally a trade-off to determine the length of the estimation period. Older data might be considered less reflective of current systematic risk assessments, with this favouring a shorter period. Statistically robust estimates need to have a sufficient number of observations, with this favouring a longer period.

110. In considering these trade-offs, a shorter period may better reflect the contemporary regulatory framework for the regulated benchmark entity and its relative risk profile to the market. In addition, a shorter period may also recognise that the regulated networks can be seen as a bond proxy and thereby allows for the effects of the current interest rate environment. In contrast, a longer period may result in a constant equity beta and provide for greater stability.

111. The ERA considers that estimates from a five-year period best balance these trade-offs and reflect the efficient financing outcomes for the forward regulatory period, while also ensuring statistical reliability.

112. Ideally, when conducting empirical analysis the ERA would use firms that share all or most of the key characteristics of the benchmark efficient entity with a similar degree of risk as a relevant service provider in the provision of regulated energy services. However, in practice few firms fully reflect the benchmark.

[36] Partington and Satchell, *Report to the AER: Allowed rate of return 2018 Guideline review*, May 2018, p. 18.

[37] *Review of Rate of Return Guidelines – Concurrent Expert Evidence Session 2*, April 2018, p. 74.

[38] Partington and Satchell, *Report to the AER: Allowed rate of return 2018 Guideline review*, May 2018, p. 21.

113. The ERA continues to support the estimation of an equity beta using a benchmark sample of Australian network businesses. While it recognises the small sample, the ERA considers that the sample of domestic firms is the best empirical guide currently available to estimate the systematic risk of a network business. The ERA considers that the use of international firms and other Australian firms would carry different risks and characteristics compared to regulated network businesses. In the AER's expert session there was general agreement that there were no simple adjustments that could be made to make international data comparable to domestic data.[39]

114. As noted by APA, it is necessary to weigh the potential statistical improvement from expanding the comparator set against the suitability of the additional firms.[40] International or other domestic industry firms are not comparable to the risk characteristics of an Australian energy network. Experts and submissions to the AER noted that a small sample for firms does not necessarily require expanding the comparator set.[41]

115. Furthermore, the ERA considers that the use of a benchmark sample of companies is consistent with its approach to the estimation of gearing and the credit rating.

116. The equity beta estimate is based on empirical analysis of listed Australian service providers. The ERA recognises that the inclusion of comparator firms with a high proportion of unregulated activities would lead to a higher equity beta estimate. However, the ERA notes that, for a relatively large proportion of these sample companies total revenue is regulated and this is the best available information.

117. The ERA recognises that APA has a relatively high proportion of unregulated activities. However, it includes APA in its sample because of concerns with the small number of comparators.

118. The AER has said that the CRG's substantive issue with the use of market data for estimating equity beta is that the relatively high volatilities (in share price) for APA, SKI and AST appear inconsistent with the (relatively) low risk of supplying the regulated energy services and the overall low volatility in the Australian market.[42]

119. The ERA considers the use of market data is appropriate for estimating equity beta. The rate of return needs to be consistent with the prevailing cost of equity and that is best measured through market data. The rate of return also needs to reflect the efficient cost of finance. The ERA considers that efficient financial costs are more likely to be reflected in the prevailing market cost of capital. In the AER expert session, there was general agreement that equity beta should be assessed from stock market data.[43]

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[39] Cambridge Economic Policy Associates, *Expert Joint Report*, April 2018, p. 43.

[40] Energy Networks Australia, *AER review of the rate of return guideline response to Discussion Papers and concurrent expert evidence sessions,* May 2018, p. 62.

[41] Partington and Satchell, *Report to the AER: discussion of comparator firms for estimating beta*, June 2016, p. 9.

Network Shareholder Group, *Submission on the Rate of Return Guideline (RORG) review from the Network Shareholder Group (NSG*), May 2018, p. 15.

Cambridge Economic Policy Associates, *Expert Joint Report*, April 2018, p. 44.

[42] AER, *Draft rate of return guidelines – explanatory statement*, July 2018, p. 291.

[43] Cambridge Economic Policy Associates, *Expert Joint Report*, April 2018, p. 42.

120. The equity beta measures the riskiness of a firm's returns compared with the market. Therefore, while the firm's risks may not change overtime, the market's risks and the relative attractiveness of the firm may change. This will affect equity beta.

121. The ERA does not agree with the WAMEU's concern about the double counting of risks. The CAPM approach takes into account the regulatory framework that applies to an energy network and its lower risk. The equity beta measures energy network performance relative to the market. An equity beta of less than one recognises the lower risk experienced by energy networks. Therefore, the ERA considers that there is no double counting of risk.

122. For the final decision, the ERA estimates an equity beta from market data using a benchmark sample of Australian network businesses.

123. The ERA considers that market evidence supports an equity beta of 0.70 for Western Power.

124. For this final decision, the ERA has adopted an equity beta of 0.70.

8.3 Market risk premium

125. The ERA uses the Sharpe-Lintner CAPM to estimate the return on equity. The market risk premium is a parameter of the Sharpe-Lintner CAPM.

126. The market risk premium reflects the difference between: the nominal risk free rate and the market return on equity. The market risk premium can be defined as the return on the market portfolio above the prevailing risk free rate.

127. The market risk premium compensates an investor for the systematic risk of investing in a fully diversified portfolio. Systematic risk is risk that cannot be diversified away by investors because it affects all firms in the market. Therefore, the market risk premium represents an investor's required return, over and above the risk free rate of return, on a fully diversified portfolio of assets. This is a forward-looking concept.

128. The market risk premium cannot be directly observed. In order to set the return on equity, the market risk premium needs to be estimated for a future time period. The ERA's forward looking market risk premium is estimated for a five-year period, consistent with the term of the regulatory period.

8.3.1 Western Power's initial proposal

129. Western Power's initial proposal was based on the ERA's recent approach to estimating the market risk premium. In its 2016 DBNGP decision, the ERA used an estimate of the long-run average market risk premium computed from historical data (the lower bound) and an estimate derived from the dividend growth model (the upper bound) to establish a range of possible outcomes for the market risk premium. Having established this range, the ERA then selected a point estimate by applying forward-looking indicators of market conditions and its own judgment.[44]

130. Western Power proposed several changes to the ERA's method for setting the lower bound:

- Using Australian Taxation Office (ATO) data on credit yields from 1998 onwards and assuming that dividends were 75 per cent franked prior to 1998 (in its DBNGP decision, the ERA assumed that dividends were 75 per cent franked in all years and did not use ATO data on credit yields).[45]
- Placing greater weight on the NERA Economic Consulting (NERA) market risk premium study[46] than on the Brailsford, Handley and Maheswaran (BHM) market risk premium study[47] by using only the NERA adjustments, and so not using the BHM study.[48]

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[44] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, pp. 108-127.

[45] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 196.

[46] NERA Economic Consulting, *The market risk premium: Analysis in response to the AER's Draft Rate of Return Guidelines: A report for the Energy Networks Association*, October 2013.

[47] T. J. Brailsford, J. C. Handley and K. Maheswaran, *'The historical equity risk premium in Australia: Post-GFC and 128 years of data', Accounting and Finance*, 2012, pp. 237-247.

[48] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 197.

- Using only the arithmetic mean of a sample of returns to the market portfolio in excess of the risk free rate, rather than an average of the arithmetic and geometric means, to estimate the market risk premium.[49]
- Using the longest available time series of market data (1883 to 2016) to inform the estimate.[50]

131. Western Power's proposal resulted in a lower bound estimate of the market risk premium of 6.8 per cent.[51] This compared to a lower bound market risk premium of 5.4 per cent used in the DBNGP decision.

132. Western Power also proposed several changes to the ERA's method for setting the upper bound:

- Updating the dividend growth model to use market data up to 23 May 2017.[52]
- Recalculating market risk premium estimates to apply the gamma and theta values determined in the decision (that is, a proposed gamma of 0.4 and a theta of 0.53) and to use a five-year risk free rate.[53]
- Including the AER's most recent dividend growth model estimate, from its April 2017 final decision for TasNetworks.[54]

133. Western Power's proposal resulted in an upper bound estimate of the market risk premium of 8.2 per cent.[55] This compared to an upper bound market risk premium of 8.8 per cent used in the DBNGP decision.

134. Western Power proposed changes to indicators the ERA uses to inform its choice of point estimate for the market risk premium. It proposed retaining three of the ERA's four forward-looking indicators: the default spreads on AA bonds, dividend yields on the All Ordinaries Index and the interest rate swap spreads on five-year bonds. However, it considered that the fourth indicator – the Australian Securities Exchange 200 volatility index – was unreliable due to a weak relationship with the market risk premium.[56] Western Power also proposed that the ERA adopt three additional forward-looking indicators: the prevailing bill rate, the Wright market risk premium and independent expert reports.[57]

[49] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 198.

[50] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 198.

[51] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 198.

[52] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 198.

[53] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 200.

[54] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, pp. 201-202.

[55] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 201.

[56] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 201.

[57] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 202.

135. Western Power proposed that, based on a market risk premium range of 6.8 to 8.2 per cent and consideration of its six forward-looking indicators, the ERA should adopt a midpoint market risk premium of 7.5 per cent.[58]

8.3.2 Draft decision

136. The ERA's recent method to estimate the market risk premium was detailed in its 2016 DBNGP determination.[59]

137. Western Power commissioned HoustonKemp to provide advice on the market risk premium.[60] Western Power did not accept the ERA's method for estimating the market risk premium and proposed a modified approach.

138. Western Power proposed amendments to:

- how the lower bound for the range of the market risk premium is estimated
- how the upper bound for the range of the market risk premium is estimated
- the indicators used to inform the determination of a point estimate of the market risk premium.

139. The ERA considered the HoustonKemp report warranted further investigation and sought independent input from Pink Lake Analytics statistical consultancy to undertake a review of aspects of the HoustonKemp report and provide advice.[61]

140. Western Power's proposed amendments are addressed below.

8.3.2.1 Historic market risk premium

141. The historic market risk premium is the average realised return that stocks have earned in excess of the five-year government bond rate. This historic market risk premium can be measured directly. While not forward looking, the historic approach has been used to estimate the forward looking market risk premium, as past outcomes contribute to investors' forward expectations.

142. The benefits of using an historic market risk premium, as identified by McKenzie and Partington,[62] include that the method and results:

- are transparent
- have been well studied
- are widely used.

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[58] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 202.

[59] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016.

[60] Houston Kemp Economists, *A Constructive Review of the ERA's Approach to the MRP – A report for Western Power,* June 2017.

[61] Pink Lake Analytics, *Estimation of the Market Risk Premium – A review of weighting of arithmetic and geometric means*, December 2017.

[62] McKenzie and Partington, *Report to Corrs Chambers Westgarth: Equity market risk premium*, December 2011, pp. 5–6.

143. In their 2012 study, Dimson, Marsh and Staunton concluded that the historical average equity risk premium is the most relevant approach for estimating the market risk premium as there are no better forecasting methods available.[63]

144. There is evidence that estimates of the market risk premium using historical data on market risk premia are upwardly biased due to the presence of survivorship bias, historically high transaction costs and lack of low-cost opportunities for diversification.[64] The implication is that the long-term forward-looking market risk premium is expected to be lower in the future than the historical estimate.

145. The ERA's recent practice has been to estimate the lower bound for the market risk premium through calculating a historic market risk premium.

146. The ERA's method to calculate this lower bound is summarised below:

- Arithmetic and geometric averages of the historic market risk premium observations are calculated using the BHM and NERA datasets.[65]
- Five overlapping time periods (1883-2017, 1937-2017, 1958-2017, 1980-2017 and 1988-2017) are used for averaging periods, to reflect different economic conditions.
- The estimate of the historic market risk premium is taken from the market risk premium matrix as a simple average of the lowest arithmetic and highest geometric means. This historic market risk premium estimate is then used to estimate the lower bound of the market risk premium.

147. Western Power proposed a lower bound estimate for the market risk premium of 6.8 per cent. Western Power's proposed method to calculate the lower bound differs from the ERA's recent practice in several ways, including:

- the use of ATO data on credit yields from 1998 onward
- the sole use of the NERA dataset
- the sole use of an arithmetic mean
- the sole use of the longest time series.

Tax imputation credit yields

148. Tax imputation credits have affected investor returns since their introduction in 1988.

149. For the purposes of calculating historic market returns, which are required to estimate the market risk premium, it is necessary to adjust market returns to account for the added value of tax imputation credits.

150. In its DBNGP decision, the ERA used the assumption that dividends were 75 per cent franked for all years from 1988 when calculating the historic market risk premium. This figure was based on a historic average.

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[63] Dimson, Marsh and Staunton, *Credit Suisse Global Investment Returns Sourcebook 2012*, February 2012, p. 37.

[64] Partington and Satchell, *Report to the AER: Cost of Equity Issues 2016 Electricity and Gas Determinations,* April 2016 , p. 18.

[65] The use of the historic market risk premium to calculate a long-run average market risk premium informs today's estimate of the future market risk premium.

151. For the purpose of calculating the market risk premium, Western Power proposed that dividends are franked as follow:

- dividends are 75 per cent franked between 1988 and 1998
- dividends are franked consistent with the ATO data on credit yields from 1998 onward.[66]

152. Western Power correctly states that BHM use average imputation credits yields on the All Ordinaries Index sourced from the ATO.[67]

153. The data quality of this ATO information on the distribution rate is good and its use is consistent with current regulatory practice in Australia.[68]

154. Therefore, the ERA considers that the use of the ATO data on credit yields is a valid approach to adjust market returns for tax imputation.

155. Over the period from 1998, the adoption of the ATO imputation credit yields will, on average, slightly reduce the imputation credit yield used to calculate the historic market risk premium.

156. For the purposes of the draft decision the ERA accepted Western Power's proposed approach on tax imputation. The ERA assumed that:

- dividends are 75 per cent franked between 1988 and 1998
- dividends are franked consistent with the ATO data on credit yields from 1998 onward.

Underlying dataset

157. In its DBNGP decision, the ERA used both the BHM and NERA datasets to calculate the historic market risk premium. The ERA applied an equal weight to the two datasets given uncertainty of data quality between the two sources.

158. The relative merits of the NERA and BHM datasets prior to 1958 are subject to some controversy. The BHM historic series is claimed to be downwardly biased due to an inadequate adjustment made to the dividend yields employed in the data. While the NERA series readjusted the dividend yields prior to 1958, it is subject to concerns around whether it provides a material improvement in reliability given limited data points.

159. There is a significant difference between the NERA and BHM estimates for the 1883-2017 period only. Data periods that commence after 1936 produce similar estimates.

160. Western Power proposed to rely solely on the NERA dataset to estimate the historic market risk premium.

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[66] ATO data on credit yields is available from 1998.

ATO, https://www.ato.gov.au/Rates/Company-tax---imputation--average-franking-credit---rebate-yields/

[67] Brailsford, T., J. Handley and K. Maheswaran, *The historical equity risk premium in Australia: Post-GFC and 128 years of data*, Bond Business School Publications, 2012, p. 3.

Brailsford, T., J. Handley and K. Maheswaran, *Re-examination of the historical equity risk premium in Australia*, Accounting and Finance 48, 2008, p. 85.

[68] AER, *Discussion paper – Value of imputation credits*, March 2018, p. 9.

161. Western Power's consultant HoustonKemp detailed a June 2015 NERA report that examined the issues raised in the past by Handley on NERA's adjustments to historic data.[69] HoustonKemp argued that this report resolves past concerns of the ERA by finding that NERA's adjustments to historic data are not sensitive to the source used to provide dividend yields and that NERA is able to come close to matching other yields supplied.

162. HoustonKemp provided one example of a market practitioner, for the Credit Suisse Global Investment Returns Sourcebook, adopting the NERA dataset.

163. The AER reviewed the underlying datasets and the June 2015 NERA report. The SA Power Networks final decision described how there were more concerns with pre-1958 data than those that NERA attempted to address with its adjustment and this created a problem for any dataset.

> Fourth, and arguably most important, the above discussion crystallises the central issue on the consideration of earlier data. That is, there are significant problems with the earlier data, regardless of which adjustment is used. This finding, in part, informs our position to consider different sampling periods.[70]

164. The AER has chosen to continue the sole use of the BHM dataset.

> We do not consider NERA's adjustment, which is based on less than ten data points out of 300, represents a material improvement in reliability. NERA has also not reconciled the data it uses for its adjustment to the data of the original series.[71]

165. Given this uncertainty, it is reasonable to use both the BHM and NERA datasets to minimise any error by favouring one source over the other. Placing more weight on one dataset risks introducing bias.

> If the data prior to 1958 are retained then an 'equanimeous' position of weighting the BHM and NERA estimates equally should also be retained, given the data prior to 1958 are uncertain in nature.[72]

166. For the draft decision the ERA continued to equally weight the BHM and NERA datasets when estimating the historic market risk premium.

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69 NERA, *Further Assessment of the Historical MRP: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors,* June 2015

70 AER, *Final decision: SA Power Networks determination 2015-16 to 2019-20, Attachment 3 – Rate of Return,* October 2015, p. 3-380.

71 AER, *Final decision: TasNetworks distribution determination 2017-19, Attachment 3 – Rate of return*, April 2017, p. 3-88.

72 Pink Lake Analytics, *Estimation of the Market Risk Premium – A review of weighting of arithmetic and geometric means*, December 2017, p. iv.

Sampling periods

167. In its DBNGP decision, the ERA used five sampling periods to calculate the historic market risk premium. The dates of four of the selected sampling periods (1883, 1937, 1958 and 1980) reflects changes to the quality of the underlying data, while one of the periods (1988) reflects the introduction of the imputation tax system.

168. Western Power proposed the sole use of the longest data period 1883-2016.

169. Western Power's consultant HoustonKemp argued that the longer data period raises the precision of the market risk premium estimate, that is, minimises the standard error.

170. The longest data period is not necessarily the most efficient estimator. An efficient estimator that can predict may be better than one that minimises standard error.

> The data scenario relevant to current market conditions is likely to be shorter than the 1883-2016 scenario proposed by HoustonKemp due to structural breaks in the data series, either due to impaired data quality despite adjustment of pre-1958 data, or some structural change in the market.[73]
>
> It is our opinion that minimising standard error is not a sufficient criterion when significant risks of structural breaks and data quality are extant in the longer-term data. These tangible risks can lead to significant bias in estimates of the forward looking MRP.[74]

171. Partington and Satchel have reviewed the sampling period for calculating the historic market risk premium and favour using as much information as possible. They considered that there were valid reasons for using multiple sampling periods, including structural breaks in the data and issues of data quality. Partington and Satchel recognised that the more recent sample periods were likely to provide changing information regarding changes to the taxation and current regimes.[75]

172. There are strengths and weaknesses in taking multiple sampling periods, including that:

- longer time series contain more observations and produce a lower statistical error
- data quality markedly improved in 1937, 1958 and 1980
- more recent sampling periods reflect the current financial environment
- shorter periods are more affected by the current environment or one-off events.

[73] Pink Lake Analytics, *Estimation of the Market Risk Premium – A review of weighting of arithmetic and geometric means*, December 2017, p. 13.

[74] Pink Lake Analytics, *Estimation of the Market Risk Premium – A review of weighting of arithmetic and geometric means*, December 2017, p. 9.

[75] Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 45–46.
AER, *Final Decision AusNet distribution determination - Attachment 3 - rate of return*, May 2016, p. 62.

173. Having considered these strengths and weakness, and given that no one data period has been assessed as superior, the ERA in the draft decision continued the use of five overlapping time periods (1883-2016, 1937-2016, 1958-2016, 1980-2016 and 1988-2016).

> Until one data scenario may be clearly proven superior to another then it is advisable that the Authority retains its compromise strategy of averaging across the five data scenarios.[76]

174. The ERA further considered that relying solely on the 1883-2016 period risks introducing significant upward bias to forecast returns. This period includes very early periods subject to data quality concerns. The period also produces the highest historic market risk premium.

175. For the draft decision the ERA continued to use the five sampling periods when estimating the historic market risk premium.

Selection of an averaging method

176. The historic market risk premium uses the concept of a long-run average market risk premium as today's best forecast of the market risk premium into the future and combines this average with an on-the-day risk free rate to arrive at an on-the-day estimate of the market risk premium.

177. When applying the historic market risk premium an averaging method must be selected to apply to historical returns. In its DBNGP decision the ERA used both the arithmetic and geometric means to calculate the historic market risk premium.[77]

178. Western Power proposed the sole use of the arithmetic mean to calculate the historic market risk premium.

179. Western Power's consultant HoustonKemp argued that the use of the arithmetic mean avoids the downward bias from the use of a geometric mean.

180. There are mixed views as to the best averaging technique to apply in estimating the historic market risk premium.

[76] Pink Lake Analytics, *Estimation of the Market Risk Premium – A review of weighting of arithmetic and geometric means*, December 2017, p. iv.

[77] The arithmetic mean is also called simple average, which is the sum of all numbers in the series divided by the count of all numbers. The arithmetic mean formula is:

$$Arithmetic\ Mean = \frac{\sum_{i=1}^{n} x}{n} = \frac{x_1 + x_2 + \cdots + x_n}{n}$$

The geometric mean is the average of a set of products. The geometric mean formula is:

$$Geometric\ Mean\ = \left(\prod_{i=1}^{n} x\right)^{\frac{1}{n}} = \sqrt[n]{x_1 \cdot x_2 \cdots x_n}$$

When geometric mean works with percentage returns, the formula is altered to reflect the compounding effect, as below:

$$Geometric\ Mean\ for\ \%\ return = \sqrt[n]{(1 + x_1\%) \cdot (1 + x_2\%) \cdots (1 + x_n\%)} - 1$$

181. An arithmetic average will tend to overstate returns, whereas a geometric average will tend to understate them. These biases are empirically significant. The biases result from the fact that cumulative performance is a non-linear function of average return, and that the sample average is necessarily a noisy estimate of population mean. Bias is a function of both the imprecision of the estimate and of the forecast horizon.[78] [79]

- When compounding the arithmetic average over time, it is the sampling error in the measurement of the arithmetic average return that causes the upward bias in the expected return.[80] [81]
- The geometric average normally gives a downward biased measurement of expected returns.[82] The geometric mean can understate returns as it is based on an ideal consistent compounding, which does not account for sampling error and the actual variability of returns over time.

182. An unbiased estimate of the historical market risk premium is likely to be somewhere between the geometric average and the arithmetic average of annual market risk premium.[83] [84] The ERA has sought to minimise any error with over reliance on one of the two types of average by using the simple average of the lowest arithmetic mean and highest geometric mean.

183. The ERA has recognised the view that the geometric average is considered to have a downward bias. To account for this it has used the highest of the geometric averages to set the floor of the historic market risk premium range.

184. Pink Lake Analytics stated:

> The difference in position between what HoustonKemp have proposed and that of the Authority hinges on whether the arithmetic sample mean should be compounded or not. This issue is readily resolved – if the Authority considers that the market participants operate over a longer-period investment horizon (as articulated by Partington and Satchell, titled "*Advice to the AER on Cost of Equity Issues in 2016 Electricity and Gas Determinations")* then a weighted mixture of the arithmetic and geometric means should be applied. However, if the Authority considers the investment horizon of rational market participants to be a single period then the HoustonKemp proposal of the arithmetic mean alone should be applied.

[78] An often-overlooked presumption of the textbook definition of mean is that the forecaster knows the true values of the parameters for the mean and variance. In practice, of course, these are estimated, and even using the best estimation techniques, the estimators are subject to sampling error. Symmetric errors in the estimate of the mean therefore have asymmetric effects on returns.

[79] Jacquier, Kane, and Marcus, *Geometric or Arithmetic Mean: A Reconsideration, Financial Analysts Journal*, 59, 2003.

[80] Blume, *Unbiased Estimators of Long-Run Expected Rates of Return, Journal of the American Statistical Association, 69*, 1974, pp. 634-638.

[81] Jacquier, Kane, and Marcus, *Geometric or Arithmetic Mean: A Reconsideration, Financial Analysts Journal*, 59, 2003, p. 3.

[82] Jacquier, Kane, and Marcus, *Geometric or Arithmetic Mean: A Reconsideration, Financial Analysts Journal*, 59, 2003, pp. 46-53.

[83] McKenzie and Partington, *Supplementary report on the equity MRP*, February 2012, p. 5.

[84] Jacquier, Kane, and Marcus, *Geometric or Arithmetic Mean: A Reconsideration, Financial Analysts Journal*, 59, 2003, p. 4.

> Importantly, a review of the different positions suggests that a 50/50 weighting of the arithmetic and geometric means to form the forward looking MRP estimate can be justified if the investment horizon is long-term.[85]

185. There are arguments for both a single-period and multi-period investment horizon. Dr Martin Lally argues for a single-period investment horizon,[86] while Partington and Satchell argue for a multi-period investment horizon.[87] Given the volatility of returns over time, an investor may consider both horizons.

186. The ERA considered that market participants operate over a multi-year investment horizon and therefore it is necessary to use the geometric mean.

187. Pink Lake Analytics stated:

> The principal reason for dismissing the HoustonKemp argument when long-term horizons are considered is that the sampling error implicit in any historical arithmetic mean estimate of returns will provide an upward biased estimate of the cumulative return.[88]

188. Jacquier shows that the weight assigned to the arithmetic and geometric mean is a function of both the forecast horizon and on the length of the time series on which the market risk premium is based on. The presence of any structural breaks reduces the length of the time series on which the market risk premium is based. The reduced length of the time series increases the weight placed on the geometric mean.[89] Therefore, given possible structural breaks in the data series, it is reasonable to place some weighting on the geometric mean.

189. The respective advantages of the two types of averaging methods have been considered at length in AER decisions.[90] Based on this information, the AER reaffirmed that using both averages is the best use of all information available.

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[85] Pink Lake Analytics, *Estimation of the Market Risk Premium – A review of weighting of arithmetic and geometric means*, December 2017, p. iii.

[86] Lally M, *The Cost of Equity and the Market Risk Premium*, July 2012, pp. 31-32.

[87] Partington and Satchell, *Advice to the AER on cost of equity issues in 2016 electricity and gas determinations,* April 2016, pp. 51 – 52.

Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determination,* October 2015, pp. 44-46.

Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations,* May 2015, pp. 16-17.

[88] Pink Lake Analytics, *Estimation of the Market Risk Premium – A review of weighting of arithmetic and geometric means*, December 2017, p. 4.

Partington and Satchell, *Report to the AER: Cost of equity issues–Final decisions for the VIC DNSPs*, April 2016, pp. 49–52.

[89] Pink Lake Analytics, *Estimation of the Market Risk Premium – A review of weighting of arithmetic and geometric means*, December 2017, pp. iii, 11.

Jacquier, Kane, and Marcus, *Geometric or Arithmetic Mean: A Reconsideration, Financial Analysts Journal*, 59, 2003.

[90] Partington and McKenzie, *Return of equity and comment on submissions in relation to JGN*, May 2015, p. 1.

190. In its April 2017 TasNetwork decision, the AER continued to use both the arithmetic and geometric means, tempered by an understanding of the potential biases in both.[91] [92]

191. The ERA considered that solely using the arithmetic mean risks introducing significant upward bias to forecast returns.

192. The ERA considers an unbiased estimate of the historical market risk premium is likely to be somewhere between the geometric average and the arithmetic average of annual market risk premium. The ERA has therefore sought to minimise any error with over reliance on one of the two types of average by continuing the 50/50 weighting of the arithmetic and geometric means.

Historic market risk premium estimate

193. The following table details the ERA's estimates of the historic market risk premium.

Table 8 Estimates of the historic market risk premium

	Arithmetic			Geometric		
	NERA	BHM	Average	NERA	BHM	Average
1883-2017	6.79%	6.44%	**6.61%**	5.43%	5.08%	**5.26%**
1937-2017	6.19%	6.23%	**6.21%**	4.34%	4.39%	**4.36%**
1958-2017	6.67%	6.67%	**6.67%**	4.34%	4.34%	**4.34%**
1980-2017	6.40%	6.40%	**6.40%**	4.14%	4.14%	**4.14%**
1988-2017	5.95%	5.95%	**5.95%**	4.34%	4.34%	**4.34%**

Source: ERA analysis

194. The ERA takes the average of the lowest arithmetic mean (5.95 per cent) and the highest geometric mean (5.26 per cent) to develop an estimate of the historic market risk premium of 5.6 per cent.

8.3.2.2 Forward looking market risk premium – dividend growth model

195. The ERA's previous estimate of the upper bound for the market risk premium used a forward-looking market risk premium estimate.

196. At a high level, the ERA's method of calculating this upper bound involved the use of:

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

197. The dividend growth model method examines the forecast future dividends of businesses and estimates the return on equity that makes these dividends consistent with the market valuation of those businesses.

[91] AER, *Final decision: TasNetworks distribution determination 2017-19, Attachment 3 – Rate of return*, April 2017, p. 3-88.

[92] McKenzie and Partington, *Report to the AER: Supplementary report on the equity MRP*, 22 February 2012 Partington and Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, pp. 44–45.

198. The dividend growth model uses forecast dividend growth, forecast future growth rates, current share prices and historical returns on equity in order to estimate the market risk premium.

199. Western Power's proposed dividend growth model method:

- Incorporates the AER's most recent dividend growth model estimate, from its April 2017 final decision for TasNetworks.
- Adjusts external market risk premium estimates to ensure internally consistent assumptions (gamma and term of risk free rate).

200. Using its adjusted dividend growth model estimates of the market risk premium, HoustonKemp took the top of a range of estimates to establish its upper bound of the market risk premium at 8.2 per cent.

Value of the dividend growth model

201. The dividend growth model method has the benefit of being forward looking, and takes the current economic outlook into account through dividend growth expectations, but it is unreliable on its own.[93]

202. McKenzie and Partington note the sensitivity of the model to assumptions and input values:[94]

> Clearly valuation model estimates are sensitive to the assumed growth rate and a major challenge with valuation models is determining the long run expected growth rate. There is no consensus on this rate and all sorts of assumptions are used: the growth rate in GDP; the inflation rate; the interest rate; and so on. A potential error in forming long run growth estimates is to forget that this growth in part comes about because of injections of new equity capital by shareholders. Without allowing for this injection of capital, growth rates will be overstated and in the Gordon model this leads to an overestimate of the MRP.

203. In its evaluation of the dividend growth model, the ERA considered all available information, which included new information not available at the time of its DBNGP decision. This new information included the April 2017 Partington and Satchell report on estimation of the return on equity, which reviewed the role of the dividend growth model in estimating the market risk premium.[95]

204. The Partington and Satchell report considered the appropriateness of:

- the dividend growth model in estimating the market risk premium
- applying an equal weighting to the dividend growth model and historical excess returns.

[93] McKenzie, and Partington, *Report to the AER – Supplementary report on the equity market risk premium*, February 2012, p. 14.

[94] McKenzie and Partington, *Equity market risk premium*, December 2011, p. 25.

[95] Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017.

205. The Partington and Satchell report raised a range of concerns with the dividend growth model, including:

- That the dividend growth model is sensitive to its assumptions.
- That forecasts of future earnings and dividends are fairly inaccurate over more than two years.
- That the dividend growth model is subject to upward bias from the smoothed or sticky nature of dividends.[96]
- That biases in analysts' forecasts can lead to biased dividend growth model forecast of the market risk premium.

206. In summary, Partington and Satchell found that:

> Due to the foregoing considerations and other weaknesses of the DGM, on which we have previously commented extensively, see for example Partington and Satchell (2016 pages 25 to 29), we think it very unlikely that the DGM will produce a forward looking MRP commensurate with the prevailing conditions in the market for funds.[97]

207. Given the concerns with the dividend growth model, Partington and Satchell considered that it was not appropriate to apply equal weights to the historic market risk and the dividend growth model.[98]

208. The ERA considered that the dividend growth model also has the following weaknesses:

- There is no clear agreement among experts as to the best form for the dividend growth model, or its input assumptions.
- Forecasts of earnings and dividends are inaccurate and are likely to be upwardly biased.
- The dividend growth model is likely to be upwardly biased due to current low interest rates. Experts have advised that with low interest rates, as currently experienced, the dividend growth model can produce upwardly biased results due to the sensitivity of the model to interest rates. [99]
- The dividend growth model estimates provide a single discount rate, which equates the present value of the future infinite dividend stream with the observed share price. The estimate therefore looks out beyond the five-year period for which the ERA is seeking to estimate the market risk premium. If a lower nominal Gross Domestic Product estimate is expected than used in the model – say for the two years beyond the three actual dividend growth rate forecasts incorporated in the model – then the estimates of the dividend growth model should be lower than that reported here. The implications would be that the five-year forward looking market risk premium would also be lower.

[96] The sticky nature of dividends can create a disconnect between assumptions where slowly changing dividends may not appropriately correspond with rapidly changing share prices. In addition, dividends are particularly sticky downwards as opposed to upwards, which creates an asymmetry in effects

[97] Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017, p. 25.

[98] Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017, pp. 24, 27.

[99] Lally, *Review of the AER's proposed dividend growth model*, December 2013, pp. 11–12.

209. There are concerns with the reliability of the dividend growth model, its suitability for the regulatory task, and the manner that a regulator takes it into account when exercising discretionary judgement.[100]

210. In the past, the ERA took the mid-point between the historic estimate and the dividend growth model as a starting point for its evaluation of the market risk premium.

211. At any point in time, the ERA's estimation of the market risk premium will need to be informed by a range of relevant material. The relative contributions of different estimation methods for the market risk premium should be conditioned by their quality, including the potential to introduce bias. Averaging over different estimation methods for the market risk premium should be informed by the quality of the estimates used in the averaging and the extent that the estimates are unbiased.

212. On the basis of available information, the ERA reduces the reliance placed on the dividend growth model, relative to the historic market risk premium and relative to its past decisions.

Use of other dividend growth model studies

213. In the DBNGP decision, the ERA determined the upper bound of the market risk premium by reference to recent dividend growth model studies. These studies were from:

- SFG Consulting
- Frontier Economics
- the AER
- the ERA.

214. The DBNGP decision took the highest dividend growth model estimate from the four estimates that the ERA considered.

215. HoustonKemp noted that SFG and Frontier Economics have not updated their dividend growth model studies of the market risk premium and these studies are out of date.

216. Therefore, HoustonKemp proposed to estimate the upper bound of the market risk premium using the ERA estimate and the AER estimate.

217. HoustonKemp proposed that the ERA should include the AER's most recent dividend growth model estimate from its April 2017 final decision for TasNetworks.

218. The following table details the AER and ERA's estimate of the market risk premium using their respective dividend growth models. The AER provided a recent dividend growth model in its March 2018 discussion paper on the market risk premium.

[100] AER, *Final decision: TasNetworks distribution determination 2017-19, Attachment 3 – Rate of return*, April 2017, p. 3-80.

Table 9 Recent estimates of the market risk premium using the dividend growth model

Study	Study release date	Dividend yield source	Gamma	Risk free rate (%)	Implied MRP (%)
AER[101]	March 2018	Bloomberg	0.4	2.88% 10 years Government bond from RBA F2 table 20 days ending Feb 2018	6.72-8.08
ERA	March 2018	Bloomberg	0.4	2.37%	7.64

Consistent underlying assumptions

219. In the DBNGP decision, the ERA used four recent dividend growth model estimates of the market risk premium. These estimates were not adjusted for the different approaches used for the utilisation rate[102] and the risk free rate.

220. Western Power and HoustonKemp proposed that the ERA should use internally consistent assumptions throughout all the third party dividend growth model estimates. This would ensure that estimates are calculated consistent with other elements of the ERA's decision. This adjustment would involve ensuring:

- That all market return on equity estimates use the same value for gamma or theta employed in the ERA's decision
- That the market risk premium be calculated as a margin above the five-year risk free rate, consistent with the ERA's term for the risk free rate to be used in the CAPM.

221. Taking dividend growth model estimates of the market risk premium from different studies at different points in time and with different underlying assumptions may present a problem of consistency.

222. The ERA considered that applying consistent underlying assumptions aligns with economic and finance principles and good empirical analysis. Therefore, external dividend growth model studies should be adjusted to use consistent assumptions.

223. Given the weaknesses of the dividend growth model, the need to ensure consistent assumptions and a lower weight applied to the dividend growth model, the ERA proposed to simplify the calculation of the dividend growth model estimate.

224. The ERA's preferred construction of the dividend growth model is the two-stage dividend growth model set out in the DBNGP decision.[103] The two-stage model assumes that dividends grow at the long-term growth rate following the dividend forecast period.

[101] AER, *Discussion Paper – Market Risk Premium, risk free rate averaging period and automatic application of the rate of return*, March 2018, p. 18.

[102] The utilisation rate or theta is the value to investors of utilising imputation credits per dollar of imputation credits distributed.

[103] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return,* 30 June 2016, p. 115.

225. The ERA's two-stage dividend growth model uses a point estimate of 4.6 per cent for the long-term growth rate of nominal dividends per share (DPS). This rate is informed by the analysis of Lally.[104]

226. The AER uses Lally's estimated rate of 4.6 per cent in its model and also applies an upper (5.1 per cent) and lower (3.86 per cent) sensitivity. The AER has considered the 4.6 per cent a reasonable estimate:

> We consider our estimated long term growth rate of the nominal DPS of 4.6 per cent to be reasonable, if not 'somewhat on the generous side'.[105]

227. The ERA considered the use of a point estimate of 4.6 per cent was a reasonable assumption.

228. Partington analysed available growth estimates and found that the rate of 4.6 per cent was high compared to that of taking the average across these estimates.[106] Accordingly, the ERA believes the AER's upper estimate of 5.1 per cent is inappropriate for use as a point estimate for the calculation of its dividend growth model. Therefore, a growth rate of 4.6 per cent is considered to be a more reasonable assumption.

229. The two-stage dividend growth model provides for a simple and reasonable approach:

- The three-stage model is an added complication that does not add much value. In addition, as detailed by Partington, there is significant uncertainty about the optimal construction of the three-stage model and its transition pattern for dividends.[107]
- With a growth rate of 4.6 per cent, the two-stage dividend growth model produces slightly higher results than the three-stage model.[108]
- The extent to which any weight should be applied to the dividend growth model further decreases the small difference between the two-stage and three-stage models.

230. Furthermore, using the same underlying assumptions, the ERA's and AER's two-stage dividend growth model will produce the same results.

231. On this basis, to the extent to which any weight should be applied to the dividend growth model, the ERA will use the two-stage dividend growth model, which produces an estimate of 7.6 per cent.

8.3.2.3 Range for the market risk premium

232. The ERA considered that the historic market risk premium estimate of 5.6 per cent should set the lower bound of a range for the market risk premium.

233. The dividend growth model market risk premium of 7.6 per cent should set the upper bound of a range for the market risk premium.

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[104] Lally, *Review of the AER's proposed dividend growth model*, December 2013, p. 14.

[105] AER, *AusNet Services determination 2016-20, Attachment 3 – Rate of return,* October 2015, p. 3-328.

[106] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 26, 53.

[107] Partington, *Report to the AER: Return on equity (Updated)*, April 2015, pp. 26, 52.

[108] AER, *Final decision: TasNetworks distribution determination 2017-19, Attachment 3 – Rate of return*, April 2017, p. 3-222.

8.3.2.4 Other indicators

234. The ERA's previous approach determined a range for the market risk premium, with a lower and an upper bound.

235. To inform its determination of a point estimate for the market risk premium, the ERA used four conditioning variables or forward looking indicators and regulatory discretion.

236. Conditioning variables are readily available market data which allow the ERA to take into account current market conditions. Conditioning variables should be considered symmetrically through time to avoid bias.

237. These four conditioning variables were:

- The default spread, which is the difference between the five-year yield from the AA Australian Corporate Bloomberg Fair Value Curve and the yield on a five-year Commonwealth Government bond.
- The five-year interest rate swap spread, which is the difference between the five-year interest rate swap rate and the yield on a five-year Commonwealth Government bond.
- Dividend yields on the Australian Securities Exchange (ASX) All Ordinaries Analyst Consensus Dividend Yield.
- A stock market volatility index.

238. HoustonKemp supported the use of:

- dividend yields
- default spread
- interest rate swap spreads.

239. For the different conditioning variables HoustonKemp used data up to various times around the first half of 2017. HoustonKemp argued that no adjustment from the mid-point of the range is needed as the most recent observations of these indicators are close to their historic means.

240. HoustonKemp considered that the evidence for a positive relation between the market risk premium and implied volatility through time is weak and little weight should be placed on this indicator.

241. Western Power also proposed that the ERA use additional indicators in its deliberations when coming to a point estimate of the market risk premium. Specifically, HoustonKemp suggested that other indicators can be useful in tracking variation in the market risk premium and that the ERA should adopt three further forward-looking indicators, which show that the market risk premium currently lies above its average level. These new indicators are:

- the prevailing bill rate
- the Wright market risk premium estimate
- independent expert reports.

Default spread

242. The default spread is the difference between the five-year yield from the AA Australian Corporate Bloomberg Fair Value Curve and the yield on a five-year Commonwealth Government bond.

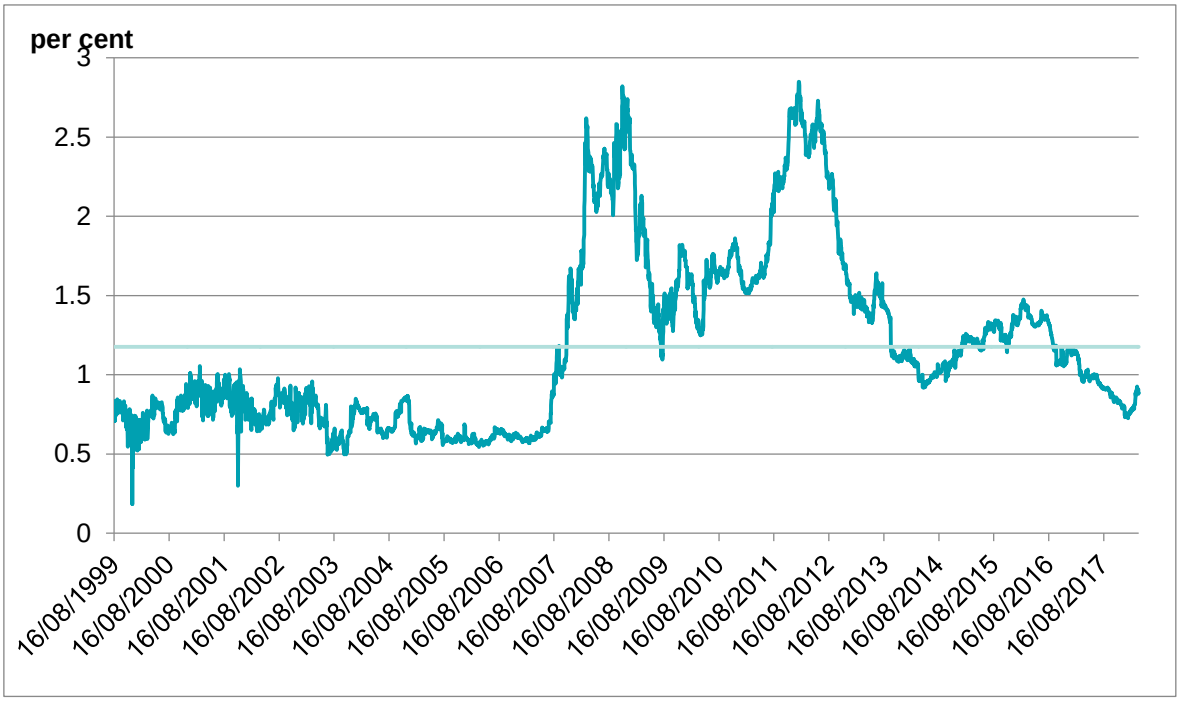
243. The default spread will tend to be high during poor economic times. Fama argues that:

> persistent poor times may signal low wealth and higher risks in security returns, both of which can increase expected returns.[109]

244. Therefore, it can be argued that there is a positive relationship between default spreads and the market risk premium.

245. Figure 1 details the default spread over the period of 1999 to 2018.

Figure 1. AA bond five year default spread from 1999 to 2018



Source: ERA analysis, Bloomberg Data

246. The default spread at end of March 2018 was 0.9 per cent, while the sample mean and standard deviation of the spread from 1999 to 2008 were 1.2 and 0.56 per cent.

247. The current default risk is below its series average, while within a standard deviation from the mean. This indicated that the level of credit risk in the broader corporate sector has remained at a low level, which supports a relatively low expected market risk premium.

248. The ERA considered that the default spread therefore supported a market risk premium estimate around the lower end of its range.

[109] Fama, *Efficient Capital Markets: II, Journal of Finance, Vol 46,* 1991, p. 1585.

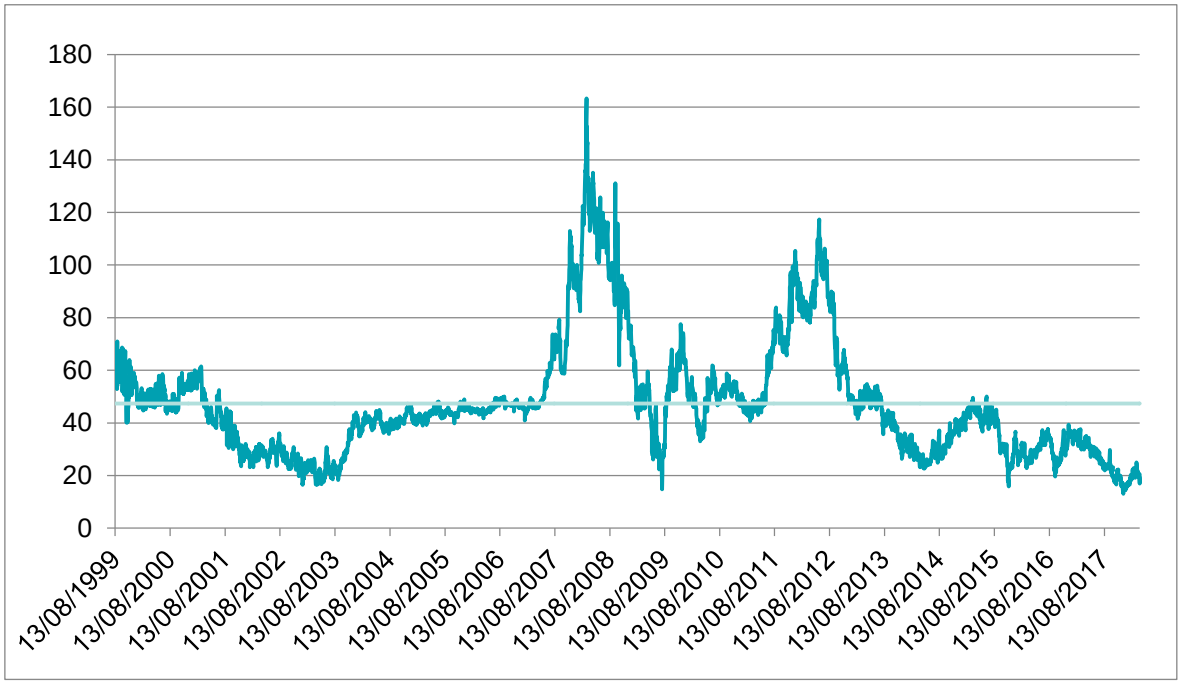
Swap spread

249. The five-year interest rate swap spread is the difference between the five-year interest rate swap rate and the yield on a five-year Commonwealth Government bond.

250. Similar to the default spread there is a positive relationship between the swap spread and the market risk premium.

251. Figure 2 details the swap spread over the period of 1999 to 2018.

Figure 2. Five year interest rate swap spread to Commonwealth Government bond (basis points) from 1999 to 2018



Source: ERA analysis, Bloomberg Data

252. The swap spread at end of March 2018 was 20 basis points, while the sample mean and standard deviation of the spread from 1999 to 2018 were 47 and 22 basis points.

253. The swap spread is currently at its lowest level since 1999, which indicated that the level of risk in the financial sector is fairly low. This supported a relatively low expected market risk premium.

254. The ERA considered that the swap spread therefore supported a market risk premium estimate around the lower end of its range.

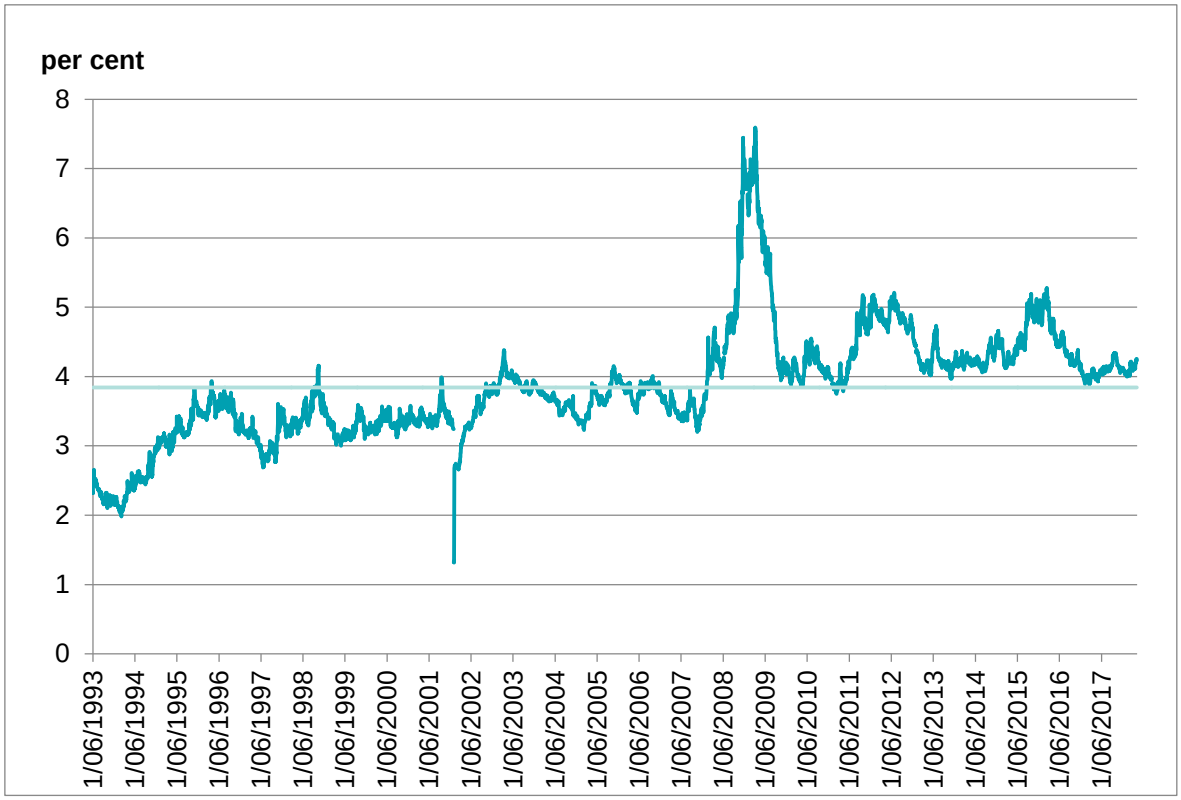
Dividend yield

255. The dividend yield is the ASX All Ordinaries Analyst Consensus Dividend Yield. The dividend yield is the ratio of the dividends paid to the stock or portfolio's price.

256. From a dividend growth model perspective, the dividend yield has a positive relationship with the market risk premium.

257. Figure 3 details the dividend yield over the period of 1993 to 2018.

Figure 3. All Ordinary Index annual dividend yield from 1993 to 2018



Source: ERA analysis, Bloomberg Data

258. The dividend yield at end of March 2018 was 4.25 per cent, while the sample mean and standard deviation of the spreads from 1993 to 2018 were 3.84 and 0.78 per cent.

259. The dividend yield is above its series average, while within a standard deviation from the mean.

260. The dividend yield was trending down from historically high levels during 2008/09. The market price appreciation since 2015/16 drove down the dividend yield further towards the long run average. The price appreciation tends to indicate a more positive outlook in the market, which in turn is more likely to be associated with a reduced market risk premium.

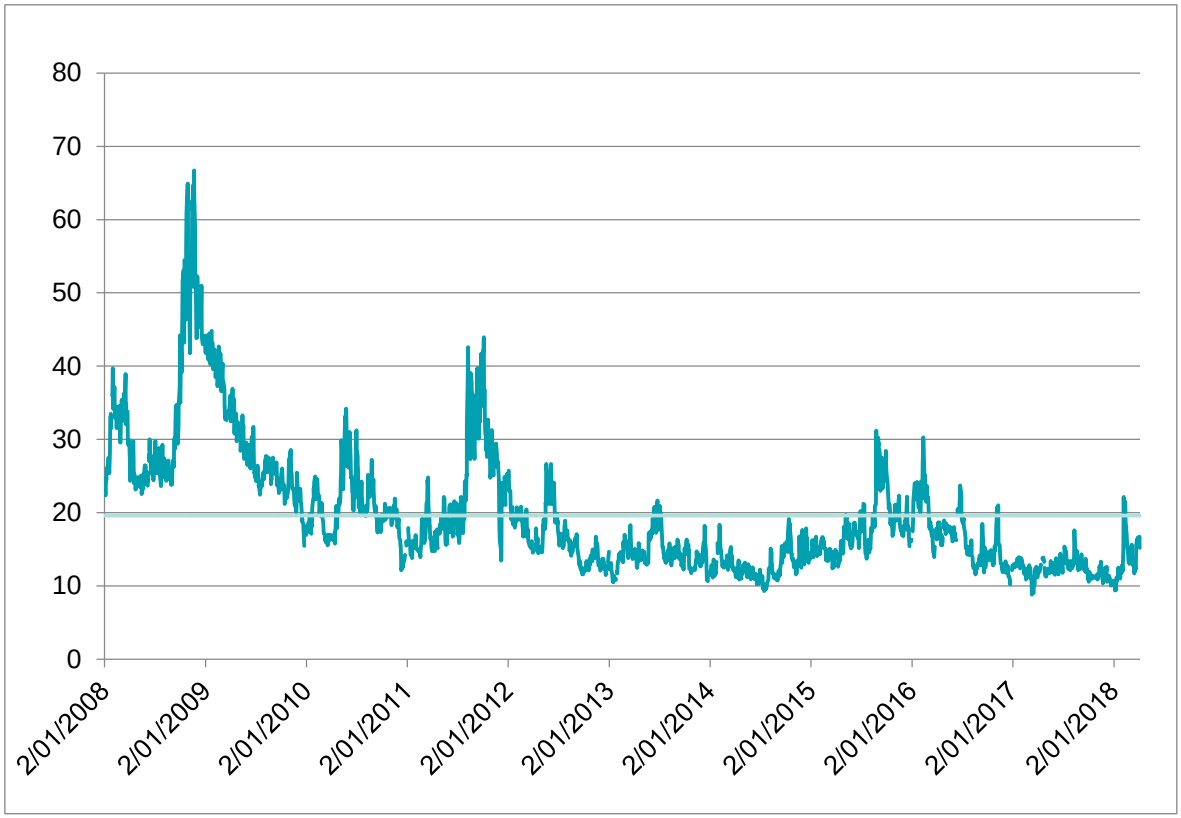
261. The ERA considered that dividend yields therefore supported a market risk premium estimate around an average value.

Implied volatility

262. The implied volatility is the ASX 200 volatility index (VIX).

263. The CAPM embodies a positive relationship that exists between the market risk premium and volatility of returns to the market portfolio.

Figure 4. Implied volatility (ASX200 VIX) from 2008 to 2018



Source: ERA analysis, Bloomberg Data

264. Implied volatility at the end of March 2018 was 16.6 per cent, while the sample mean and standard deviation of the spreads from 2008 to 2018 were 19.6 and 8.5 per cent.

265. Implied volatility is below its series average, while within a standard deviation from the mean.

266. Implied volatility was high during the global financial crisis and the European debt crisis. Recent implied volatility has been below the long run average.

267. HoustonKemp references two reports:

- Guo and Whitelaw, that find a positive but insignificant relation between the market risk premium and implied volatility[110]
- Banerjee, Doran and Peterson, that find there may be some link between the market risk premium and implied volatility.[111]

268. While recognising that there may be some link between the market risk premium and implied volatility, HoustonKemp suggested that it is unclear whether implied volatility provides information not already contained in the dividend growth model estimates of the market risk premium. Therefore, HoustonKemp argued that little weight should be placed on the indicator.

[110] Guo and Whitelaw, "Uncovering the risk-return relation in the stock market", *Journal of Finance*, 2006, p. 1448.

[111] Doran, Banerjee and Peterson, "Implied volatility and future portfolio returns", *Journal of Banking and Finance,* 2007, pp. 3183–3199.

269. On the basis that some relationship exists between the market risk premium and implied volatility, the ERA will continue to use implied volatility as a conditioning variable for the purposes of estimating the market risk premium.

270. Based on the information above, the ERA considered that implied volatility supports a market risk premium estimate below an average value.

Prevailing bill rate

271. HoustonKemp proposed to also include the prevailing bill rate. HoustonKemp argued that there is evidence of a negative relationship between the prevailing bill rate and the market risk premium. HoustonKemp stated that as current bill rates are below the historic mean this suggests that the market risk premium lies above its average.

272. In reviewing the use of the bill rate, the ERA considered there were two possible explanations of current levels: (i) the current level of bills is unusually low from an historical perspective; or (ii) that its history may not be the best comparator.

273. The AER has previously received advice from McKenzie and Partington on whether interest rates are abnormally low.[112]

274. The ERA agreed with McKenzie and Partington that classifying current interest rates as being abnormally low is a relative statement. McKenzie and Partington considered that a commonly used method is to assess the current interest rate against a long history of data. McKenzie and Partington concluded that the period of high interest rates in the 1970s, 1980s and 1990s is the best candidate for being abnormal, rather than the current low rates.

275. McKenzie and Partington argued that evidence suggests that bond yields were stable (and possibly even falling) in the long run for the United States, United Kingdom and Australian markets. They considered that the high interest rates observed during the 1970s, 1980s and 1990s were not representative of the longer time series.

276. The ERA considered that it is unclear whether the long-term average bill rate is a relevant comparator to the prevailing bill rates. As a consequence, the ERA does not agree that the market risk premium should be adjusted on the basis of the prevailing bill rate.

277. The ERA did not include the additional prevailing bill rate when determining its point estimate of the market risk premium.

[112] McKenzie and Partington, *Review of the AER's overall approach to the Risk free rate and Market Risk Premium,* February 2013, p. 8.

Wright market risk premium

278. HoustonKemp also proposed to include an assessment of the Wright estimate of the market risk premium in deliberations of the point estimate for the market risk premium.

279. The Wright approach is an alternative specification of the Sharpe-Lintner CAPM. In the Wright approach, the market risk premium is not an independent parameter, but 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.

280. HoustonKemp calculated the Wright estimate of the market risk premium at 8.85 per cent. They suggested that the midpoint of the market risk premium range is a conservative estimate of the prevailing market risk premium.

281. There have been diverging views in the past on the role of the Wright approach.

282. In considering the Wright approach for its 2013 Gas Rate of Return Guidelines, the ERA conducted statistical analysis of the long run average market return on equity, the yield on bonds and the market risk premium to confirm the appropriateness of the Wright approach.[113] The ERA analysis used the Dickey Fuller statistical test to test for a random walk 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 probably being non-stationary (a random walk).
- Provided empirical support for the Wright approach in establishing an upper bound of a market risk premium range.

283. This analysis informed the ERA's position on the Wright approach for subsequent decisions.

284. The ERA has considered a Partington and Satchell review of the ERA's statistical analysis.[114] Partington and Satchell's analysis found the following:

- There is concern with solely testing for a random walk to establish non-stationarity. 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.
- There is concern with the finding that yields on bills and bonds are non-stationary. The non-stationary result 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.

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

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

- The analysis may have been better done on levels of prices rather than on returns on shares. Partington and Satchell note that, except in very unusual circumstances, returns are stationary. Share prices better 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, the resulting error term being stationary).
- The 2013 ERA statistical analysis[115] does not support the Wright approach.

285. Partington and Satchell advised the AER they were unconvinced by the Wright approach for estimating the market risk premium and recommended 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". [116]

286. Most recently, Partington and Satchell have expressed concern regarding the use of the Wright model in the estimation of the market risk premium.

> We feel that the Wright approach has no support based on any clear evidence in the Australian context.[117]

287. Furthermore, the AER stated that it does "not agree with the underlying premise of the Wright CAPM that there is a clear inverse relationship between movements in the risk free rate and market risk premium. Consequently, we place limited reliance on the Wright approach."[118]

288. Based on the above information, the ERA considered that there are theoretical and empirical concerns with the Wright approach.

289. For the purposes of the draft decision, the ERA did not include the additional Wright estimate when determining its point estimate of the market risk premium.

Independent expert reports

290. HoustonKemp proposed to also include an assessment of independent expert reports of the market risk premium in deliberations of the point estimate for the market risk premium.

291. HoustonKemp suggested that reports in 2016 indicated that experts were using market risk premiums of between 7.8 per cent and 9.6 per cent. Some of these reports were published in early 2016 and may not reflect current market information.

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

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

[117] Partington and Satchell, *Report to the AER: Discussion of estimates of the return on equity*, April 2017, p. 28.

[118] AER, *Final decision: TasNetworks distribution determination 2017-19, Attachment 3 – Rate of return*, April 2017, pp. 3-98, 3-211.

292. However, these incorporate 'uplifted' parameters. In this context, HoustonKemp stated:

> that independent experts have in the recent past viewed uplifts to the MRP and the risk-free rate as alternative ways of raising the cost of capital for a firm to reflect the heightened risk that they see in the current environment.[119]

293. In contrast, Partington and Satchell advised the AER that there is evidence that valuation practitioners are using a market risk premium lower than the 6 per cent favoured in Australia, and there is no evidence that the market risk premium being used is going up.[120]

294. The ERA reviewed estimates produced by independent expert reports as part of its DBNGP decision. It found that overall equity market returns used by the independent experts reviewed were in a higher range. The higher range accounted for:

- Estimates from other return on equity models, such as the dividend growth model.
- A view that equity investors have re-priced risk since the global financial crisis (lifting the market risk premium above 6 per cent).
- A view that bond rates are at unsustainably low levels (leading to 'uplift' to account for a return to more normal levels in the future).[121]

295. The ERA considered that the reports presented by HoustonKemp provided limited value as a means for estimating the market risk premium. Independent expert reports tend to have different objectives to the Access Code, making them unsuitable for the ERA's regulatory purpose. For example, expert reports seek to estimate a rate of return to perpetuity to allow the calculation of equity values. It is for this reason that uplifts are often applied to the market risk premium and to the risk free rate, to 'normalise' the rate of return consistent with longer run expectations. This is not consistent with the ERA's adoption of a five year term for its estimates.

296. Therefore, for the purposes of the draft decision, the ERA placed limited weight on independent expert reports to determine its point estimate of the market risk premium.

Application of a systematic approach

297. HoustonKemp proposed the introduction of an approach that systematically examines forward indicators to set the point estimate. For example, such a systematic approach could involve assigning a weight to each of the factors considered and then mechanically calculating a forecast market risk premium. This would also remove regulatory discretion.

298. HoustonKemp, however, did not detail such an approach for examining multiple indicators to predict the market risk premium. HoustonKemp did note that this would require substantial change to the ERA's method.

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[119] Houston Kemp Economists, *A Constructive Review of the ERA's Approach to the MRP – A report for Western Power,* June 2017, p. 30.

[120] AER, *Final decision: TasNetworks distribution determination 2017-19, Attachment 3 – Rate of return*, April 2017, p. 3-86.

[121] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 WACC*, 30 June 2016, p. 132.

299. HoustonKemp recognised the formulation and application of a systematic approach has not yet matured and its ability to estimate the market risk premium over time has not been proven.

300. The ERA is aware of the limitations of conditioning variables. However, they warrant some consideration as additional evidence which can help detect changing market conditions. The ERA uses conditioning variables in a directional role and does not use them to directly estimate the market risk premium.

301. The AER uses conditioning variables in a similar manner to estimate the market risk premium.[122]

302. The ERA considered that changing market conditions require a level of regulatory discretion when determining a forward-looking estimate of the market risk premium. Therefore, the ERA did not support the development of an approach that more rigidly examines forward looking indicators to predict the market risk premium.

8.3.2.5 Determining a point estimate

303. HoustonKemp estimated a range for the five-year forward looking market risk premium of 6.8 to 8.2 per cent, with a midpoint of 7.5 per cent.

304. To determine a point estimate of the market risk premium, HoustonKemp detailed a list of conditioning variables that the ERA should consider. HoustonKemp argued that its proposed indicators suggest that the market risk premium currently lies above its average level.

305. However, Western Power and HoustonKemp have not determined a point estimate for the market risk premium different from the midpoint of 7.5 per cent.

306. In the past, the ERA has determined a point estimate for the market risk premium through taking the mid-point between the historic estimates and the dividend growth model estimates.

307. Given this information, the ERA decided in the draft decision to place more reliance on the historic market risk premium to calculate the market risk premium, relative to the dividend growth model and past decisions. The historic market risk premium is a simple and well-accepted method for calculating the market risk premium using historical data. Historical averages of the market risk premium are widely used by financial practitioners and regulators in Australia. The ERA considered historical averages provide the best source of evidence available to estimate the market risk premium.

308. The ERA placed less reliance on the dividend growth model than it has in the past. While the dividend growth model has the benefit of taking the current economic outlook into account, it is unreliable on its own. As discussed above, the dividend growth model suffers from weaknesses including the form of the model, its input assumptions, its sensitivity to assumptions and its upward bias. The dividend growth model is likely to show an upward bias in the current market conditions.

309. The ERA determines a final point estimate of the market risk premium by using regulatory judgement considering the relative merits of all the relevant materials.

[122] AER, *Final decision: TasNetworks distribution determination 2017-19, Attachment 3 – Rate of return*, April 2017, p. 3-91.

310. The ERA considered that the market risk premium estimate should be informed by a range of relevant material. In particular:

- The ERA established a market risk premium range informed by the historic market risk premium and the dividend growth model. This produces a market risk premium range of 5.6 per cent to 7.6 per cent.
- The ERA placed less weight on the dividend growth model.
- The ERA's review of conditioning variables supported a market risk premium around the lower end of its range.

311. On this basis the ERA determined a market risk premium of 6.2 per cent in its draft decision.

312. The ERA's estimate of the market risk premium differed from Western Power's proposed market risk premium of 7.5 per cent as it: updates for current market information; maintains the ERA's approach to calculating the historic market risk premium; simplifies the dividend growth model estimate; places less weight on the dividend growth model; and finds that conditioning variables support a market risk premium estimate at the lower end of the range of estimates. The combination of these factors lead to a lower market risk premium estimate than that proposed by Western Power.

8.3.2.6 Further issues raised on Western Power's initial proposal - Market risk premium and compensation of market risk.

313. In response to Western Power's initial proposal, Emergent Energy and NewGen Power Kwinana considered that if Western Power was allowed full cost recovery and was immune to value destruction (from changing market conditions), then a rate of return commensurate with this risk class of investment should be applied.

314. NewGen Power Kwinana also considered that the WACC reflected a market risk premium to compensate Western Power for market risk that could drive asset write-offs.

315. The market risk premium accounts for broad systematic market risks that cannot be diversified. The market risk premium represents the premium investors expect to receive in return for taking on systematic risk. These systematic market risks may include risks arising from revenue variability and asset write-offs due to demand or technology change.

316. These stakeholders viewed that it would be unreasonable for Western Power's rate of return to include an allowance for these risks if, in fact, Western Power is not subject to them (or is subject to them to a lower degree compared to the market).

317. The generally lower risks of a regulated entity relative to the market are recognised through an equity beta of less than one. The equity beta is estimated by a sample of network providers with similar risk exposure to Western Power. This means that the rate of return is appropriately adjusted to recognise Western Power's lower risks compared to the broader market.

318. The lower risk of a regulatory regime compared to market risk is distinct from Western Power being government-owned, which is discussed below.

8.3.3 Public submissions

319. Western Power did not accept the market risk premium of 6.2 per cent proposed in the ERA's draft decision.[123] Western Power submitted that the rate did not provide it with the opportunity to earn a return on investment corresponding to the commercial risk involved in the provision of network services. [124]

320. Western Power's concerns with the market risk premium included the following:

- The way the point estimate of the market risk premium has been selected from within the range of estimates. Western Power argued it was reasonable to draw more heavily on the forward-looking indicators.
- Concern that the ERA's interpretation of the conditioning variables in the Western Power draft decision was different to its interpretation in the DBNGP final decision. Western Power submitted that the conditioning variables had not changed since the DBNGP final decision and therefore the ERA should determine the market risk premium point estimate from the same percentile of the range.

321. In response to the draft decision, Western Power revised its initial market risk premium of 7.6 per cent. Western Power accepted the ERA's range, but submitted that the market risk premium estimate should be 6.6 per cent, drawn from the mid-point of the ERA's market risk premium range.[125]

322. ATCO provided a submission on the market risk premium. ATCO raised concerns with the reduction in the market risk premium.[126]

323. ATCO's submission can be summarised as follows:[127]

- The ERA presented no new evidence for the down-weighting of the dividend growth model and the Wright estimate.
- ATCO referred to an ERA October 2017 rail decision that was determined by effectively giving 100 per cent weight to the dividend growth model and using the Wright approach.
- ATCO proposed that the ERA:
  - Give equal weight to the dividend growth model and historical evidence when deriving its final point estimate of the market risk premium.
  - Give equal weight to the Ibbotson and Wright estimates when deriving its final point estimate of the historical market risk premium estimate.

[123] Western Power, *Revised AA4 proposal – Response to the ERA's draft decision,* 14 June 2018, pp. 120-125.

[124] Western Power, *Revised AA4 proposal – Response to the ERA's draft decision,* 14 June 2018, p. 121.

[125] Western Power, *Revised AA4 proposal – Response to the ERA's draft decision,* 14 June 2018, p. 120.

[126] ATCO, *Re: Draft decision – Proposed revisions to Western Power's Fourth Access Arrangement (AA4)*, June 2018, p. 1.

[127] ATCO, *Re: Draft decision – Proposed revisions to Western Power's Fourth Access Arrangement (AA4)*, June 2018.

324. The WAMEU provided a submission on the market risk premium that used the Major Energy Users' submission to the AER and work carried out by the CRG. The WAMEU submitted that the market risk premium should be closer to 4.0 per cent (based on the geometric mean for the period 1984-2017).[128]

325. The WAMEU submission can be summarised as follows:[129]

- The WAMEU considered that the market risk premium effectively double counted risks. The WAMEU argued that the market risk premium reflected the full value of the rewards generated by the firms listed on the ASX, while the regulatory framework reduced the risks of regulated energy networks.
- The WAMEU considered that many of the firms on the ASX secure debt and equity from overseas. The submission argued that the benefit of these of overseas sources of funds was embedded in the ASX market risk premium, however, the ERA assumed Western Power would access all of its debt and equity from Australian sources. The WAMEU argued that this increased the double counting effect.
- The WAMEU supported the use of the geometric mean as a better averaging tool where there was significant volatility in the data points being measured. The WAMEU's proposed market risk premium value was solely determined by the geometric mean.
- The WAMEU's proposed market risk premium value was solely determined by the period 1984-2017. The WAMEU considered that the start of this period reflected when most of the changes to open the Australian economy were implemented.
- The WAMEU argued that there had been a structural change in the usage pattern of electricity, and this would affect the earnings growth factors for energy networks. Therefore, this implied that the use of the dividend growth model to assess the market risk premium for networks was probably flawed.

326. Following the publication of the draft decision, the ERA issued a notice on 17 August 2018 on new rate of return information that may affect Western Power's rate of return. This information included new information that may indicate a lower market risk premium. The ERA decided that it was appropriate to take this new information into account and offer interested parties the opportunity to make further comment.[130]

327. This new information included the AER's Draft Rate of Return Guidelines. These guidelines further considered available information regarding the market risk premium including expert views, public submissions and current data. Consistent with the easing risk conditions in Australia and with diminished confidence in the robustness of the dividend growth model the AER reduced its estimate of the market risk premium.[131] The ERA considers this information below.

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[128] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp. 34-35.

[129] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp. 34-35.

[130] https://www.erawa.com.au/cproot/19393/2/Notice%20-%20New%20information%20to%20be%20considered%20-%20Draft%20Decision%20on%20Proposed%20Revisions%20to%20the%20Access%20Arrangement%20for%20the%20Western%20Power%20Network.pdf

[131] AER, *Draft Rate of Return Guidelines – Explanatory Statement,* July 2018.

328. Western Power provided a submission on the new rate of return information and expressed concern with the consultation process.[132]

329. Western Power considered that the ERA should not rely on the AER's Draft Rate of Return Guideline until it was finalised:

- Western Power submitted that the AER's Draft Rate of Return Guideline would be subject to extensive public consultation over the coming months and could change considerably prior to its expected publication in late December 2018.
- Western Power considered the Guideline was a forward looking document expected to apply to all regulatory decisions conducted by the AER during the four years from 2019.
- Western Power considered that the ERA was currently looking to set Western Power's rate of return for the AA4 period, which was due to start on 1 July 2017.

330. ATCO provided a submission on the new rate of return information, which detailed the market risk premium. ATCO's submission can be summarised as follows: [133]

- ATCO's submission did not challenge the ERA's reasoning for disregarding the Wright estimate.
- ATCO submitted that the historical market risk premium was best derived from the arithmetic mean. ATCO referred to an evaluation by Lally on whether an arithmetic and geometric mean should be applied to historical data. Lally's report found that the arithmetic mean was consistent with the 'present value principle'.[134]
- ATCO argued that the dividend growth model should be used to derive the forward-looking market risk premium. ATCO submitted that:
  - The dividend growth model has important advantages, including that it is a forward-looking estimate.
  - Placing less reliance on the dividend growth model will no longer provide a reasonable opportunity to recover at least efficient costs (though ATCO does not explain why it is of this view).
  - There is no new evidence to discredit the use of the dividend growth model.
- ATCO considered the market risk premium point estimate was best estimated as the mid-point between the historical market risk premium estimate and the forward-looking market risk premium estimate.

331. The WAMEU provided a submission on this new information and strongly supported the ERA using new information that may affect Western Power's rate of return. The WAMEU argued that this is aligned with its submission to the draft decision, and many of the issues raised in this submission regarding WACC.[135]

[132] Western Power, *Public consultation – New rate of return information to be considered,* August 2018.

[133] ATCO, *Re: New Rate of Return Information – Western Power Network Access Arrangement – 2017/18 to 2021/22.*

[134] Lally, *Review of the AER's Methodology for the Risk Free Rate and the Market Risk Premium*, March 2013, p. 40.

[135] EnergyXL, *Submission from WAMEU re New Rate of Return Information*.

8.3.4 Final decision

332. Given these public submissions and available information, the ERA has given the market risk premium further consideration.

Historic market risk premium estimate

333. Submissions expressed diverse views on the use of arithmetic and geometric means to calculate the historic market risk premium. The WAMEU submitted that the ERA has not placed adequate reliance on the geometric mean and that it alone should be used. ATCO argued for sole reliance on the arithmetic average.

334. The ERA recognises that there are mixed views as to the best averaging technique to apply in estimating the historic market risk premium.

335. The ERA notes the Lally report on the arithmetic mean being consistent with the 'present value principle'. [136] Lally finds that an arithmetic mean is applied to a discounting model.

336. However, the matter of concern here is how best to estimate a market risk premium. An often-overlooked presumption is that the forecaster knows the true values of the parameters. In practice, of course, these are estimated, and even using the best estimation techniques, the estimators are subject to sampling error. It is this variability of returns, or sampling error, that causes a level of bias in both arithmetic and geometric means. Therefore, in determining a forward estimate of the market risk premium one has to recognise these biases.

337. In addition to the considerations detailed in the draft decision, the ERA notes the report prepared for the AER by McKenzie and Partington. McKenzie and Partington argued that the market risk premium was measured with a standard error and that there was a finite sample of returns for the stock market and the stocks.[137] On the ground of a study by Blume,[138] McKenzie and Partington considered that:[139]

- First, when compounding the arithmetic mean over time, it is the sampling error in the measurement of the arithmetic mean return that causes the upward bias in the expected return.
- Second, with a finite sample of returns, there is an upward bias when the arithmetic average is compounded over more than one period.

338. McKenzie and Partington also used findings from various academic studies to support their view that the unbiased estimator of the market risk premium lay between the arithmetic average and the geometric average. For example, Indro and Lee (1997) concluded that arithmetic returns were upward biased and geometric

[136] Lally, *Review of the AER's Methodology for the Risk Free Rate and the Market Risk Premium*, March 2013, p. 40.

[137] McKenzie and Partington, *Supplementary report on the equity market risk premium, a report to the AER on behalf of the Securities Industry Research Centre of Asia-Pacific (SIRCA) Limited*, February 2012, p. 6.

[138] Blume, "Unbiased Estimators of Long-Run Expected Rates of Return", *Journal of the American Statistical Association*, vol. 69, 1974, pp. 634-638.

[139] McKenzie and Partington, *Supplementary report on the equity market risk premium, a report to the AER on behalf of the Securities Industry Research Centre of Asia-Pacific (SIRCA) Limited*, February 2012, pp. 5 - 6.

returns were downward biased.[140] The same conclusion was also reached by Jacquier, Kane and Marcus who noted that academics favoured the arithmetic return while practitioners favoured the geometric return.[141]

339. McKenzie and Partington considered that the strength of the estimator of the historic market risk premium should also be taken into consideration, together with its unbiasedness as previously discussed.[142] Strong estimators have lower standard errors and as such they were more precise. McKenzie and Partington noted findings from Jacquier, Kane and Marcus that compounding using the estimated arithmetic average return gave results that were not only upward biased, but also highly inefficient. [143]

340. McKenzie and Partington concluded that:[144]

> In our opinion there is no indisputable single best estimator for long run returns. The widespread current practice is to use unadjusted geometric and arithmetic averages. Given the current state of knowledge, we see no strong case to depart from this common practice and recommend that the use of both of these metrics, tempered by an understanding of their inherent biases.

341. The ERA considers that an unbiased estimate of the historical market risk premium is likely to be somewhere between the geometric average and the arithmetic average.

342. In its final decision, the ERA has sought to minimise any error with over-reliance on one type of average and continues to support the use of both the arithmetic and geometric averages. This approach recognises:

- That when compounding the arithmetic averages over time, sampling error can cause an upward bias.
- That geometric average can understate returns as it is based on a constant compounding, which does not account for actual variability of returns over time.
- That given the volatility of returns over time, an investor may consider different investment horizons.
- An unbiased estimate of the historical market risk premium is likely to be somewhere between the geometric average and the arithmetic average.

343. The respective advantages of the two types of averaging methods has also been considered at length in previous AER decisions.[145] Based on this information, the AER has reaffirmed that using both averages is the best use of all information available. This was confirmed in its Draft Rate of Return Guidelines.[146]

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[140] Indro and Lee "*Biases in arithmetic and geometric averages as estimates of long-run expected returns and risk premia", Financial Management*, vol 26, 1997, pp. 81–90.

[141] Jacquier, Kane and Marcus, *"Geometric or Arithmetic Mean: A Reconsideration", Financial Analysts Journal,* vol 59, 2003, pp. 46-53.

[142] McKenzie and Partington, *Supplementary report on the equity market risk premium, a report to the AER on behalf of the Securities Industry Research Centre of Asia-Pacific (SIRCA) Limited*, February 2012.

[143] Jacquier, Kane, and Marcus, A, *"Geometric or Arithmetic Mean: A Reconsideration", Financial Analysts Journal*, vol 59, 2003, pp. 46-53.

[144] McKenzie and Partington, *Supplementary report on the equity market risk premium, a report to the AER on behalf of the Securities Industry Research Centre of Asia-Pacific (SIRCA) Limited*, February 2012, pp. 8-9.

[145] Partington and McKenzie, *Return of equity and comment on submissions in relation to JGN*, May 2015, p. 1.

[146] AER, *Draft Rate of Return Guidelines – Explanatory Statement,* July 2018, pp. 211-213.

344. In the final decision, the historical market risk premium estimate has been updated to reflect an increased value of imputation credits (gamma) from 0.4 to 0.5. The value of imputation credits is further discussed in Section 10.3.

345. The ERA has amended the following assumptions for calculating the historical market risk premium estimate to reflect the change in gamma:

- Dividends are 88 per cent franked between 1988 and 1998
- The ATO imputation yields are 60 per cent utilised from 1998 onward.

346. The following table details the ERA's revised estimates of the historic market risk premium.

Table 10 Updated estimates of the historic market risk premium

	Arithmetic			Geometric		
	BHM	NERA	Average	BHM	NERA	Average
1883-2017	6.46%	6.82%	**6.64%**	5.11%	5.46%	**5.29%**
1937-2017	6.28%	6.23%	**6.26%**	4.44%	4.39%	**4.41%**
1958-2017	6.73%	6.73%	**6.73%**	4.40%	4.40%	**4.40%**
1980-2017	6.50%	6.50%	**6.50%**	4.24%	4.24%	**4.24%**
1988-2017	6.08%	6.08%	**6.08%**	4.47%	4.47%	**4.47%**

Source: ERA Analysis

347. These estimates suggest a downward trend in the market risk premium. The AER has also found evidence that suggests a downward trend in realised market risk premium.[147]

348. The ERA takes the average of the lowest arithmetic mean (6.08 per cent) and the highest geometric mean (5.29 per cent) to develop an estimate of the historic market risk premium of 5.7 per cent.

Wright approach

349. As detailed in the draft decision, the ERA considered existing and new evidence to assess the reasonableness of using the Wright approach to estimate the market risk premium.

350. The ERA has also given consideration to expert views, public submissions and considerations that address the Wright approach in the AER's Draft Rate of Return Guidelines.[148]

351. On the basis of all available information, the following information raised concern with the continued use of the Wright approach:

- The Partington and Satchell review of the ERA's past statistical analysis on the stationarity of the return on equity, the market risk premium and the risk free rate found that the analysis did not support the Wright approach.[149]

[147] AER, *Draft rate of return guidelines – explanatory statement,* July 2018, p. 240.

[148] AER, *Draft Rate of Return Guidelines – Explanatory Statement,* July 2018.

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

- Partington and Satchell expressed concern regarding the use of the Wright model in the estimation of the market risk premium.[150]
- There is concern with the "underlying premise of the Wright CAPM that there is a clear inverse relationship between movements in the risk free rate and market risk premium." [151]
- There is lack of support for the use of the Wright approach from the AER's concurrent evidence session.[152]
- There is no estimable inverse relationship between the market risk premium and the risk free rate.[153]
- The AER considers that the model has no theoretical basis in Australia and is not an appropriate tool for regulatory use, nor is it used by market practitioners.[154]

352. Based on this information, the ERA continues to consider that theoretical and empirical concerns exist with the Wright approach. The ERA will continue to apply no weight to the Wright estimate when considering the market risk premium in this final decision.

Dividend growth model approach

353. As detailed in the draft decision, the ERA considered existing and new evidence to assess the reasonableness of using the dividend growth model approach to estimate the market risk premium.

354. The ERA has also given consideration to expert views, public submissions and considerations that address the dividend growth model approach in the AER's Draft Rate of Return Guidelines.[155]

355. On the basis of all available information, there exists concern with the dividend growth model approach:

- The dividend growth model method has the benefit of being forward-looking, and takes the current economic outlook into account through dividend growth expectations, but is unreliable on its own.[156]
- The concerns raised in the Partington and Satchell report on the estimation of the return on equity, which reviewed the role of the dividend growth model in

[150] Partington and Satchell, *Report to the AER: Discussion of estimates of the return on equity*, April 2017, p. 28.

[151] AER, *Final decision: TasNetworks distribution determination 2017-19, Attachment 3 – Rate of return*, April 2017, pp. 3-98, 3-211.

[152] AER, *Second Concurrent Evidence Session*, April 2018, p. 69.

[153] AER, *Draft rate of return guidelines – explanatory statement,* July 2018, p. 204.

[154] AER, *Draft rate of return guidelines – explanatory statement,* July 2018, p. 234.

Partington and Satchell, *Cost of Equity issues 2016 Electricity and Gas Determinations,* April 2016, pp. 30-31.

Partington and Satchell, *Report to the AER*, May 2018, pp. 34-35.

AER, *Draft decision - Multinet Gas access arrangement 2018-22, Attachment 3 - Rate of return*, p. 220.

AER analysis of independent valuation reports for the 2018 rate of return guideline review also indicated no reports appeared to use the Wright CAPM.

[155] AER, *Draft Rate of Return Guidelines – Explanatory Statement,* July 2018.

[156] McKenzie, and Partington, *Report to the AER – Supplementary report on the equity market risk premium*, February 2012, p. 14.

estimating the market risk premium.[157] The Partington and Satchell report on the estimation of the return on equity raised a range of concerns with the dividend growth model. Partington and Satchell viewed it very unlikely that the dividend growth model would produce a forward-looking market risk premium commensurate with the prevailing conditions in the market for funds.[158]

- The AER analysed the historical results from its construction of the dividend growth model and found that there is a large negative correlation between the market risk premium estimates from the dividend growth model and the risk free rate. This means that the dividend growth model implicitly assumes a stable return on equity, which is inconsistent with the view that there is a lack of support for an inverse relationship between the risk free rate and the market risk premium.[159]
- The AER has stated that conceptually, the dividend growth model has some merit as a theoretical model to estimate the market risk premium but issues surrounding inputs, potential biases and sensitivities have limited its use.[160]
- Given the concerns with the dividend growth model, Partington and Satchell considered that it was not appropriate to apply equal weights to the historic market risk and the dividend growth model.[161]
- Furthermore, the AER does not propose to use the dividend growth model to directly inform the market risk premium estimate.[162]

356. Based on available information, the ERA considers that the dividend growth model has the following weaknesses:

- There is no clear agreement among experts as to the best form for the dividend growth model, or its inputs.
- The dividend growth model is sensitive to its assumptions.
- Forecasts of future earnings and dividends are fairly inaccurate over more than two years.
- The dividend growth model is subject to upward bias from the smoothed or sticky nature of dividends.
- Biases in analyst forecasts can lead to biased dividend growth model forecasts of the market risk premium.
- The dividend growth model is likely to be upwardly biased when interest rates are low.
- The dividend growth model estimates provide a single discount rate, which equates the present value of the future infinite dividend stream with the observed share price. Therefore, the estimate looks out beyond the five-year period for which the ERA is seeking to estimate the market risk premium.

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[157] Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017.

[158] Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017, p. 25.

Partington and Satchell, Report to the AER: Allowed rate of return 2018 Guideline review, May 2018, p. 33;

[159] AER, *Draft rate of return guidelines – explanatory statement,* July 2018, p. 221.

[160] AER, *Draft rate of return guidelines – explanatory statement,* July 2018, p. 235.

[161] Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017, p. 27.

[162] AER, *Draft rate of return guidelines – explanatory statement,* July 2018, p. 236.

357. ATCO's submission referred to an ERA rail decision from October 2017 that included a market risk premium determined by effectively giving 100 per cent weight to the dividend growth model. The ERA noted that this rail decision was the application of a past rail method, and not a review of the market risk premium method. The ERA is in the process of reviewing the rate of return method for rail.

358. The ERA recognises that it has had past concerns with the use of the dividend growth model, and notes ATCO's view that some of the ERA's concerns are not new and therefore it should not adjust its view. However, new information, submissions and further advice over the course of the ERA's considerations have better raised these weaknesses of the dividend growth model.

359. As detailed in the draft decision, at any point in time, the ERA's estimation of the market risk premium will need to be informed by a range of relevant material. The relative contributions of different estimation methods for the market risk premium should be conditioned by their quality, including the potential to introduce bias. The averaging over different estimation methods for the market risk premium should be informed by the quality of the estimates used in the averaging and the extent that the estimates are unbiased.

360. Based on this information, the ERA has diminished confidence in the dividend growth model and considers that it is reasonable to place less reliance on the dividend growth model, relative to the historic market premium.

Conditioning variables

361. To determine a point estimate for the market risk premium, the ERA uses conditioning variables and regulatory discretion.

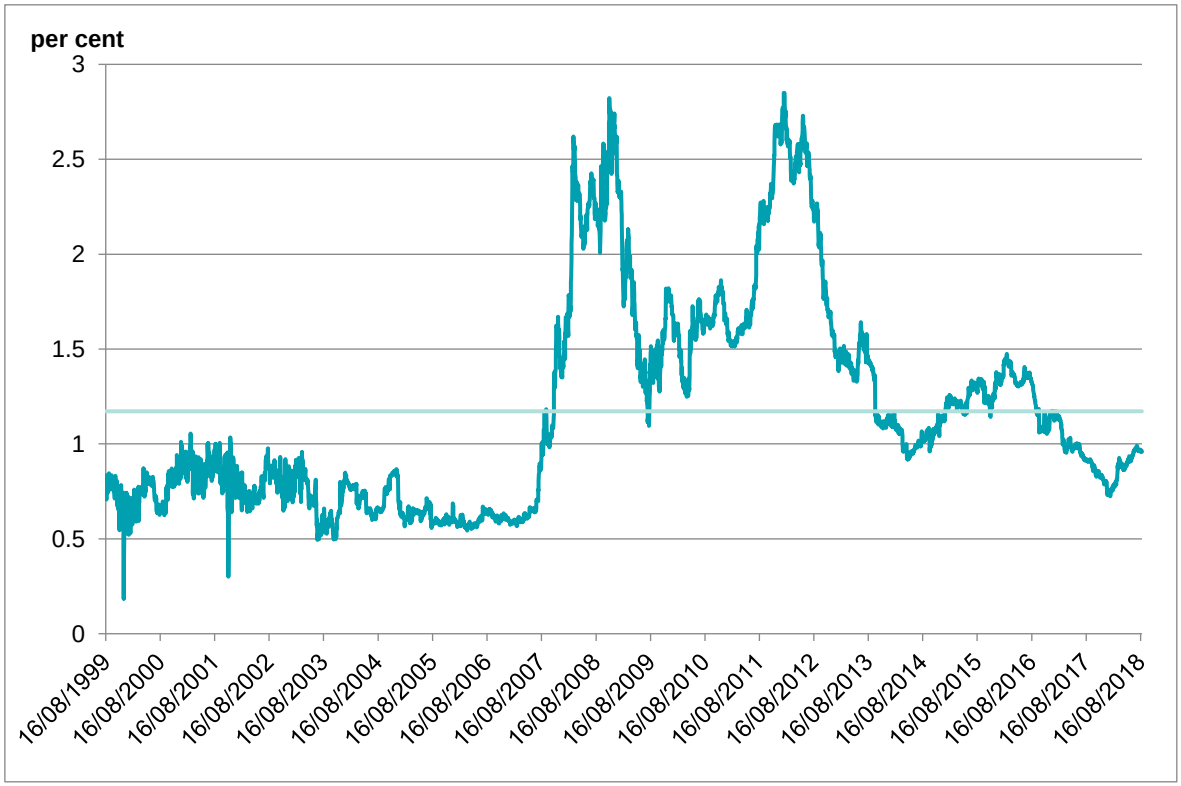
362. The ERA disagrees with Western Power's view that conditioning variables are not significantly different from those at the time of the DBNGP Final Decision in June 2016. The ERA considers that conditioning variables have changed since the DBNGP Final Decision in June 2016.

363. The ERA has used the same conditioning variables over time (the default spread, the interest rate swap spread, dividend yields and a stock market volatility index).

364. The ERA has reviewed conditioning variables based on updated information.

365. Consistent with its draft decision, the ERA review of conditioning variables supports a market risk premium around the lower end of its range.

Figure 5. Updated AA bond five year default spread from August 1999 to August 2018



Source: ERA analysis, Bloomberg Data

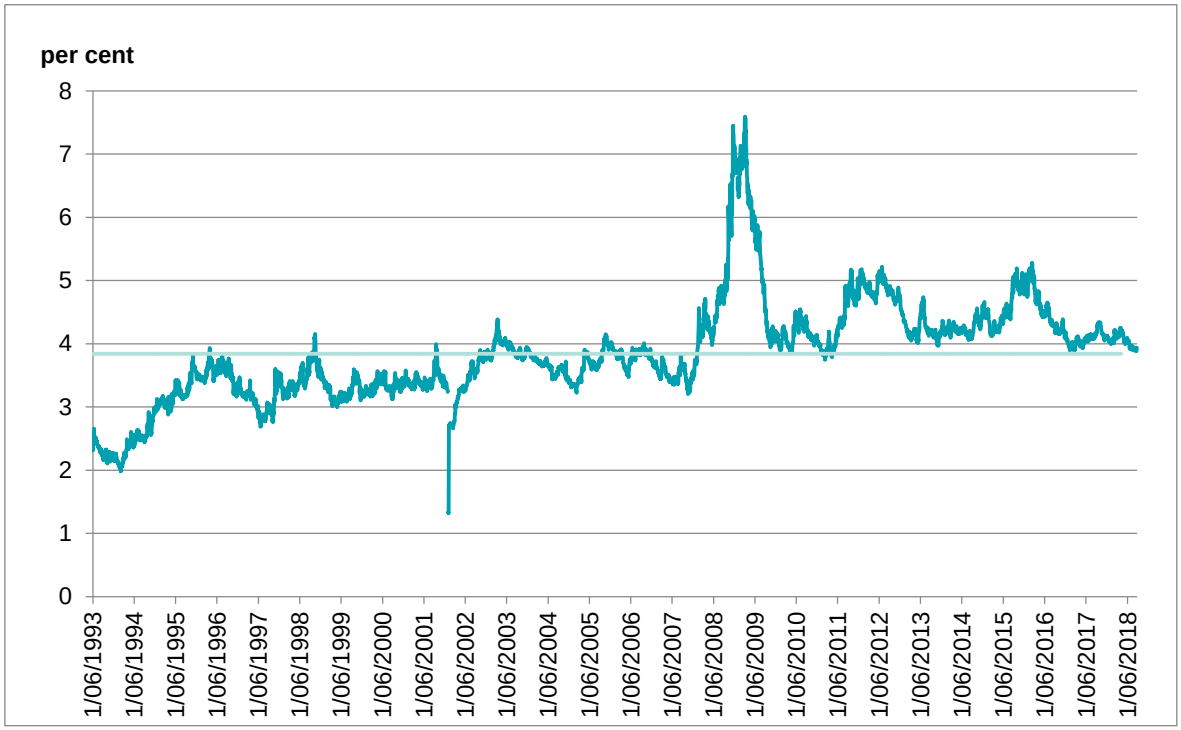
366. The current default risk is below its series average, while within a standard deviation from the mean. The ERA considers that the default spread therefore supports a market risk premium estimate around the lower end of its range.

Figure 6. Updated five year interest rate swap spread to Commonwealth Government bond (basis points) from August 1999 to August 2018

Source: ERA analysis, Bloomberg Data

367. The swap spread is currently around its lowest level since 1999. The ERA considers that the swap spread therefore supports a market risk premium estimate around the lower end of its range.

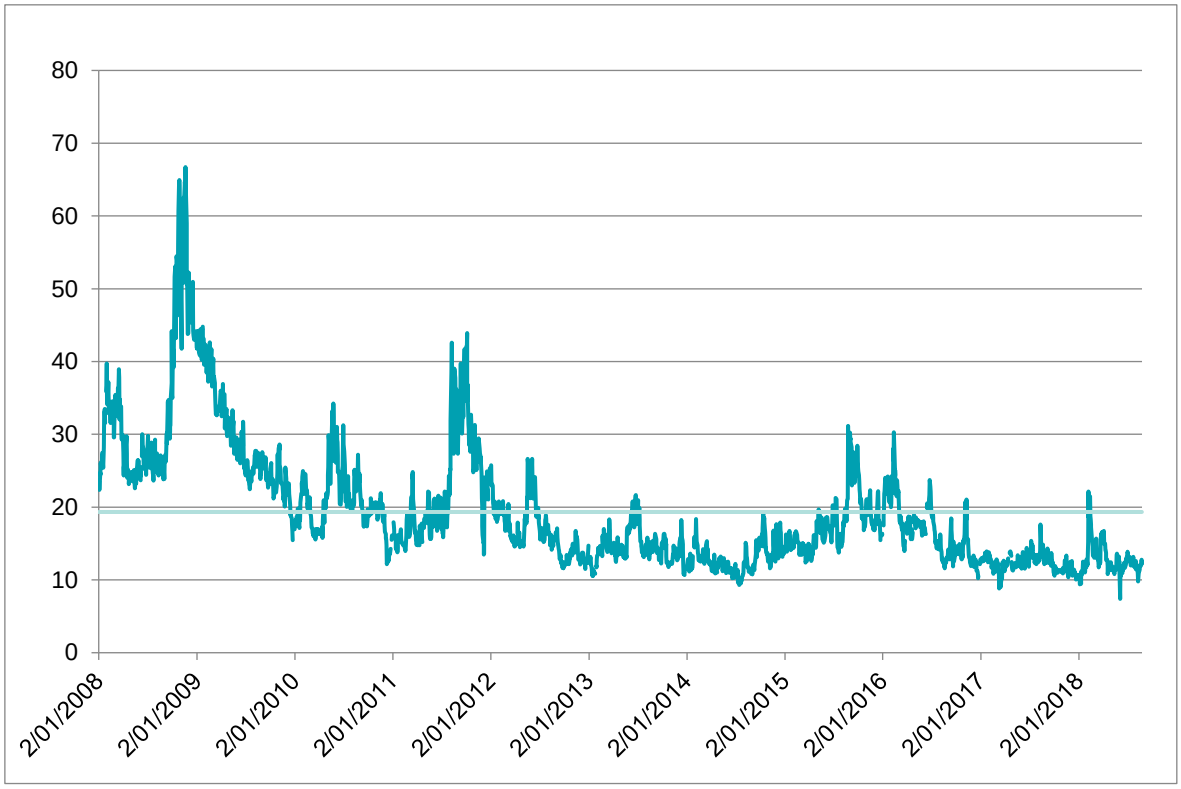
Figure 7. Updated All Ordinary Index annual dividend yield from June 1993 to August 2018



Source: ERA Analysis, Bloomberg Data

368. The dividend yield is close to its series average. The ERA considers that dividend yields therefore support a market risk premium estimate around an average value.

Figure 8. Updated Implied Volatility (ASX200 VIX) from January 2008 to August 2018



Source: ERA analysis, Bloomberg Data

369. Recent implied volatility levels have been below the long-run average. The ERA considers that implied volatility supports a market risk premium estimate below an average value.

370. The ERA determines a final point estimate of the market risk premium by using regulatory judgement and considering the relative merits of all the relevant material. Conditioning variables are only part of the material that the ERA considers when determining a final point estimate.

371. Furthermore, the AER has previously used cross-checks that included the comparison of the debt risk premium and the market risk premium. A February 2016 Australian Competition Tribunal decision suggested that such a comparison between the market risk premium and the debt risk premium was an appropriate and obvious cross-check, which could provide reasonable evidence for the overall return on equity decision. Such consideration did not tend to suggest that the overall return on equity estimate was too low.[163]

372. There has been a material decrease in debt risk premiums in the market since 2013 and this is supportive of choosing a lower market risk premium.[164]

[163] Australian Competition Tribunal, *Applications by PIAC Ltd and AusGrid AComT1*, February 2016, p. 222.

[164] AER, *Draft rate of return guidelines – explanatory statement,* July 2018, p. 296.

Other matters

373. The WAMEU considered that the market risk premium effectively double counted risks. The ERA notes that the CAPM approach takes into account the complete regulatory framework that applies to an energy network and, through the equity beta, its performance relative to the market. The market risk is expressed by the market risk premium. The equity beta is less than one, which reflects the lower relative risk profile of energy networks. Therefore, the ERA considers that there is no double counting of risk.

374. The WAMEU considered that the benefit of overseas sources of funds was embedded in the ASX market risk premium, however, the ERA assumes Western Power will access all of its debt and equity from Australian sources. The ERA recognises the reality of foreign financial sources in the Australian market. It accounts for foreign denominated bonds issued by Australian entities in its bond yield approach. The ERA thus accepts the Australian equity market is partially integrated. Therefore, the ERA views there is no biased approach with the market risk premium.

375. To calculate the historic market premium, the WAMEU proposed the sole use of the geometric mean. The ERA considers that an unbiased estimate of the market risk premium is likely to be somewhere between the geometric average and the arithmetic average of the annual market risk premium.[165] The ERA has sought to minimise any error with over-reliance on one of the two types of average by using the simple average of the lowest arithmetic mean and highest geometric mean. The ERA still considers it appropriate to use both the arithmetic mean and geometric mean to derive the historic market risk premium.

376. In calculating the historic market premium, the WAMEU proposed the sole use of the period 1984-2017. The ERA recognises that there are strengths and weaknesses in taking multiple sampling periods including:

- longer time series contain more observations and produce a lower statistical error
- data quality markedly improved in 1937, 1958 and 1980
- more recent sampling periods reflect the current financial environment
- shorter periods are more affected by the current environment or one-off events.

377. Given that no one data period has been assessed as superior, the ERA will continue to use multiple overlapping time periods.

378. The WAMEU argued that there has been a structural change in the usage pattern of electricity, which in turn has affected future earnings growth. The WAMEU implies that the use of the dividend growth model to assess the market risk premium for networks is probably flawed. The dividend growth model is applied to the entire market when it is used to calculate the market risk premium. Therefore, contention lies in determining the whole of market forecast growth rates, rather than determining the growth for energy networks.

[165] McKenzie and Partington, *Supplementary report on the equity MRP*, February 2012, p. 5.

Point estimate

379. The ERA uses the Ibbotson approach to calculate the historic market premium. This approach is summarised below:

- Arithmetic and geometric averages of the historic market premium observations are calculated using the BHM and NERA datasets.
- Six overlapping time periods (1883-2017, 1937-2017, 1958-2017, 1980-2017, 1988-2017 and 2000-2017) are used for averaging periods, to reflect different economic conditions.
- A simple average of the lowest arithmetic and highest geometric estimates of the produced historic market premium matrix is then used.

380. To the extent that any weight is applied to the dividend growth model, the ERA will use the two-stage dividend growth model to estimate the market risk premium.

381. For the purposes of the final decision, the ERA will use the following approach to estimate the market risk premium.

- The ERA will place more reliance on the historic market premium, relative to the dividend growth model. The historic market premium is a simple and well-accepted method for calculating the market risk premium using historical data. Historical averages of the market premium are widely used by financial practitioners and regulators in Australia. The ERA considers historical averages provide the best source of evidence available to estimate the market risk premium.
- The ERA will place less reliance on the dividend growth model, relative to the historic market premium. While the dividend growth model has the benefit of taking the current economic outlook into account, it is unreliable on its own. The dividend growth model suffers from weaknesses including the form of the model, its input assumptions, its sensitivity to assumptions and its upward bias.
- The ERA will determine a final point estimate of the market risk premium by using its regulatory judgement considering the relative merits of all relevant material, including conditioning variables.

Final decision

382. The ERA has reflected further on the market risk premium and considered all information, including public submissions of the draft decision and current data; and expert views and public submissions from the AER's guideline processes.

383. On the basis of all available information, the ERA considers that a market premium estimate of 6.0 per cent is consistent with the easing of risk conditions in Australia, and with the diminished confidence in the robustness of dividend growth model estimates. This reduces the market risk premium from the draft decision's 6.2 per cent.

384. For the final decision, the ERA has adopted a market risk premium of 6.0 per cent.

9 Cost of debt

385. The cost of debt is the return investors require on issued debt.

386. To estimate the return on debt the ERA will separately estimate:

- the risk free rate (cost of debt)
- the debt risk premium
- debt-raising and hedging costs.

9.1 Risk free rate (cost of debt)

387. The risk free rate represents the return an investor would expect when investing in an asset with no risk.

9.1.1 Western Power's initial proposal

388. Western Power proposed using the five-year bank bill swap rate as a proxy for the risk free rate, when calculating the cost of debt.[166] This was consistent with the ERA's approach in the 2016 DBNGP decision.[167, 168]

389. Using the 20-day averaging period to 30 June 2017 as a placeholder, this approach produced a risk free rate of 2.29 per cent.

9.1.2 Draft decision

390. For the draft decision, the ERA considered that Western Power's proposed method for determining the risk free rate used to calculate the cost of debt was appropriate.

391. The risk free rate represents the return an investor would expect when investing in an asset with no risk. The interbank rate can represent a risk free rate for the purposes of debt financing. Though interbank lending has a cost above that of Commonwealth Government Securities used to calculate the cost of equity, the use of the interbank rate is equivalent to using a Government Security and separately adjusting the debt risk premium. For the purposes of determining the cost of debt the use of the interbank rate is more convenient for businesses and regulators. The ERA therefore considers the five-year bank bill swap rate as a proxy for the risk free rate when calculating the cost of debt.

392. The use of the five-year bank bill swap rate is consistent with Western Power's proposal.

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[166] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 204.

[167] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, p. 144.

[168] At the time of Western Power's third access arrangement, the ERA used the same risk free rate for calculating both the cost of debt and cost of equity. In more recent decisions, the ERA has used the bank bill swap rate to calculate the cost of debt, as it gives a more appropriate, market-based measure of the rate at which banks lend to one another.

393. Western Power proposed a 20-day averaging period to 30 June 2017 as a placeholder. This averaging period approach provides a risk free rate for the cost of debt of 2.29 per cent.

394. Western Power has nominated a 20-day averaging period to 29 March 2018. The ERA accepted this period. The averaging period to 29 March 2018 provides a risk free rate for the cost of debt of 2.59 per cent.

9.1.3 Public submissions

395. Western Power accepted the risk free rate (for cost of debt) in the draft decision.

396. No public submissions were received on the risk free rate for the cost of debt.

9.1.4 Final decision

397. For the Final Decision, the ERA considers the estimated nominal risk free rate (for cost of debt) should be taken from the five-year bank bill swap rate, over an averaging period of 20-business days.

398. For the final decision, the ERA has adopted risk free rate (for cost of debt) of 2.59 per cent for the agreed averaging period of 29 March 2018.

9.2 Debt risk premium

399. The debt risk premium represents the return above that risk free rate that lenders require to compensate them for the risk of providing debt funding to a benchmark business.

400. In recent decisions, the ERA has calculated the debt risk premium as the difference between the yield on an appropriate sample of corporate bonds and the bank bill swap rate over an appropriate term.[169]

401. The debt risk premium relies on two additional inputs:

- the benchmark credit rating
- the term of debt.

9.2.1 Benchmark credit rating

402. Credit ratings provide a broadly uniform measure of default risk.

403. The benchmark credit rating determines the sample of bonds used to calculate the debt risk premium and should reflect a benchmark efficient entity in the electricity and gas industry in Australia.

404. Calculation of the debt risk premium requires data from a benchmark sample of bonds. The first step in determining the benchmark sample is to identify the appropriate benchmark credit rating. The ERA uses this benchmark credit rating to perform a Bloomberg search to identify firms to include in the sample.

9.2.1.1 Western Power's initial proposal

405. Western Power considered that a credit rating within the BBB band was appropriate, and noted that the ERA has used a credit rating within this band for Australian electricity and gas businesses in the past.[170]

406. The ERA used a credit rating within the BBB band in its recent DBNGP decision,[171] but used an average of A-/BBB+/BBB corporate bonds in its benchmark sample for the last Western Power access arrangement decision.[172]

9.2.1.2 Draft decision

407. The ERA conducted a review of the credit rating for the benchmark entity.

408. The ERA used two approaches to determine credit ratings - the Standard and Poor's credit rating matrix approach and the 'median value' approach.

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[169] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, p. 159.

[170] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 204.

[171] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, p. 205.

[172] ERA, *Final decision on proposed revisions to the access arrangement for the Western Power network*, 5 September 2012, p. 344.

Standard and Poor's credit rating matrix approach

409. The credit ratings for the benchmark sample of firms outlined are presented in Table 11.

Table 11 Benchmark sample credit metrics

Company	S&P credit rating[173]
APA Group	BBB
Duet Group	BBB/BBB-
Spark Infrastructure	BBB+
SP AusNet Group	A-

Source: ERA analysis, Bloomberg

410. The Standard and Poor's credit rating matrix approach takes economy-wide and company-specific factors into account when assigning credit ratings to debt securities. For example, Standard and Poor's determines the credit rating by evaluating the business risk (qualitative assessment) and financial risk (quantitative assessment) faced by holders of debt securities.[174] This approach suggests a credit rating around BBB/BBB+.

Median value approach

411. To estimate the benchmark efficient entity's credit rating using a median credit rating approach, a benchmark sample of comparator companies must first be constructed. This does not have to be constrained to listed or privately owned companies, because the analysis takes parent and government ownership into consideration.

412. This approach is relatively robust to the presence of outliers in the comparator business sample. The approach is somewhat superficial because it does not analyse the drivers of credit ratings in much detail and focuses on the prevalence of the final ratings.

413. For the purposes of the median credit rating, a company that is included in the sample is required to satisfy two characteristics. First, the company must be a network service provider in the gas and/or electricity industry in Australia. Second, its credit rating must be published by an international rating agency such as Standard and Poor's or Moody's. Moody's credit ratings are converted into the equivalent Standard and Poor's credit ratings because the ERA's debt risk premium approach uses Standard and Poor's ratings.

414. The ERA has used the 2013 Gas Rate of Return Guidelines' sample as a starting point for establishing the credit rating. This is shown in Table 12.

[173] DUET Group based on asset level credit ratings.

[174] This is a generalised and incomplete illustration of the actual process followed by Standard Poor's.

Table 12 2013 rate of return guidelines credit rating sample remapped to 2018 and final sample

2013 sample	2018 mapping	2018 sample
Alinta LGA Ltd/Jemena (AGL)/Singapore Power International Assets Australia	Jemena	Jemena
Alinta Network Holding Pty Ltd/WA Network Holdings Pty Ltd/ATCO Gas Australia LP	ATCO	ATCO
The CitiPower Trust	Victorian Power Networks	Victorian Power Networks
DBNGP Finance Co Pty Ltd	DBP	DBP
DBNGP Trust	DBP	
Diversified Utility and Energy Trusts (DUET) Group	Acquired	
ElectraNet Pty Ltd	Electranet	Electranet
Energy Partnership (Gas) Pty Ltd	Energy Partnerships	No data
Envestra Ltd	Australian Gas Networks	Australian Gas Networks
Envestra Victoria Pty Ltd	Australian Gas Networks	
Ergon Energy Corporation Ltd	Ergon Energy	Ergon Energy
Ergon Energy Queensland Pty Ltd	Ergon Energy	
ETSA Utilities Finance Pty Ltd	South Australian Power Networks	South Australian Power Networks
Gas Net Australia (Operations) Pty Ltd/APT Pipelines Ltd	APA Group	APA Group
Powercor Australia, LLC	Victorian Power Networks	
SP AusNet Group	Ausnet	Ausnet
SPI Australia Holdings (Partnership) LP	Ausnet	
SPI Electricity & Gas Australia Holdings Pty Ltd	Ausnet	
SPI Electricity Pty Ltd	Ausnet	
SPI PowerNet Pty Ltd	Ausnet	
United Energy Distribution Holdings Pty Ltd	United Energy Distribution	United Energy Distribution
United Energy Distribution Pty Ltd	United Energy Distribution	
-	-	Transgrid
-	-	Multinet Gas

Source: ERA analysis

415. In this analysis, the ERA considered the median credit rating of the above samples for the period of five years from 2012 to 2017. The results of the analysis are shown in Table 13.

Table 13 Median credit rating approach results

	2013	2014	2015	2016	2017	Number of firms
Sample 1 - All firms	BBB	BBB+	BBB+	BBB+	BBB+	13
Sample 2 - excluding government ownership	BBB	BBB+	BBB+	BBB+	BBB+	7
Sample 3 - excluding government ownership and parent control	BBB	BBB	BBB	BBB	BBB	1

Source: ERA analysis

416. The analysis shows that credit ratings have generally been improving over the period with all samples indicating a BBB rating in 2013 and BBB/BBB+ credit rating in 2017. The all firms sample indicates a rate in 2017 of BBB+.

417. The median value approach suggests a credit rating around BBB+.

Other regulators' decisions

418. In its recent decisions the AER used a BBB+ benchmark credit rating to estimate the return on debt. This benchmark credit rating is the same rating proposed in its 2013 Rate of Return Guidelines.

419. The AER applied this credit rating to decisions that were upheld before the Australian Competition Tribunal.[175] [176] [177] The Tribunal observed that the more recent years point towards a BBB+ credit rating for the benchmark efficient entity.[178]

420. On the basis of the analysis and cross-checks, the ERA determined a benchmark credit rating of BBB+ as appropriate for application in the cost of debt estimations.

Relevance to Western Power of State government ownership

421. Many public submissions on Western Power's initial proposal stated that the WACC should recognise Western Power's status as a monopoly State-owned entity. These submissions suggested that this resulted in a lower commercial risk profile and access to lower borrowing costs.

422. However, the ERA considered that there is no compelling reason to depart from the current efficient benchmark network service provider and its resulting effect on the credit rating:

- The State Government's credit rating reflects its ability to raise revenue from taxpayers. Western Power's cost of debt should reflect the level of risk inherent in its operations. The difference in the cost of debt to government and Western Power acts as a premium on credit insurance for taxpayers in the event there is a Western Power default. Eliminating this premium through providing debt to the service provider at the State Government rating leaves taxpayers uncompensated against the risk of a default.
- A credit rating established independently of ownership is required to maintain competitive neutrality. Agencies borrowing from the Government should thus face interest rates equal to private sector rates; that is, Western Power's cost of debt should not be lowered to reflect the benefit of Government ownership and should instead be commensurate with the risks Western Power would face were it was privately owned. To ensure competitive neutrality and reflect risk more appropriately the State Government charges Western Power a loan guarantee fee over and above the rate that the State can borrow at.

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175 Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 993.

176 AusNet Transmission Group Pty Ltd, *Transmission Revenue Review 2017–2022 regulatory proposal*, 30 October 2015, pp. 191, 196.

177 AusNet Transmission Group Pty Ltd, *Transmission Revenue Review 2017–2022 revised regulatory proposal*, 21 September 2016, pp. 137, 167.

178 Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 993.

- A credit rating that is inconsistent with market outcomes distorts investment decisions in upstream and downstream markets. Investment decisions made in those markets would be undertaken as a result of artificially low or high prices stemming from an artificial credit rating and lead to inefficient investment.
- A rating that is inconsistent with efficient market outcomes also creates the potential for the network service provider to undertake inefficient levels of capital investment; i.e. over-investment if the rating is too low. The WACC must accurately reflect the level of risk embodied in the network service provider's operations in order to constrain the potential for inefficient investment.

423. In summary, the ERA considered that Western Power's government ownership should not be taken into account in determining a benchmark cost of capital.

9.2.1.3 Public submissions

424. Western Power accepted the benchmark credit rating.

425. The WAMEU's submission included the Major Energy Users' submission to the AER. The Major Energy Users' submission raised the following points on the credit rating of the benchmark efficient entity:[179]

- There is no currently listed or unlisted network that perfectly matches the benchmark efficient entity in that all of them have other revenue streams not related to their regulated assets.
- The credit rating noted for the entire industry reflects a credit rating that includes more risk activities.
- The credit rating for the entire industry is likely to understate the credit rating for the benchmark efficient entity.
- The credit rating needs to be adjusted upwards to A or A-.

9.2.1.4 Final decision

426. The evidence for all firms in the benchmark sample indicates a credit rating of BBB+. The sample of firms has maintained a relatively stable credit rating. The ERA considers that this provides sufficient evidence that a credit rating of BBB+ is appropriate.

427. The ERA does not agree with the WAMEU's proposed A or A- credit rating. This credit rating is not supported by evidence. There is no clear evidence that a credit rating of A or A- more accurately reflects the risk to provide regulated services.

428. For the final decision, the ERA determines a benchmark credit rating of BBB+ for application in the debt risk premium.

9.2.2 Term of debt

429. The term of debt used to calculate the debt risk premium represents the average term of debt of a benchmark efficient entity and its staggered debt portfolio.

[179] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, p. 61.

9.2.2.1 Western Power's initial proposal

430. Western Power proposed a 10-year term of debt for its access arrangement.[180]

9.2.2.2 Draft decision

431. The ERA has used a 10-year term of debt in its recent regulatory decisions.[181]

432. For the draft decision, the ERA agreed with Western Power in using a 10-year term of debt for calculating the debt risk premium.

9.2.2.3 Public submissions

433. Western Power accepted the 10-year term of debt.

434. The WAMEU's submission referred to the analysis that Chairmont undertook for the AER on the actual cost of debt of service providers versus that allowed by the AER. The WAMEU noted that Chairmont found actual service provider debt terms varied between four years and nine years.[182]

435. On the basis of the Chairmont analysis, the WAMEU considered that the ERA needed to reassess the debt risk premium and reduce the term to reflect that which firms actually incur. [183]

9.2.2.4 Final decision

436. The ERA needs to determine a benchmark debt term to calculate the debt risk premium for a service provider. The benchmark debt term also establishes the period over which the trailing average is calculated.

437. The ERA considers that a benchmark term of 10-years should be used for the reasons detailed below:

- Conceptually, a valid financing strategy for service providers is to issue long-term debt where possible to reflect the lives of their long-term assets and minimise refinancing risk.
- Chairmont's analysis of actual debt practices over the 2013 to 2017 period did not reach clear conclusions. The time period assessed by Chairmont was complicated by factors that probably affected the financing strategies of sample service providers. These factors included regulatory appeals and the privatisation of some of the networks.
- The AER's introduction of, and transition to, a new debt approach is also likely to have affected service providers' financing practices. Therefore, current financing strategies may not reflect longer term efficient strategies.

[180] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 205.

[181] For instance: ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, p. 159.

[182] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, p.39.

[183] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, p.39.

- As detailed by network stakeholders, Chairmont's simple average term of 7.4 years for the sample of actual debt may understate the term of debt. Service providers' actual debt included short term debt facilities that have been refinanced numerous times over the period without growing in value. Therefore, short term debt facilities are refinanced multiple times in any one year, which has the effect of reducing the term of debt.

438. For the final decision, the ERA applies a 10-year term to estimating the debt risk premium.

9.2.3 Calculation of debt risk premium

439. Once the benchmark credit rating and term are set it is then necessary to detail how the debt risk premium is calculated.

9.2.3.1 Western Power's initial proposal

440. In its last DBNGP decision, the ERA calculated the debt risk premium as a 'hybrid trailing average', averaging the most recent 10 years of DRP estimates, consistent with debt with a 10-year term in the BBB credit rating band.[184] Debt risk premium estimates for specific years were determined using the ERA's revised bond yield approach (from the 2016 year),[185] and Reserve Bank of Australia (RBA) credit spreads for 10-year non-financial bonds (for 2015 and earlier periods).[186]

441. Western Power proposed using the same approach for this access arrangement.[187]

9.2.3.2 Draft decision

442. Western Power proposed a hybrid trailing average approach to estimating the debt risk premium that was consistent with the ERA's approach in recent decisions.[188] The ERA considered that this approach was appropriate for this access arrangement decision.

443. This method involves calculating a 10-year trailing average debt risk premium for each year. This will consist of a debt risk premium for the current year and a debt risk premium for each of the nine prior years, and so must be updated each year.

444. This updating process means that the WACC will reflect the most efficient debt structure for a regulated business in any given year and that the benefits of an efficient debt structure can be passed through to consumers.

[184] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, p. 202.

[185] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, p. 204.

[186] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, p. 233.

[187] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 203.

[188] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 WACC*, 30 June 2016.

445. From 1 June 2016 onwards, the debt risk premium for each year in the trailing average is to be calculated using the revised bond yield approach. The revised bond yield approach uses international bonds with a country of risk identified by Bloomberg as Australia to estimate the cost of debt each year. The debt risk premium represents the risk spread of the cost of debt estimated over the bank bill swap rate estimate in any given year.

446. The benchmark credit rating and the term to maturity are major assumptions in applying the revised bond yield approach to estimate the debt risk premium. Western Power's proposals for the benchmark credit rating and the term to maturity are discussed separately in sections above.

447. As discussed above, the ERA updated the benchmark credit rating to BBB+. The ERA has calculated the latest year's debt risk premium consistent with the credit rating of BBB+. This ensures that the debt risk premium continues to reflect debt funding of a benchmark business.

448. For periods up to 31 May 2016 (where there is insufficient data to use the revised bond yield approach), the annual debt risk premia used in the trailing average can be derived from RBA credit spread to swap data.

449. Western Power has used a calendar year approach to calculate the debt risk premium consistent with the DBNGP final decision.[189] However, Western Power's access arrangement is on a financial year basis.

450. To accommodate Western Power's access arrangement, the ERA has revised the historic annual debt risk premia in the trailing average to be on a financial year basis. Historic financial year debt risk premium had been taken from the ATCO Gas Australia final decision and, where not available, calculated by the ERA applying a consistent method.[190]

451. The following table sets out the ERA's estimate of the hybrid trailing average debt risk premium.

[189] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 WACC*, 30 June 2016, p. 235.

[190] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems*, June 2015, pp. 714-716.

Table 14 ERA estimated hybrid trailing average debt risk premium[191]

Year	Debt risk premium (%)	Source
2008/09	5.525	RBA
2009/10	2.509	RBA
2010/11	2.005	RBA
2011/12	3.000	RBA
2012/13	2.988	RBA
2013/14	3.016	RBA
2014/15	1.770	RBA
2015/16	2.420	RBA to end of May 2016 and ERA rest of year (20-days average to 30 June 2017)
2016/17	1.656	ERA method for the whole year (20-days average to 30 June 2017)
2017/18	1.241	ERA method for the whole year (20-days average to 29 March 2018)
Trailing average debt risk premium	2.613	

Source: ATCO final decision and ERA analysis

452. For each annual update, Western Power proposes that the averaging period be "as close as is reasonably practical to the beginning of the forthcoming financial year", with Western Power nominating the actual averaging period for each annual update in advance, and the dates remaining confidential.[192]

453. The ERA considered Western Power's proposal for annual updating of the debt risk premium was consistent with the objectives set out in section 6.4 of the Access Code and the Code objective.

[191] RBA method for the financial year consistent with that detailed in the ERA's *Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution System*, pp. 714-716.

[192] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 205.

9.2.3.3 Public submissions

454. Western Power accepted the debt risk premium detailed in the draft decision.

455. The WAMEU raised the ERA's approach to debt and concluded that the ERA approach to debt essentially relied on similar data to the AER in that the debt risk premium was calculated from the issue of Australian 10-year corporate bonds. The WAMEU went on to refer to recent analysis by Chairmont for the AER that compared the actual debt costs incurred by networks to that allowed by the AER. [193]

456. On this basis, the WAMEU considered that the ERA needed to reassess the debt risk premium and to reduce the allowance to a value more closely representing the actual costs of debt that the privately owned firms actually incur. [194]

457. Following the publication of the draft decision, the ERA issued a notice on 17 August 2018 on new rate of return information to be considered that may affect Western Power's rate of return. The ERA took this new information into account and offered interested parties the opportunity to make further comment.[195]

458. In June 2018, the RBA revised its historic series in its F3 table on aggregate measures of Australian corporate bond spreads and yields. Further information about these changes is provided in the Reserve Bank's correspondence to the AER.[196] This new information reduces the debt risk premium.

459. Western Power's submission expressed concern with the consultation process for this new information. However, Western Power's submission did not discuss the revisions to the RBA historic series and the debt risk premium.[197]

460. ATCO made a submission on this additional information. The following summarises ATCO's positions:[198]

- ATCO supported retaining the prior-year estimates of the debt risk premia, as it promoted regulatory certainty and stability, and recognised that regulated businesses have locked in debt financing based on this approach.
- ATCO recognised that Western Power had not previously adopted the hybrid trailing average method.
- ATCO considered that, before making any change to the prior-year estimates of the debt risk premia in the Draft Decision, the ERA should satisfy itself that Western Power has not already made commercial decisions based on these rates.

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[193] WAMEUs, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp. 37-39.

[194] WAMEUs, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp. 37-39.

[195] https://www.erawa.com.au/cproot/19393/2/Notice%20-%20New%20information%20to%20be%20considered%20-%20Draft%20Decision%20on%20Proposed%20Revisions%20to%20the%20Access%20Arrangement%20for%20the%20Western%20Power%20Network.pdf

[196] https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/review-of-rate-of-return-guideline/draft-decision

[197] Western Power, *Public consultation – New rate of return information to be considered,* August 2018.

[198] ATCO, *Re: New Rate of Return Information – Western Power Network Access Arrangement – 2017/18 to 2021/22.*

461. The WAMEU provided a submission on this new information and strongly supported the ERA using new information that may affect Western Power's rate of return. The WAMEU viewed that this was aligned with its submission to the draft decision, and many of the issues raised in this submission regarding WACC.[199]

9.2.3.4 Final decision

462. The ERA has considered:

- the WAMEU's submission and its referenced CRG and MEU repots
- the Chairmont review of actual debt costs compared to the AER's benchmark costs.

463. The ERA has separately addressed the WAMEU's comments regarding the benchmark credit rating and the term of debt above.

464. Given a particular debt term, the Chairmont report found that energy network businesses could deliver costs of debt cheaper than the AER's benchmark efficient cost of debt.

465. The ERA takes a different approach to the cost of debt compared with the AER.

- The ERA calculates the cost of debt through the estimation of a risk free rate and its own debt risk premium. The debt risk premium is calculated from a sample of BBB+ bonds with a country of risk identified by Bloomberg as Australia (denominated in Australian dollars [AUD], Euros [EUR], United States dollars [USD], and British pounds [GBP]).
- The AER calculates the cost of debt through the use of third-party data providers. The AER has used a simple average of the 10-year BBB rated bond yield published by the RBA and the 10-year BBB BVAL bond curve data from Bloomberg, after extrapolating both to an exact 10-year term.

466. Of particular note, the ERA's approach to the cost of debt:

- Reflects lower debt costs as the ERA calculates the cost of debt based on BBB+ bonds, which contrasts with the AER's historic use of the BBB band (including BBB-, BBB and BBB+).
- Results in less volatility as the ERA uses a 10-year trailing average while the AER is in the process of moving to a 10-year trailing average over a 10-year period.

467. The debt costs and volatility detailed in the Chairmont report are based on a broad-BBB rated (BBB-, BBB and BBB+) 10-year debt instrument rolling 12 month average. This is not reflective of the ERA's calculation of the cost of debt.

468. For the final decision, the ERA has used the hybrid trailing approach with a benchmark credit rating of BBB+ and a term of 10 years.

469. For periods up to 31 May 2016, the annual debt risk premia used in the trailing average are derived from RBA credit spread to swap data.

[199] EnergyXL, *Submission from WAMEU re New Rate of Return Information,* August 2018.

470. On 5 June 2018 the RBA revised and updated its historic series in its F3 Table[200] to reflect changes to methodology. Therefore, the ERA has updated the historic debt risk premium for Western Power.

471. The hybrid trailing average debt risk premium does not yet apply to Western Power. The revision to historic debt risk premia therefore does not represent the retrospective change of historic values.

472. The following table sets out the ERA's estimate of the hybrid trailing average debt risk premium.

Table 15 ERA estimated hybrid trailing average debt risk premium

Year	Debt risk premium (%)	Source
2008/09	5.483%	RBA
2009/10	2.355%	RBA
2010/11	1.895%	RBA
2011/12	2.842%	RBA
2012/13	2.768%	RBA
2013/14	2.634%	RBA
2014/15	1.640%	RBA
2015/16	2.352%	RBA to end of May 2016 and ERA rest of year (20-days average to 30 June 2017)
2016/17	1.656%	ERA method for the whole year (20-days average to 30 June 2017)
2017/18	1.241%	ERA method for the whole year (20-days average to 29 March 2018)
Trailing average debt risk premium	2.487%	

Source: ERA analysis

473. On this basis, for the final decision, the ERA calculates the debt risk premium as 2.487 per cent.

474. The ERA will update the hybrid trailing average debt risk premium annually.

[200] RBA F3 Table: Aggregate Measures of Australian Corporate Bond Spreads and Yields.

9.2.4 Annual update process

475. Regulators that use a trailing average approach to determine the cost of debt may apply an annual update to this parameter. This means that the WACC will reflect the debt structure for a regulated business in any given year and that the updated debt structure will be passed through to consumers.

9.2.4.1 Western Power's initial proposal

476. Consistent with the DBNGP decision, Western Power's proposed approach used a hybrid trailing average method for determining the return on debt. This method:

- Adopted the 5-year bank bill swap rate, set on the day.
- Used a 10-year trailing average for the debt risk premium, which is updated annually so that each year a new year's debt risk premium is estimated and the oldest estimate in the 10-year series is removed.

477. Western Power proposed updating its hybrid trailing average debt risk premium in each year of the access arrangement period. This is consistent with the ERA's approach in its 2016 decision on the access arrangement for the DBNGP.[201]

478. For each annual update, Western Power proposed that the averaging period be "as close as is reasonably practical to the beginning of the forthcoming financial year", with Western Power nominating the actual averaging period for each annual update in advance, and the dates remaining confidential.[202]

9.2.4.2 Draft decision

479. For the draft decision, the ERA accepted Western Power's annual update process, which was consistent with the process applied for in the ERA's current regulatory practices.

9.2.4.3 Public submissions

480. Western Power had no comment on the annual update process for the debt risk premium.

481. No public submissions were received on the annual update process for the debt risk premium.

9.2.4.4 Final decision

482. For the final decision, the ERA has determined to update the hybrid trailing average debt risk premium in each year of the access arrangement period.

483. For the final decision, the ERA accepts that the averaging period be as close as is reasonably practical to the beginning of the forthcoming financial year, with Western Power nominating the actual averaging period for each annual update in advance, and the dates remaining confidential.

[201] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 203.

[202] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 205.

9.3 Debt-raising and hedging costs

484. Debt-raising and hedging costs are the administrative costs and other charges incurred by businesses when obtaining and hedging debt financing.

9.3.1 Western Power's initial proposal

485. Western Power proposed debt-raising costs of 0.125 per cent and a hedging allowance of 0.114 per cent.[203] The ERA has used the same figures in its recent decisions.[204]

9.3.2 Draft decision

9.3.2.1 Debt-raising costs

486. Regulators across Australia have typically included an allowance to account for debt-raising costs in their regulatory decisions. Debt-raising costs may include underwriting fees, legal fees, company credit rating fees and any other costs incurred in raising debt finance. A company has to pay debt-raising costs over and above the debt risk premium. Such debt-raising costs are likely to vary between each issuance of debt depending on the borrower, lender and market conditions.

487. Western Power proposed debt-raising costs of 0.125 per cent.

488. Australian regulators use benchmark estimates to determine debt-raising costs. In doing so, regulators attempt to derive an estimate of debt-raising costs that mimics debt-raising costs that would be incurred by a well-managed efficient benchmark business operating in a competitive market.

489. The rationale for using a figure of 0.125 per cent dates back to work undertaken by the ACCC in the early 2000s. Based on the advice from the Allen Consulting Group in December 2004, the ACCC affirmed that debt-raising costs were a legitimate expense that should be recovered through the revenues of a regulated utility.[205] This conclusion was consistent with the ACCC's decisions on the issue of debt-raising costs in its regulatory decisions prior to 2004.[206]

490. The ERA and several other Australian regulators have adopted an estimate of debt-raising costs of 0.125 per cent in previous regulatory decisions. As shown in Table 16, while some regulators have continued to apply a figure of 0.125 per cent (including the ERA in its past decisions), the ACCC, AER and Queensland Competition Authority (QCA) have elected to use lower estimates.

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[203] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 206.

[204] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, p. 187.

[205] The Australian Competition and Consumer Commission, *Final Decision, NSW and ACT Transmission Network Revenue Cap, TransGrid 2004-05 to 2008-09*, April 2005, p. 144.

[206] For instance, the Australian Competition and Consumer Commission, *Final Decision, South Australian Transmission Network Revenue Cap, 2003 to 2007/8*, December 2002, p. 25; and the Australian Competition and Consumer Commission, *Final Decision, GasNet Australia access arrangement revisions for the Principal Transmission System*, November 2002, p. 95.

Table 16 Debt-raising costs in Australian regulatory decisions

Regulator	Year	Allowance (bppa)
AER[207]	2017	8.4 – 9.2
ERA[208]	2016	12.5
ESCOSA[209]	2015	12.5
ACCC[210]	2014	9.8 – 10.9
IPART[211]	2014	12.5
QCA[212]	2014	10.8

Source: Compiled by the ERA

491. The ERA investigated the allowances provided by various Australian regulators, and gave particular attention to research underpinning the QCA's 2014 *Cost of debt estimation methodology*.[213] In this report, the QCA reviewed Allen Consulting Group's 2004 findings and the origins of the 0.125 per cent estimate.

492. The QCA found that the 0.125 per cent figure was based on figures provided to the ACCC by Westpac in 2002.[214] This figure was discussed in Allen Consulting Group's report in 2004, which noted that an allowance of 0.125 per cent was likely to have been overstated. Specifically, Allen Consulting Group stated that:

- The ACCC had inappropriately included a dealer swap margin in 2004, resulting in a double-count.[215]
- Without a swap margin, the ACCC's estimate would have been about 0.075 per cent (which was closer to other estimates sourced by the ACCC from banks at the time).[216]

493. The QCA also noted that the AER had recently updated its debt-raising allowance, based on a 2011 analysis of debt-raising costs by PwC.[217]

[207] AER, *Draft Decision: AusNet Services Gas access arrangement 2018 to 2022 – Attachment 3 – Rate of return*, July 2017, p. 3-446.

[208] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 Rate of Return*, 2016, p. 177.

[209] Essential Services Commission of South Australia, *SA Water Regulatory Rate of Return 2016-2020: Final Report to the Treasurer*, March 2015, p. 52.

[210] Australian Competition and Consumer Commission, *AusNet Services Gas access arrangement: 2018 to 2022 Attachment 3 – Rate of return (Draft Decision*), March 2014, p. 56.

[211] Independent Pricing and Regulatory Tribunal, *New Approach to Estimating the Cost of Debt: Use of the RBA's Corporate Credit Spreads*, February 2014, p. 2.

[212] Queensland Competition Authority, Cost of debt estimation methodology: final decision, August 2014, p. ii.

[213] Queensland Competition Authority, *Cost of debt estimation methodology: final decision,* August 2014, p. ii.

[214] Allen Consulting Group, Debt and equity raising transaction costs: Final report to ACCC, December 2004, p. 18.

[215] Allen Consulting Group, *Debt and equity raising transaction costs: Final report to ACCC*, December 2004, p. 28.

[216] Allen Consulting Group, *Debt and equity raising transaction costs: Final report to ACCC*, December 2004, p. xvii.

[217] Queensland Competition Authority, *Cost of debt estimation methodology: final decision*, August 2014, p. 12.

494. The QCA had concerns about the inclusion of the swap margin and the age of the 0.125 per cent estimate. It engaged PwC to prepare updated advice on debt-raising costs. PwC found that debt-raising costs were within the range of 0.09 to 0.108 per cent. PwC's method used the same cost categories identified by Allen Consulting Group in 2004.[218]

495. The ERA is not aware of any new alternatives to the Allen Consulting Group method. Other estimates of debt-raising costs – including Deloitte's 2010 estimate,[219] PwC's' 2011[220] and 2013[221] estimates, and the ERA's own estimate in 2013[222] – have adopted essentially the same approach used by the Allen Consulting Group. The approach set out in the Allen Consulting Group's 2004 study appears to still be relevant and fit-for-purpose. This approach is robust and has been adopted by many Australian regulators over the last 10 years.

496. Therefore, a debt-raising cost allowance of 0.100 per cent per annum is appropriate. This falls within the range provided in the 2013 PwC study, is comparable with estimates now used by the ACCC and QCA and is slightly higher than the most recent estimate adopted by the AER. This allowance does not include the swap margin, which is captured separately in debt hedging costs.

497. Therefore, for the draft decision, the ERA did not accept Western Power's proposed debt-raising costs of 0.125 per cent.

498. For the draft decision, the ERA considered that an allowance of 0.100 per cent for debt-raising costs was appropriate.

9.3.2.2 Debt hedging costs

499. Interest rate swaps are derivative contracts, which typically exchange – or swap – fixed-rate interest payments for floating-rate interest payments. They provide a means to hedge and manage risk, but also have a cost.

500. In 2016, the ERA engaged Chairmont Consulting to advise on the cost of undertaking swaps.[223] Based on Chairmont Consulting's advice and work by the Competition Economists Group,[224] the ERA concluded that an allowance for hedging costs of 0.114 per cent per annum was appropriate.[225] Western Power's proposal is consistent with this finding.

501. For the draft decision, the ERA considered that 0.114 per cent was appropriate for hedging costs.

[218] PwC, *Debt and Equity Raising Costs: Report for Powerlink Queensland (Appendix K)*, 2011, p. 20.

[219] Deloitte, *Envestra Limited: Debt Financing Costs*, September 2010, p. 4.

[220] PwC, *Debt and Equity Raising Costs: Report for Powerlink Queensland (Appendix K)*, 2011, p. 20.

[221] PwC, *A cost of debt methodology for businesses regulated by the Queensland Competition Authority*, June 2013.

[222] ERA, *Explanatory Statement for the Rate of Return Guidelines*, 16 December 2013, p. 202.

[223] Chairmont Consulting, *ERA Hedging Costs in the Cost of Debt*, 13 May 2015.

[224] Competition Economists Group, *Debt strategies of utility businesses*, June 2013.

[225] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 | Appendix 4 – Rate of Return*, 30 June 2016, p. 179.

9.3.3 Public submissions

502. Western Power accepted the debt-raising and hedging costs in the draft decision.

503. No public submissions were received on debt-raising and hedging costs.

9.3.4 Final decision

504. For this final decision, ERA has applied an allowance of 0.100 per cent for debt-raising costs.

505. For this final decision, the ERA has applied an allowance of 0.114 per cent for hedging costs.

10 Other parameters

506. Three further parameters affect the WACC:

- gearing
- forecast inflation
- gamma.

10.1 Gearing

507. Gearing is the proportion of a 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 so is generally expressed as follows:

$$Gearing = \frac{Debt}{Debt + Equity}$$

508. This ratio is used to weight the costs of debt and equity when the regulated WACC is determined.

509. 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 is also used:

- To re-lever asset betas for the purposes of analysing the level of systematic risk across businesses in the estimate of equity beta.
- As a factor in determining an appropriate credit rating for deriving the debt risk premium.
- To determine the interest and tax expenses in a post-tax revenue model.

10.1.1 Western Power's initial proposal

510. The ERA has adopted a gearing ratio of 60 per cent debt and 40 per cent equity in recent decisions,[226] and Western Power proposed that the same ratio be used for this access arrangement.[227]

10.1.2 Draft decision

511. The target gearing is the relevant gearing level in the cost of capital. The ERA considers that target gearing should be determined from observations of the gearing levels of firms in the benchmark sample of Australian utility businesses.

[226] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, p. 33.

[227] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 207.

512. To calculate gearing the ERA used the following method:

- A market based gearing level is used to reflect efficient financing.
- Gearing is observed over a five-year period. This is consistent with the averaging period used for other parameters. Using inconsistent measures of gearing for de-levering and re-levering can result in under or overestimated equity betas in the Henry approach.
- The market value of equity is equal to a firm's market capitalisation, which is equal to the share price multiplied by volume of shares issued.
- As the availability of market values of debt is limited, the book value of debt is used as a proxy.
- Debt is taken at a gross level. That is, no deduction is made for cash or marketable securities. Gross debt is used as it is not possible to determine whether cash equivalents are funded by debt and/or equity. In addition, an efficient network business would have some cash as part of its optimal asset mix.
- Debt is adjusted to incorporate a firm's investments in associates and its associated debt, which may not be reported on the firm's balance sheet. Debt from associates is added to parent debt in line with proportional ownership.
- Debt and equity are adjusted to recognise the nature of hybrid securities. That is, hybrid securities, which have equity characteristics, are removed from debt.

513. In its February 2018 discussion paper on gearing, the AER detailed some of the practical considerations of calculating gearing.[228]

514. The ERA has observed trends in average gearing across various definitions of debt and equity and examined the drivers of the results.

515. The ERA's analysis, using the updated dataset to 2017, indicated that the estimated benchmark gearing level reduced to 55 per cent.

516. Table 17 details the gearing for the benchmark entity based on market values.

[228] AER, *Discussion Paper - Gearing*, February 2018.

Table 17 ERA market value gearing estimates

	APA	AST	DUE	SKI	Average
2008	73%	59%	76%	70%	69%
2009	69%	70%	80%	70%	72%
2010	54%	64%	80%	65%	66%
2011	54%	64%	79%	62%	65%
2012	47%	59%	72%	59%	59%
2013	46%	57%	71%	62%	59%
2014	45%	58%	64%	55%	55%
2015	50%	59%	62%	56%	57%
2016	49%	57%	51%	54%	52%
2017	49%	52%		52%	51%
5 year average	**48%**	**56%**	**62%**	**56%**	**55%**

Source: Annual reports, ERA analysis

517. Gearing levels have been declining over time. This is mainly driven by the increasing market capitalisation from strong share price growth from around 2009, without a simultaneous rise in debt levels.

518. Book-value based measures of gearing provide an alternative measure of gearing. On this basis, average gearing has remained the same over the past five years (Table 18).

Table 18 ERA book value gearing estimates

	APA	AST	DUE	SKI	Average
2008	71%	58%	76%	89%	74%
2009	70%	67%	79%	85%	75%
2010	68%	62%	79%	66%	69%
2011	63%	60%	77%	69%	68%
2012	64%	61%	77%	68%	68%
2013	63%	61%	79%	68%	68%
2014	65%	64%	76%	67%	68%
2015	68%	69%	74%	66%	69%
2016	71%	66%	65%	68%	67%
2017	71%	64%		69%	68%
5 year average	68%	65%	73%	68%	68%

Source: Annual reports, ERA analysis

519. The AER's recent analysis has also shown that gearing estimates, both on the basis of market values and book values, have been declining since 2007.[229]

520. The ERA placed more reliance on the use of market value gearing estimates as they reflect the market's current information on the efficient financing of the benchmark entity. This gearing can then be used to inform the setting of efficient financing costs for the upcoming regulatory period. Book values, however, are a historical measure and not necessarily representative of forward looking values.

521. Gearing decisions by regulators other than the AER are based on analysis that pre-dates December 2013, and are too far out-of-date to be relevant to gearing decisions over the coming years.

522. The ERA's 2017 analysis of the efficient costs of water providers updated the gearing estimate for energy.[230] Consistent with the above analysis, the ERA's 2017 analysis found:

- A declining trend in Australian gas and electricity network service provider gearing since 2011.
- Market capitalisation growth appears to have been outstripping debt issuance in the Australian electricity and gas network utility sector.
- On average, a decrease in gearing of 5 percentage points appears reasonable for Australian electricity and gas network utilities from the historic figure of 60 per cent.

523. The ERA's general gearing method involves observing actual gearing over the last five-year period.[231] Forecasts on the direction of debt relative to equity, which may include consideration of factors such as market capitalisation forecasts and debt issuance constraints, are not taken into account.

524. The estimated benchmark gearing of 55 per cent is lower than the 60 per cent proposed by Western Power and that which has been consistently used by Australian regulators for over a decade.

525. The ERA considered that available data supports lower gearing of 55 per cent on the basis that:

- There has been a general deleveraging trend, only interrupted by the effect of the global financial crisis on equity values.
- Recent gearing levels of 51 per cent suggest a step change away from gearing levels of 60 per cent.

[229] AER, Discussion Paper - Gearing, February 2018, pp. 15-16.

[230] ERA, *The efficient costs and tariffs of the Water Corporation, Aqwest and Busselton Water*, November 2017, pp. 337-343.

[231] ERA, *Explanatory Statement for the Rate of Return Guidelines,* December 2013, p. 52.

526. The ERA and AER have periodically reviewed gearing.[232] Although the outcome has been to apply a value of 60 per cent, it does not automatically follow that the gearing must be held constant at this value, particularly if evidence suggests otherwise. Appropriately incorporating new information on gearing as it becomes available assists in avoiding a number of well-documented analytical biases such as anchoring and adjustment, conservatism, availability, confirmation and status quo.[233] It also assists in avoiding larger changes or shocks if declining trends continue. For example, making small adjustments at each review can avoid shocks resulting from large delayed adjustments that fail to incorporate new information as it becomes available.

527. Considering all the above information, for the draft decision the ERA used a debt to total assets ratio (gearing level) of 55 per cent and the equity to total assets ratio of 45 per cent.

10.1.3 Public submissions

528. Western Power accepted the gearing in the draft decision.

529. The WAMEU's submission discussed gearing and considered that the benchmark efficient entity gearing should be set at 70 per cent.[234]

530. The WAMEU's comments on gearing are summarised below.[235]

- The observed market data used to identify the levels of gearing are for the entire firm's activities, including both regulated and unregulated activities. Observed market data will not reflect the gearing that is appropriate for a pure-play regulated firm. Therefore, gearing of the benchmark efficient entity is expected to be higher than that observed for the entire entity.
- If it is accepted that the allowed rate of return is efficient, the market value of the RAB must be the RAB.
- Subordinated debt should be classified as equity.
- The risk profile of the benchmark efficient entity has not changed significantly from the past and therefore gearing should not have changed.

[232] AER, *Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, May 2009, pp. 111-125.

AER, *Explanatory statement: Rate of return guideline appendices*, December 2013, pp. 126-130.

ERA, *Explanatory statement for the rate of return guidelines*, December 2013, pp. 44-52.

[233] N. Epley and T. Gilovich, '*Putting adjustment back in the anchoring and adjustment heuristic: Differential processing of self-generated and experimenter-provided anchors'*, *Psychological Science*, vol. 12, no. 5, 2001, pp. 391-396.

M. Hilbert, 'Toward a Synthesis of Cognitive Biases: H*ow Noisy Information Processing Can Bias Human Decision Making', Psychological Bulletin*, vol. 138, no.2, pp. 211-237.

W. Samuelson and R. Zeckhauser, *Status quo bias in decision making*, *Journal of Risk and Uncertainty*, vol. 1, no. 1, 1988, p. 7-59.

[234] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp.39-40.

[235] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp.39-40.

10.1.4 Final decision

531. The ERA has considered its approach to gearing and the comments raised by the WAMEU. The ERA continues its approach to gearing for the reasons detailed below.

532. The ERA continues to support the estimation of a benchmark gearing ratio using a benchmark sample of companies. This approach will provide incentives to service providers to adopt efficient gearing structures. In addition, this approach prevents exposing consumers to variability of individual service provider gearing levels.

533. Furthermore, the ERA considers that the use of a benchmark sample of companies is consistent with the estimation of equity beta and the credit rating.

534. The benchmark gearing estimate is based on empirical analysis of listed Australian service providers. The ERA notes that a relatively large proportion of these companies' total revenue is regulated.

535. The ERA places more reliance on the use of market value gearing estimates as they reflect the market's current information on the efficient financing of the benchmark entity. This gearing can then be used to inform the setting of efficient financing costs for the upcoming regulatory period. It would be expected that new entrants would have a gearing consistent with currently observed market gearings.

- Book values (including the RAB), however, are a historical measure and not representative of forward looking values.
- The use of the market value of equity is consistent with the Henry approach to estimating equity beta, which uses gearing to de-lever and re-lever beta estimates, and the five-year observation period over which equity beta is measured.
- Lally also supports that use of market value for gearing.[236]
  - Beta is mathematically derived from a number of assumptions, and the gearing parameter arises in the course of the derivation and is defined in market terms.
  - Though the WACC formula is not derived, it is simply definitional. Its role within a regulatory context is to implement the NPV = 0 condition, that is, the present value of the future cash flows is equal to the initial investment. This condition requires that the allowed rate of return that determines cash flows is equal to an investor's discount rate. Therefore, the allowed rate of return would be a WACC with a market value gearing.
- In the AER's expert evidence sessions, experts agreed that market-based estimates are the only appropriate measure of gearing.[237]

536. The method of accounting for investments in associates and hybrid securities can reduce the comparability of debt reported on a firm's balance sheet. This can complicate the estimation of the true target gearing level of each firm in the benchmark sample and thus, the benchmark firm.

[236] Lally, *Review of the AER's views on gearing and gamma,* May 2018, pp. 7-9.

[237] Cambridge Economic Policy Associates, *Expert Joint Report,* April 2018, p. 27.

537. To ensure that a firm's balance sheet is comparable with other businesses, the ERA considers it is necessary to adjust for investments in associates and for hybrid securities.

- Debt from associates is added to parent debt in line with proportional ownership.
- Hybrid securities which have equity characteristics are removed from debt. The ERA considers that subordinated debt with equity characteristics, for example stapled to shares, should be treated as equity.

538. Gearing levels are influenced by more than just the risk profile of a business. Gearing levels are affected by the risk of the business, the cost and availability of debt, and the cost and availability of equity.

- While the risk profile of a regulated business may not have changed, the cost of debt and cost of equity has changed since the global financial crisis. Market conditions change the feasibility of issuing capital or change the feasibility of issuing debt relative to equity.
- In addition, the "implementation of sophisticated tax structure and of high-geared investment vehicles may [now] be more difficult to achieve given the more stringent terms on debt funding following the global financial crisis".[238]

539. For the final decision, the ERA considers that benchmark gearing should be determined from observations of the market gearing level of firms in the benchmark sample of Australian utility businesses.

540. For the final decision, the ERA has applied a gearing of 55 per cent.

[238] Deloitte Corporate Finance, *Regulated assets: Trends and investment opportunities*, July 2011, p. 5.

10.2 Forecast inflation

541. Forecast inflation can be used to translate the nominal post-tax WACC to a real post-tax WACC.

10.2.1 Western Power's initial proposal

542. To calculate forecast inflation, the ERA has historically used the Fisher equation[239] and the observed yields of:

- Five-year Commonwealth Government Securities, which reflect a market-based estimate of the nominal risk free rate.
- Five-year indexed Treasury bonds, which reflect a market-based estimate of a real risk free rate.[240]

543. The approach uses linear interpolation to derive both the nominal risk free rate and the real risk free rate. In doing this, it takes a 20-day moving average to reduce the volatility of the estimate. It is based on the premise that the yield on Commonwealth Government Securities and the yield on Treasury bonds differ only by an inflation component.

544. Western Power proposed using the same approach for this access arrangement. Western Power's proposal used the 20-day averaging period to 30 June 2017 as a placeholder. This period provided a forecast inflation rate of 1.64 per cent.[241]

10.2.2 Draft decision

545. For the draft decision, the ERA accepted Western Power's proposed approach for calculating forecast inflation.

546. The ERA accepted the Western Power nominated 20-day averaging period to 29 March 2018.

547. The period to 29 March 2018 provided a forecast inflation rate of 1.84 per cent.

10.2.3 Public submissions

548. Western Power accepted the approach to forecast inflation.[242]

549. The WAMEU's submission supported the ERA's decision to use bonds to provide this parameter.[243]

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[239] The formal Fisher equation is: $1+i=(1+r)(1+\pi^e)$

where: *i* is the nominal interest rate, *r* is the real interest rate and π^e is the expected inflation rate.

[240] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 4 Rate of Return*, 30 June 2016, p. 33.

[241] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 207.

[242] Western Power, *Revised AA4 proposal – Response to the ERA's draft decision,* 14 June 2018, p. 121.

[243] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp. 40-41.

10.2.4 Final decision

550. For the final decision, the ERA considers the Treasury bond implied inflation approach is appropriate.

551. For the final decision, the ERA accepts a forecast inflation rate of 1.84 per cent for the period to 29 March 2018.

10.3 Value of imputation credits (gamma)

552. The imputation tax system prevents corporate profits from being taxed twice. Prior to the introduction of imputation on 1 July 1987, company profits were taxed once at the corporate level and again at the dividend recipient level (for example, as personal income tax). Under the Australian imputation tax system, franking credits are distributed to investors at the time dividends are paid and provide an offset to those investors' taxation liabilities.

553. 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 utilise 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.

10.3.1 Western Power's initial proposal

554. In its 2016 DBNGP decision, the ERA adopted a gamma of 0.4.[244]

555. Western Power proposed a gamma value of 0.4, but noted that "we consider this a preliminary estimate, and reserve the right to update and/or revise our gamma estimate pending the outcome of the ongoing judicial and limited merits review of this issue".[245]

10.3.2 Draft decision

556. The ERA has used the following estimation methods to determine gamma in recent decisions:[246]

- the equity share ownership approach, which gives an estimate of gamma of 0.41
- the taxation statistics approach, which gives an estimate of gamma of 0.34
- the dividend drop-off study approach, which gives a range estimate of gamma of 0.28 to 0.40.

557. Of these results, the ERA gave the most weight to the equity share ownership approach, and adopted a point estimate for gamma of 0.4.

558. The estimate of gamma has been the subject of some contention in recent Australian regulatory decisions, with network businesses consistently proposing a gamma value of 0.25, and the ERA and AER setting a value of 0.40.

[244] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 – Appendix 5 Gamma*, 30 June 2016, p. 48.

[245] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 208.

[246] ERA, *Final decision on the proposed revisions to the access arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016-2020 | Appendix 5 - Gamma*, 30 June 2016.

559. The estimate of gamma under the National Electricity Rules and National Gas Rules has been the subject of several limited merits reviews by the Australian Competition Tribunal, with the following outcomes:

- In February 2016, the Tribunal found in favour of the New South Wales networks Ausgrid, Endeavour Energy and Essential Energy that gamma should be 0.25. In March 2016, the AER applied to the Federal Court for judicial review of the Tribunal decisions to set aside the New South Wales and Australian Capital Territory electricity and gas distribution network revenue determinations. In May 2017, the Full Federal Court upheld the AER's appeal in respect of the Tribunal's construction of the rules regarding gamma.[247]
- In June 2016, the Tribunal found in favour of ATCO Gas Australia that gamma should be 0.25. At that time there was no final determination of the Full Federal Court appeal of the AER decision.
- In October 2016, the Tribunal found in favour of the AER, against SA Power Networks, that gamma should be 0.4. SA Power Networks appealed the Tribunal decision to the Federal Court. In January 2018, the Full Federal Court also affirmed the AER's decision on gamma for a value of 0.4.[248]

560. The ERA's gamma decision in the most recent DBNGP access arrangement decision was appealed by DBNGP and at the time of the draft decision the matter was before the Tribunal.

561. Western Power proposed using the same approach for gamma as that used by the ERA in its DBNGP decision. However, Western Power states that "we consider this a preliminary estimate and reserve the right to update and/or revise our gamma estimate pending the outcome of the ongoing judicial and limited merits review of this issue".

562. In the draft decision the ERA considered that, despite the DBNGP's Tribunal decision remaining unresolved, the appropriate value of imputations credits (gamma) is 0.4. The contemporary and later Tribunal and Federal Court judicial reviews have all upheld the reasoning in the regulator's decision and found no error with the value of 0.4 and how it was derived.

563. In July 2018, the Australian Competition Tribunal dismissed the application for merits review of the ERA's final decision on proposed revisions to the access arrangement for the DBNGP.

564. Although the Access Code does not contain a specific rule on how to estimate gamma (as is the case in the National Electricity Rules and the National Gas Rules) the overarching Access Code objective and the price control objectives require similar considerations to the objectives in the national frameworks.

565. The estimate of gamma is an industry-wide parameter and the ERA considered the recent regulatory decisions and outstanding legal reviews are relevant to Western Power's AA4 proposal.

[247] Federal Court of Australia, Australian Energy Regulator v Australian Competition Tribunal (No 2) [2017] FCAFC 79, May 2017

[248] Federal Court of Australia, SA Power Networks v Australian Competition Tribunal (No 2) [2018] FCAFC 3, Jan 2018.

566. In its draft decision, the ERA did note that recent analysis by the AER suggested that a gamma value may be higher than 0.4.[249]

567. For the purposes of the draft decision, the ERA considered that Western Power's proposed gamma of 0.4 achieved the objectives set out in section 6.4 of the Access Code and the Code objective.

568. The ERA noted that it would further consider the new Australian Bureau of Statistics (ABS) data before making a decision on gamma.

10.3.3 Public submissions

569. Western Power accepted the ERA's position on gamma.[250]

570. ATCO's submission raised gamma.[251] ATCO commissioned Frontier Economics to produce a report on gamma, which was included in its submission.[252]

571. Frontier has three principal propositions:[253]

- That ATO data can provide a suitable estimate of gamma through the use of credits redeemed divided by credits created. This approach would not separately need to calculate the distribution rate and the utilisation rate.
- That deficiencies in the ABS data warrant its rejection for estimating the utilisation rate. Frontier notes some concerns expressed by the ABS and notes that this data has been significantly revised by the ABS, suggesting that this warrants rejection. Frontier does express a view on the need to compare the quality of competing estimators.
- That errors in Lally's analysis using financial statement data to estimate the distribution rate mean that this method should not be used.
  - Frontier argues that the 20 companies examined by Lally are unsuitable because these companies have substantial foreign income, and Frontier assumes that foreign income drives up the distribution rate.
  - Frontier argues that Lally presumes that all credits distributed by firms are immediately available for shareholders to redeem, but that this might not occur. Therefore some credits might be delayed or lost.
  - Frontier argues that there are a number of errors in Lally's analysis to estimate the aggregate distribution rate of the largest 20 firms. Frontier does not present a revised estimate of the aggregate distribution rate.

[249] AER, *Discussion paper – Value of imputation credits*, March 2018, p. 16.

[250] Western Power, *Revised AA4 proposal – Response to the ERA's draft decision,* 14 June 2018, p. 121.

[251] ATCO's submission on the ERA's Draft Decision on Western Power's Access Arrangement for AA4, including the Frontier report, is available at:
https://www.erawa.com.au/cproot/19203/2/WPAA4%20-%20DD%20PubSub%20-ATCO%20Australia.pdf

[252] Frontier Economics, *The 'utilisation' estimate of gamma – report prepared for ATCO Gas Australia,* May 2018.

[253] Frontier Economics, *The 'utilisation' estimate of gamma – report prepared for ATCO Gas Australia,* May 2018.

572. The WAMEU's submission also included a discussion on gamma based in part on the CRG and Major Energy User submissions to the AER.[254] The WAMEU makes three main points:

- As the benchmark efficient entity is a defensive stock with a mature asset base, it does not have a have high capital growth and therefore does not need to retain earnings for growth. Therefore, the distribution rate for the benchmark efficient entity should be higher than an average business.
- The WAMEU submitted that the version of CAPM that incorporates tax imputation (the Officer model[255]) implied that the benchmark efficient entity must be an Australia firm with equity sourced exclusively from Australian shareholders. Therefore, the WAMEU argued that the utilisation rate should be one.
- The WAMEU referred to a recent analysis that tax paid by energy networks is less than the tax allowance provided by the AER to energy networks. The WAMEU referred to a Major Energy Users' submission to the AER that gamma should be increased due to the low actual tax payments of the energy networks.

573. Following the publication of the draft decision, the ERA issued a notice on 17 August 2018 on new rate of return information to be considered that may affect Western Power's rate of return. This information included new information that may have increased the estimate of gamma. The ERA considered that it was appropriate to take this new information into account and offered interested parties the opportunity to make further comment. [256]

574. This new information relating to gamma included:

- Clarification of the application of ATO data and its application to gamma. In May 2018, ATO advised the AER that taxation statistics data should not be used for detailed time series analysis of the imputation system.[257] On 21 June 2018, the two parties had a meeting along with other experts and network stakeholders to clarify this matter.[258]
- New advice from Lally on gamma. [259] In response to public submissions on Western Power's draft decision the ERA commissioned additional work from Lally on gamma.

[254] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp. 41-42.

[255] Officer, *The cost of capital of a company under an imputation tax system*, Accounting and Finance, May 1994.

[256] https://www.erawa.com.au/cproot/19393/2/Notice%20-%20New%20information%20to%20be%20considered%20-%20Draft%20Decision%20on%20Proposed%20Revisions%20to%20the%20Access%20Arrangement%20for%20the%20Western%20Power%20Network.pdf

[257] Available at: https://www.aer.gov.au/system/files/ATO%20Note%20to%20AER%20regarding%20imputation%20-%209%20May%202018.pdf

[258] Available at: https://www.aer.gov.au/system/files/AER%20-%20Minute%20of%2021%20June%202018%20meeting%20with%20ATO%20and%20comments%20on%20ENA%20summary%20-%205%20July%202018_1.DOCX

[259] Lally, *Review of gamma submissions and the ERAWA's views on gamma,* July 2018.

575. Western Power's submission expressed concern with the consultation process. Western Power considered that the short time frame provided for public submissions on Lally's review did not enable sufficient expert review to challenge Lally's assertions. Western Power argued that the ERA should not rely solely on Lally's review until such time as the detailed public consultation process for the Gas Guidelines is completed.[260]

576. ATCO provided a submission on the new rate of return information, which focused on gamma. ATCO commissioned a detailed expert review on gamma by Frontier Economics. This expert report on gamma helped to inform ATCO's submission.[261] ATCO's submission can be summarised as follows. [262]

- ATCO considered that gamma should be estimated directly from ATO data, which produced a gamma estimate of 0.34.
  - ATCO argued that this method was simple and produced stable results.
  - ATCO referred to a June 2018 Hathaway report that confirmed the calculation from ATO data as a ratio of credits redeemed to credits credited.[263]
- ATCO submitted that the ERA's proposed distribution rate did not reflect an estimate consistent with the benchmark efficient entity, as it included firms with foreign income.
- ATCO submitted the distribution rate estimates provided by Lally contained several unresolved issues, including its reliance on Franking Account Balance information.
- ATCO expressed concern with the quality of the ABS data used for the equity ownership estimate.
- ATCO expressed concerns that the equity ownership approach did not reflect other potential reasons why tax credits might not be redeemed by investors in Australia.
- ATCO considered it was internally inconsistent to estimate the proportion of credits that are distributed to one group of shareholders and the proportion that are redeemed by an entirely different group of shareholders. ATCO referred to this as a 'cash flow' interpretation of gamma.

577. The WAMEU provided a submission on this new information and strongly supported the ERA using new information that may affect Western Power's rate of return. The WAMEU viewed that the consideration of this new rate of return information was aligned with its submission to the draft decision, and issues raised in this submission regarding WACC.[264]

[260] Western Power, *Public consultation – New rate of return information to be considered,* August 2018.

[261] Frontier Economics, *The 'utilisation' estimate of gamma – Report prepared for ATCO Gas Australia,* August 2018.

[262] ATCO, *Re: New Rate of Return Information – Western Power Network Access Arrangement – 2017/18 to 2021/22.*

[263] Hathaway, Capital Research Memorandum, 28 June 2018, Available from: https://www.aer.gov.au/system/files/ENA%20-%20Capital%20Research%20Memorandum%20-%2028%20June%202018.pdf

[264] EnergyXL, Submission from WAMEU re New Rate of Return Information.

10.3.4 Final decision

578. The ERA has further considered gamma given:

- New developments in gamma identified during the ERA's recent consideration the Draft Gas Rate of Return Guidelines.[265]
- Further clarifications from the ATO on the use of its data for the purpose of estimating gamma. [266] [267]
- ATCO's submission and the Frontier Economics report.[268]
- The WAMEU submission.[269]

579. As part of the AER's 2018 review of its guidelines, it sought clarification from the ATO on the use of tax statistics. In May 2018, the AER was advised that the ATO is of the view that the taxation statistics data should not be used for detailed time series analysis of the imputation system. The ATO would not recommend using taxation statistics data as the basis of a detailed macro analysis of Australia's imputation system.[270]

580. On 21 June 2018, the AER, ATO, experts and network stakeholders had an additional meeting to clarify the ATO's note. The minutes for this meeting are available on the AER's website.[271] At this meeting the ATO confirmed its concern with the use of tax statistics in time series analysis for gamma, including that:

- Tax statistics should not be used to reconcile the imputation system.
- Using aggregate data related to the imputation system from taxation statistics (including franking account balance [FAB], net tax amounts, dividends) in a time series analysis does not allow for entries and exits of businesses and therefore this analysis will be flawed.

581. To assist with its consideration of gamma, the ERA commissioned Dr Lally to:

- Review public submissions on the ERA's approach to gamma in its draft decision on Western Power's AA4.

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[265] ERA, *Draft Explanatory Statement for the Rate of Return Guidelines,* 29 June 2018.

[266] ATO note to the AER regarding imputation. Available at: https://www.aer.gov.au/system/files/ATO%20Note%20to%20AER%20regarding%20imputation%20-%209%20May%202018.pdf

[267] AER minute available at:

https://www.aer.gov.au/system/files/AER%20-%20Minute%20of%2021%20June%202018%20meeting%20with%20ATO%20and%20comments%20on%20ENA%20summary%20-%205%20July%202018_1.DOCX

[268] ATCO's submission on the ERA's Draft Decision on Western Power's Access Arrangement for AA4, including the Frontier report, is available at:

https://www.erawa.com.au/cproot/19203/2/WPAA4%20-%20DD%20PubSub%20-ATCO%20Australia.pdf

[269] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp. 41-42.

[270] ATO note to the AER regarding imputation. Available at: https://www.aer.gov.au/system/files/ATO%20Note%20to%20AER%20regarding%20imputation%20-%209%20May%202018.pdf

[271] AER minute available at:

https://www.aer.gov.au/system/files/AER%20-%20Minute%20of%2021%20June%202018%20meeting%20with%20ATO%20and%20comments%20on%20ENA%20summary%20-%205%20July%202018_1.DOCX

- Review the ERA's approach to gamma in its Draft Gas Rate of Return Guidelines.
- Account for the AER's recent consultation process.
- Express a view on the ERA's approach to gamma in the Draft Gas Rate of Return Guidelines.

582. The findings from Lally's review of gamma are summarised below.[272]

- Lally largely concurred with the ERA's views. The only major exception was the ERA's view that, despite using a domestic version of the CAPM, internal consistency required that the estimate of gamma take account of the presence of foreign investors. Lally took the view that the model was for the domestic CAPM, with no foreign investors. Therefore, the distribution rate should theoretically be 1.[273]
- The review noted that the empirical reality was that the market was partially integrated.[274]
- The review noted there was no suitable model that recognised the empirical reality that national equity markets were partially integrated. Lally favoured estimating the cost of equity using a model that assumed complete segregation of national equity markets, and also from one that assumed complete integration of these markets, followed by exercising judgement in choosing between these two boundary values.[275]
- Lally favoured the use of ABS data for estimating the proportion of Australian equities held by local investors.[276]
- Lally disagreed with the three principal propositions from Frontier.[277]
  - The principal drawback with using ATO data to estimate gamma is that it implicitly estimates the distribution rate for the average firm rather than the benchmark efficient entity. In addition, an estimate of the utilisation rate is still required.
  - There are deficiencies in the ABS data but not to the extent as those in the ATO data. The revision to the ABS data is not a concern and it improves the data set.
  - The review addresses Lally's analysis of financial statements:
    - While the 20 companies examined have substantial foreign income and this is not a feature of the benchmark efficient entity, Frontier offers no empirical evidence that this increases the distribution rate. Lally showed that as the proportion of foreign income increases the distribution rate decreases, which is the opposite direction that is claimed by Frontier. Lally showed that the distribution rate will increase with the removal of firms with high foreign income.

[272] Lally, *Review of gamma submission and the ERAWA's views on gamma,* 25 July 2018.
[273] Lally, *Review of gamma submission and the ERAWA's views on gamma,* 25 July 2018, p. 3.
[274] Lally, *Review of gamma submission and the ERAWA's views on gamma,* 25 July 2018, p. 3.
[275] Lally, *Review of gamma submission and the ERAWA's views on gamma,* 25 July 2018, p. 3.
[276] Lally, *Review of gamma submission and the ERAWA's views on gamma,* 25 July 2018, p. 17.
[277] Lally, *Review of gamma submission and the ERAWA's views on gamma,* 25 July 2018, p. 3.

- Lally demonstrated that delay in the transmission of credits from the source companies to ultimate users has an immaterial effect. Lally went on to demonstrate credits trapped in intermediaries do not materially reduce the distribution rate.

- Frontier referred to errors in a previous report by Lally. Frontier ignored later reports from Lally that corrected these errors. In any case, these correction of errors in the distribution rate using financial statement data does not change the estimate of 83 per cent using 2000-2013 data and extension of the data to 2017 raises the estimate to 88 per cent.

- The review found some merit in the three points made by the WAMEU.[278]

  - The maturity of the businesses merely explains the high distribution rates observed and does not necessarily mean that the estimate needs to be revised upwards.

  - Lally agreed that the utilisation rate should be 1 as the version of CAPM (the Officer model) implies that the benchmark efficient entity must be an Australian firm with equity sourced exclusively from Australian shareholders. However, Lally also noted that there was no suitable model that recognises the empirical reality that national equity markets are partially integrated.

  - Lally found there was room for doubt that low tax payments would raise the distribution rate for credits. Therefore, adjusting the observed distribution rates upwards was not warranted.

583. There is no suitable model that addresses that national equity markets are partially integrated:

- The ERA and AER have both taken a partial integration approach when estimating the utilisation rate.
- Lally considered that it did not follow that it was wrong to include foreign investors to estimate the utilisation rate. This might be done to pragmatically incorporate the empirical reality of foreign investors into a model that implicitly precludes them, in the belief that this produces more realistic results.[279]
- The ERA considers it as pragmatic to interpret this definition to recognise the existence of foreign investors. This approach therefore defines the utilisation rate as a weighted average over the utilisation rates of all investors in the Australian market, both foreign and local investors.
- Taking such an approach to define the utilisation rate also has the benefit of providing an estimator that can be fairly reliably estimated, which contrasts with difficulties associated with other approaches to estimating the utilisation rate.

584. In response to ATCO's submission on the consideration of new rate of return information for Western Power's access arrangement, the ERA commissioned further advice from Lally on gamma.[280]

[278] Lally, *Review of gamma submission and the ERAWA's views on gamma,* 25 July 2018, pp. 3-4.

[279] Lally, *Review of the AER's views on gearing and gamma,* May 2018, p. 23.

[280] Lally, *Review of Frontier's Gamma Submissions*, September 2018.

585. Lally's further advice can be summarised as follows.[281]

- With regard to Frontier's concerns on Lally's distribution rate calculation:
  - Frontier argued that the problems with the use of the ATO FAB data applied equally to the franking balance data drawn from the financial statements of the top 20 firms. Therefore, Frontier argued that it was inappropriate to use Lally's approach, which used franking data from financial statements. In response, Lally argues that the problem of firms dropping out of the ATO FAB data does not affect financial statement data from a stable list of companies.
  - Frontier argued that the use of financial statement data was subject to the problem that some credits were extinguished within corporate structures without being distributed to shareholders. Lally noted that the examples provided by Frontier for BHP and Rio Tinto were issues involving the utilisation rate for credits rather than the distribution rate. To correct this, BHP and Rio Tinto could be removed from the set of companies, which would have the effect of increasing the distribution rate from 88 per cent to 95 per cent.
  - Frontier argued that some firms have received large tax refunds that decreased their franking balancing, leading to an overestimate of the distribution rate. Lally noted the tax refunds could also lead to underestimation and most refund situations would not lead to errors in the estimate.
- The review reaffirmed that there was no necessity to use the same set of companies for estimating the utilisation and distribution rates. Lally considered that there is good reason to not do so. For example, one might want to use specific firms to estimate the distribution rate, while at the same time using all firms to estimate the utilisation rate.[282]

586. The ERA disagrees with Frontier's concerns over Lally's distribution rate calculation. The ERA considers that it is not necessary to use the same set of companies for estimating the utilisation and distribution rates.

587. Frontier restated a number of concerns that have been addressed by Lally's earlier advice. Frontier again raised concern with:

- The use of the 20 largest ASX-listed firms, as it argued that these firms are not relevant comparator entities.
- The quality of ABS data.
- The equity ownership approach does not reflect other reasons why tax credits might not be redeemed.

[281] Lally, *Review of Frontier's Gamma Submissions*, September 2018.

[282] Lally, *Review of Frontier's Gamma Submissions*, September 2018, p. 6.

588. The ERA has not used ATO data to determine the distribution rate. This is confirmed by Lally, who, in view of problems with the dividend and franking balance data of the ATO, considered the best estimate of the distribution rate of the benchmark efficient entity was obtained from financial statement data.[283] The ATO data also has the problem of being market wide, which means that it is not reflective of the benchmark efficient entity..

589. ABS information on equity ownership obtained from the Australian National Accounts can be used to estimate the utilisation rate.[284]

590. When using this ABS data, the ERA has refined the equity ownership approach by filtering the national accounts data to focus on the type of equity that are most relevant to the estimation of a market-wide utilisation rate. This data refinement is consistent with the method set out by AER. [285] The method:

- Excludes from the calculation entities that are wholly owned by the public sector – including equity issued by the 'central bank', 'central borrowing authorities', 'national public non-financial corporations' and 'state and local public non-financial corporations'.
- Sums the equity held by those classes of domestic investor that are eligible to utilise imputation credits – 'households', 'pension funds' and 'life insurance corporations'.
- Sums the equity held by the classes of investors that are not eligible to utilise imputation credits - 'the rest of the world'.
- Determines the share of equity held by domestic private investors eligible to utilise imputation credits as a proportion of the equity held by the eligible and non-eligible private investors in the market.
- Excludes government-held equity from the calculation of the domestic ownership share.

591. Based on the most recent updated ABS data,[286] all (listed and unlisted) equity suggests a range for the utilisation rate of between 0.6 to 0.7.

592. The most recent March 2018 quarter's ABS equity ownership data shows a utilisation rate for all equity of 0.65. The average of domestic equity ownership rate over 120 quarterly observations since the introduction of imputation tax system in June 1988 is 0.63.

593. Given estimation accuracy, the ERA considers it appropriate to only round to one decimal place. Therefore, the ERA has applied a utilisation rate of 0.6.

594. The utilisation rate of 0.6 and a distribution rate of at least 0.9, based on Lally's updated work, will produce a value of imputation credits of 0.5.

[283] Lally, *Review of Frontier's Gamma Submissions*, September 2018, p. 8.

[284] Australian Bureau of Statistics, Australian National Accounts: Finance and Wealth, Catalogue 5232.0, Tables 47 and 48.

[285] AER, *TasNetwork Access Arrangement 2017-19, Attachment 4 – Value of Imputation credits*, p. 161.

[286] ABS, Technical Notes on significant quality assurance work undertaken for the historical revision through review of complication methods and through source data, September 2017 http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/5232.0Technical+Note1Sep%202017

595. Having considered expert reports, public submissions and recent advice from Lally, the ERA considers that the following approach to gamma is appropriate for the final decision:

- The determination of gamma through the Monkhouse formula as the product of the distribution rate and utilisation rate.[287]
- The distribution rate represents the proportion of imputation credits generated by a benchmark efficient entity that is expected to be distributed to investors. The ERA considers that the distribution rate is a firm-specific rather than a market-wide parameter.
- In estimating the distribution rate, the ERA relies on Lally's estimate of 0.88 for the distribution rate from financial reports of the 20 largest ASX-listed firms.[288]
- The ERA rounds the distribution rate to one decimal place and considers that the distribution rate is at least 0.9. As detailed by Lally, the three energy network businesses for which data is available produce a higher distribution rate of 1. Addressing the problems of limited available data and ability for manipulation, the ERA considers the use of the 20 largest ASX listed firms as the best proxy for the distribution rate for the benchmark efficient entity.
- The utilisation rate is the weighted average over the utilisation rates of individual investors, with investors able to fully use the credits having a rate of 1 and those unable to use them having a rate of zero. The ERA considers that the utilisation rate is a market-wide rather than a firm wide parameter.
- In estimating the utilisation rate, the ERA relies on the equity ownership approach to determine the percentage of domestic investors in the Australian equity market. The utilisation rate is estimated for all Australian equity from the national accounts of the ABS. The ERA considers that a utilisation rate of 0.6 is appropriate.

596. For the final decision, the ERA has applied a gamma of 0.5.

[287] The Monkhouse formula is expressed as: gamma = distribution rate x utilisation rate

Monkhouse, *The Valuation of Projects under a Dividend Imputation Tax System*, *Accounting and Finance 36*, 1996, pp. 185-212.

[288] Lally, *Review of gamma submission and the ERAWA's views on gamma,* 25 July 2018, p. 5.

11 Final decision on rate of return

597. Taking account of the information provided with Western Power's amended access arrangement information, public submissions and available information, the ERA has reviewed and updated its draft decision. The considerations of the ERA are set out above.

598. Based upon the above assessment of each of the rate of return parameters, the point estimates for each of the parameters that the ERA considers may reasonably be applied to Western Power are as shown in Table 19 below.

- The ERA estimates the nominal after tax cost of equity as 6.57 per cent
- The ERA estimates the nominal cost of debt as 5.29 per cent
- The ERA's rate of return estimate is 5.87 per cent.

599. The ERA considers that the objectives set out in section 6.4 of the Access Code and the Code objective are not satisfied by the rate of return in Western Power's revised AA4 proposal for the reasons detailed above.

600. Therefore the ERA does not approve Western Power's proposed nominal after tax rate of return of 6.12 per cent.

601. The ERA considers that a nominal after tax rate of return of 5.87 per cent meets the objectives set out in section 6.4 of the Access Code and the Code objective for the reasons detailed above.

602. For the purpose of this final decision, the ERA adopts a nominal after tax rate of return of 5.87 per cent.

Table 19 The ERA's final decision on WACC compared to the draft decision

Parameter	ERA final decision	ERA draft decision
Averaging period	29 March 2018	29 March 2018
Cost of equity parameters		
Nominal risk free rate (per cent)	2.37	2.37
Equity beta	0.7	0.7
Market risk premium (per cent)	6.0	6.2
Nominal after tax return on equity (per cent)	**6.57**	**6.71**
Cost of debt parameters		
Five-year interest rate swap (effective yield) (per cent)	2.590	2.590
Debt risk premium (per cent)	2.487	2.613
Benchmark credit rating	BBB+	BBB+
Term of debt for debt risk premium	10 years	10 years
Debt issuing costs (per cent)	0.100	0.100
Debt hedging costs (per cent)	0.114	0.114
Nominal cost of debt (return on debt) (per cent)	**5.29**	**5.42**
Other parameters		
Debt proportion (gearing)	55	55
Forecast inflation rate (per cent)	1.84	1.84
Franking credits (gamma) (per cent)	50	40
Corporate tax rate (per cent)	30	30
Weighted Average Cost of Capital		
Nominal after-tax WACC (per cent)	**5.87**	**6.00**
Real after tax-WACC (per cent)	**3.95**	**4.08**

Source: ERA analysis

ATTACHMENT 1

ENERGY NETWORK PROFITABILITY AND THE REGULATORY ASSET BASE

Profitability of energy networks and relation to WACC

603. The Western Australian Major Energy Users (WAMEU) raised concerns that high energy network profitability has been driven by an unreasonably high Weighted Average Cost of Capital (WACC).[289] These concerns included that:

- Western Power is an extremely profitable corporation relative to its risk
- Western Power's return on equity is higher than that allowed by the ERA's rate of return.

604. The WAMEU noted the Australian Energy Regulator (AER) was implementing a method to assess energy network profitability. The WAMEU considered that the ERA should undertake ex-post reviews of Western Power's profitability and compare this to what was allowed.[290]

605. The ERA has reviewed the AER's consultation for its Rate of Return Guidelines and its review of energy network profitability. As part of these processes, some stakeholders have also raised concerns with high energy network profitability being driven by an unreasonably high WACC.

606. The AER released a Draft Position Paper on energy network profitability in April 2018.[291] The aim of the AER's review was to identify suitable profitability measures and the associated data requirements that would allow it to report and compare the returns of energy networks it regulates.

607. The AER's consideration of profitability identified factors, in addition to the rate of return, that affect network business profitability.[292] These factors include:

- The incentive schemes that offer service providers incentives to improve efficiency of their service, which was the main factor identified.
- Regulatory, operational and environmental factors (for example revenue smoothing, the timing of regulatory decisions, WACC parameters, pass through events and one-off type events).

[289] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, pp. 20-22.

[290] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, p. 20.

[291] AER, *Profitability measures for electricity and gas network businesses – Draft position paper,* April 2018.

[292] AER, *Profitability measures for electricity and gas network businesses – Draft position paper,* April 2018, p. 13-14.

608. Reflecting the difficulties in identifying profitability drivers, the AER considered that adjusting for all these yearly fluctuations to try to make the return on assets more comparable to the pre-tax WACC would add complexity and never fully account for all variations.[293]

609. However, the AER considered that reporting on energy network profitability would assist to achieve of the National Gas Objective by making those returns and their drivers transparent.[294]

610. Therefore, as detailed in its Draft Position Paper, the AER will implement a method to assess the profitability of energy networks, which includes:

- A suite of five profitability measures.
- Annual publication of a performance report for network businesses.
- A focus on core regulated services, as measures will be used to compare service providers with regulatory benchmarks.
- Improved reporting of regulatory accounts, including the development of specific guidance on how to translate statutory accounts to regulatory accounts and a requirement for independent assurance of submitted information.

611. The AER will have regard to profitability outcomes as part of regulatory determination processes, however, the information will not be used in a mechanical way to make adjustments to allowed revenues.[295] The information on energy network profitability will help inform future stakeholder submissions.

612. The ERA will continue to monitor developments with the AER's assessment of network business profitability.

613. For Western Australia's energy networks, the ERA may further consider the introduction of improvements to the reporting of regulatory accounts and annual profitability of businesses.

Regulatory Asset Base multiples

614. The WAMEU raised concerns that high energy network business values, Regulatory Asset Base (RAB) multiples, have been driven by an unreasonably high WACC.[296]

615. A recent report by Darryl Biggar has reviewed the role of energy networks' RAB multiples and what contributed to a RAB multiple greater than one.[297]

[293] AER, *Profitability measures for electricity and gas network businesses – Draft position paper,* April 2018, p. 14.

[294] AER, *Profitability measures for electricity and gas network businesses – Draft position paper,* April 2018, p. 2.

[295] AER, *Profitability measures for electricity and gas network businesses – Draft position paper,* April 2018, p. 5.

[296] WAMEU, *Response to the Draft Decision ERA 2017/18 regulatory review of Western Power SWIN*, May 2017, p. 21.

[297] Biggar, *Understanding the role of RAB multiples in regulatory processes*, February 2018.

616. Biggar found that there was a range of factors, in addition to expected returns, that influence RAB multiples. A RAB multiple greater than one may be driven by: [298] [299]

- The possibility that buyers overpaid through buyers irrational exuberance or the 'winner's curse'.
- Buyers expecting to achieve greater efficiency gains that result in actual operating and capital expenditure being below the amount currently allowed.
- Buyers expecting to increase revenue by increasing demand for regulated services.
- Buyers expecting to undertake future capital expenditure to increase the RAB.
- Buyers benefiting from more efficient tax structures or financing than the benchmark assumption adopted by the regulator.
- Expectations of higher returns if regulation is relaxed.
- Buyers paying for existing and/or potential unregulated revenue streams that sit outside the RAB.
- Buyers paying an option premium for the ability to undertake future value adding activities.

617. Biggar found that a RAB multiple range of 0.9 to 1.3 was reasonably expected. A RAB multiple outside of this range may give cause for further investigation.[300]

618. Furthermore, McGrathNicol found that RAB multiples were only relevant for a limited period following the transaction, becoming less relevant as time passes.[301]

619. The ERA views that there are multiple factors that drive a RAB multiple greater than one. Therefore, it is not appropriate to directly link an energy network business's RAB multiple to its WACC.

[298] Biggar, *Understanding the role of RAB multiples in regulatory processes*, February 2018.

[299] AER, *Profitability measures for electricity and gas network businesses – Draft position paper,* April 2018, p. 24.

[300] Biggar, *Understanding the role of RAB multiples in regulatory processes*, February 2018, p.11

[301] McGrathNicol, Response to submissions on performance measures, April 2018, p. 16. Available at: https://www.aer.gov.au/system/files/McGrathNicol%20response%20to%20submissions%20on%20profitability%20measures%20-%2023%20April%202018.pdf