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

Appendix 5 Return on Regulated Capital Base

2 May 2018

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Appendix 5 Return on regulated capital base

1. This appendix sets out the Economic Regulation Authority's (**ERA**) considerations on the return on the regulated capital base.

Access Code requirements

2. Section 6.4 of the 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 *Electricity Networks Access Code 2004* (**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; and
   - must be based on an accepted financial model such as the Capital Asset Pricing Model (**CAPM**).

Western Power's proposal

8. Western Power states it has based its proposed WACC on the method used by the ERA in its 2016 decision on the access arrangement 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'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 for 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.

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

Parameter	Western Power's Approved WACC for AA3[3]	DBNGP Approved WACC[4]	Western Power's Proposed WACC for AA4[5]
Cost of equity parameters			
Nominal risk free rate	2.52%	1.80%	1.99%
Equity beta	0.65	0.70	0.70
Market risk premium	6.0%	7.40%	7.5%
Nominal after tax return on equity	**6.42%**	**6.98%**	**7.24%**
Cost of debt parameters			
Five-year interest rate swap (effective yield)	n/a	2.100%	2.29%
Debt risk premium	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	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)	**5.35%**	**5.06%**	**5.32%**
Other parameters			
Debt proportion (gearing)	60%	60%	60%
Forecast inflation rate	2.10%	1.43%	1.64%
Franking credits (gamma)	0.25	0.4	0.4
Corporate tax rate	30%	30%	30%
Weighted Average Cost of Capital			
Nominal after-tax WACC	**5.78%**	**5.83%**	**6.09%**
Real after tax-WACC	**3.60%**	**4.33%**	**4.38%**

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

[4] 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.

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

Approach to estimating the WACC

10. Western Power has used 2017/18 data to calculate the proposed WACC. It has used placeholder values, as at 30 June 2017 where necessary, with the intent that these be replaced with the most current values at the time of the ERA's final decision.[6]

Cost of equity

11. 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. Western Power proposes use of the CAPM as the principal means of determining the return on equity.

12. The main parameters used to calculate the cost of equity in the CAPM are the risk free rate, the equity beta and the market risk premium.

- **Risk free rate (for the cost of equity estimate):** The risk free rate represents the return an investor would expect when investing in an asset with no risk. Western Power proposes adopting the yield of a five-year Commonwealth Government Security as a proxy for the nominal risk free rate.[7] This is consistent with the ERA's approach in its 2016 DBNGP decision,[8] and its final decision for AA3.[9] Using the 20-day averaging period to 30 June 2017 as a placeholder, this approach gives a risk free rate of 1.99 per cent.
- **Equity beta:** The equity beta represents the sensitivity of returns to overall movements in the market. Western Power notes that recent regulatory determinations in Australia have converged on an equity beta of 0.7, and proposes this value be used for this access arrangement.[10] The ERA adopted an equity beta of 0.7 for its 2016 DBNGP decision.[11]
- **Market risk premium:** The market risk premium is the difference between the return investors expect from a diversified market portfolio and the risk free rate. It represents the premium investors expect to receive in return for taking on systematic risk. Western Power has proposed several changes to the ERA's approach to estimating the market risk premium. These are detailed below.

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

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

[8] 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.

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

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

[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, pp. 102-103.

Western Power's proposed approach to the market risk premium

13. Western Power's proposal is 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.[12]

14. Western Power has 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);[13]
    - placing greater weight on the NERA Economic Consulting (**NERA**) market risk premium study[14] than on the Brailsford, Handley and Maheswaran (**BHM**) market risk premium study[15] by using only the NERA adjustments, and so not using the BHM study;[16]
    - 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;[17] and
    - using the longest available time series of market data (1883 to 2016) to inform the estimate.[18]

15. Western Power's proposal results in a lower bound estimate of the market risk premium of 6.8 per cent.[19] This compares to a lower bound market risk premium of 5.4 per cent used in the DBNGP decision.

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[12] 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.

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

[14] 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.

[15] 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.

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

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

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

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

17. Western Power has 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;[20]
- 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;[21] and
- including the Australian Energy Regulator's (**AER**) most recent dividend growth model estimate, from its April 2017 final decision for TasNetworks.[22]

18. Western Power's proposal results in an upper bound estimate of the market risk premium of 8.2 per cent.[23] This compares to an upper bound market risk premium of 8.8 per cent used in the DBNGP decision.

19. Western Power has proposed a change to the way in which the ERA has previously set the market risk premium point estimate. It proposes retaining three of the ERA's four forward-looking indicators, being 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 considers that the fourth indicator – the Australian Securities Exchange 200 volatility index – is unreliable due to a weak relationship with the market risk premium.[24] Western Power also proposes that the ERA adopt three additional forward-looking indicators, being the prevailing bill rate, the Wright market risk premium and independent expert reports.[25]

20. Western Power proposes 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.[26]

Cost of debt

21. The cost of debt is the return investors require on issued debt. The main parameters used to determine the cost of debt are the risk free rate, the debt risk premium, and debt raising and hedging costs.

- **Risk free rate (for the cost of debt estimate):** The risk free rate represents the return an issuer would expect when providing finance to a firm with no risk. Western Power proposes using the five-year bank bill swap rate as a proxy for

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

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

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

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

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

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

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

the risk free rate, when calculating the cost of debt.[27] This is consistent with the ERA's approach in the 2016 DBNGP decision.[28, 29] Using the 20-day averaging period to 30 June 2017 as a placeholder, this approach gives a risk free rate of 2.29 per cent.

- **Debt risk premium:** The debt risk premium is the margin above the risk free rate that debt issuers require to compensate them for the risk inherent in providing debt finance. 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.[30] The debt risk premium relies on two additional inputs, being the benchmark credit rating and the term of debt:
  - **Benchmark credit rating:** 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. Western Power considers that a credit rating within the BBB band is appropriate, and notes that the ERA has used a credit rating within this band for Australian electricity and gas businesses in the past.[31] The ERA used a credit rating within the BBB band in its recent DBNGP decision,[32] but had previously used an average of A-/BBB+/BBB corporate bonds in its benchmark sample for the last Western Power access arrangement decision.[33]
  - **Term of debt:** 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. The ERA has used a 10-year term of debt in its recent regulatory decisions.[34] Western Power also proposes a 10-year term of debt for this access arrangement.[35]

  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.[36] Debt

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

[28] 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.

[29] 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.

[30] 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.

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

[32] 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.

[33] Economic Regulation Authority, *Final decision on proposed revisions to the access arrangement for the Western Power network*, 5 September 2012, p. 344.

[34] 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.

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

[36] 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.

risk premium estimates for specific years were determined using the ERA's revised bond yield approach (for the 2016 year),[37] and Reserve Bank of Australia (**RBA**) credit spreads for 10-year non-financial bonds (for 2015 and earlier periods).[38] Western Power proposes using the same approach for this access arrangement.[39]

- **Debt raising and hedging costs:** These are the costs incurred when raising or refinancing debt – for example, legal fees and company rating fees. There are also costs involved in hedging a firm's exposure to movements in the risk free rate. Western Power has proposed debt raising costs of 0.125 per cent and a hedging allowance of 0.114 per cent.[40] The ERA has used the same figures in its recent decisions.[41]

Other parameters

22. Three further parameters are used to calculate the WACC. These are gearing, forecast inflation and gamma. Western Power has proposed the following approach to determining these parameters:

    - **Gearing:** Firms are generally financed by a combination of debt and equity. The ratio of debt to equity capital is referred to as 'gearing' and is used to weight the debt and equity portions of the WACC. The ERA has adopted a gearing ratio of 60 per cent debt and 40 per cent equity in recent decisions,[42] and Western Power proposes the same ratio be used for this access arrangement.[43]
    - **Forecast inflation:** Forecast inflation is used to translate the nominal post-tax WACC to a real post-tax WACC. To calculate forecast inflation, the ERA has historically used the Fisher equation[44] and the observed yields of five-year Commonwealth Government Securities (which reflect a market-based estimate of the nominal risk free rate) and five-year indexed Treasury bonds (which reflect a market-based estimate of a real risk free rate).[45] Western Power proposes using the same approach for this access arrangement and notes that

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[37] 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.

[38] 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.

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

[40] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 206.

[41] 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.

[42] Economic Regulation Authority, *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.

[43] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 207.

[44] 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.

[45] 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.

it results in "a forecast inflation rate of 1.64 per cent for the 20 days to the end of June 2017".[46]

- **Value of imputation credits (gamma):** Gamma represents the reduction in effective taxation that is generated by the distribution of franking credits to investors, under Australia's imputation tax system. In its 2016 DBNGP decision, the ERA adopted a gamma of 0.4.[47] This decision is currently before the Australian Competition Tribunal. Western Power proposes a gamma value of 0.4, but notes 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".[48]

Annual update

23. Consistent with the DBNGP decision, Western Power's approach uses a hybrid trailing average method for determining the return on debt. This method:

    - adopts the five-year bank bill swap rate, set on the day; and
    - uses 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.

24. 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.

25. Western Power proposes 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.[49]

26. 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.[50]

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[46] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 207.

[47] 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.

[48] Western Power, *Access arrangement information: Access arrangement revisions for the fourth access arrangement period*, 2 October 2017, p. 208.

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

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

Submissions

27. Of 41 submissions received by the ERA, the following deal with the estimates of the WACC.

- Alinta Energy
- Australian Energy Council
- Bluewaters Power
- Change Energy
- Community Electricity
- Emergent Energy
- Kleenheat
- NewGen Neerabup Partnership (ERM Power)
- NewGen Power Kwinana
- Synergy

28. Points raised from the submissions are summarised below.

- Alinta Energy considers the rate of return should incentivise Western Power to act in a commercial manner when making investment decisions.
- The Australian Energy Council requests that, in considering a reasonable WACC, the ERA should have due regard to other Australian regulatory methods and determinations.
- Change Energy suggests that Western Power takes minimal commercial risk and this should be reflected in the rate of return calculations. It also expressed concern that the change in the rate of return requested by Western Power is one of the largest contributors to increased costs over the previous access arrangement.
- Change Energy, Kleenheat, NewGen Power Kwinana and Synergy were concerned with the size of Western Power's proposed increase in the equity component of the WACC.
- Change Energy and Kleenheat suggest that the ERA consider the proposed WACC in light of Western Power's status as a monopoly state-owned entity, having a lower commercial risk profile and access to lower borrowing costs.
- Emergent Energy and NewGen Power Kwinana considered that if Western Power is allowed full cost recovery and is immune to value destruction (from changing market conditions), then a rate of return commensurate with this risk class of investment should be applied. NewGen Power Kwinana considered that the WACC is overestimated as it reflects a market risk premium that compensates Western Power for market risk that can drive asset write-offs, which it does not face.
- Synergy requests that Western Power should provide more information to justify why its proposed use of the DBNGP determination WACC methodology effectively achieves the Access Code objective. Synergy suggests there may be subtle, but significant, differences between the requirements of the two regimes that mean the WACC methodology used for the DBNGP determination may not be always suitable.

- Synergy recommends that the ERA considers Western Power's approach to relying exclusively on the NERA estimates when calculating the market risk premium, and Western Power's approach to relying exclusively on the arithmetic averages when calculating the market risk premium.

29. In reviewing the components of Western Power's WACC the ERA will consider stakeholder submissions, either directly in specific commentary or indirectly through its considerations.

Considerations of the ERA

30. As a high level summary, 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 proposed:

- risk free rate (for the cost of equity estimate), updated for current data;
- equity beta, updated for current data;
- risk free rate (for the cost of debt estimate), updated for current data;
- debt risk premium, updated for current data and the use of calendar years;
- the term of debt;
- forecast inflation, updated for current data;
- value of imputation credits (gamma); and
- annual update of the debt risk premium.

31. The ERA has applied different values to:

- the credit rating;
- the gearing ratio;
- debt raising and hedging costs, correcting for a double counting in the debt raising costs; and
- the market risk premium.

32. A starting point to calculate an efficient rate of return for Western Power is the method used in the ERA's 2016 decision on the access arrangement for the DBNGP.[51] The ERA considered all available information and regulatory practice to determine any changes required to this method.

33. The ERA considers:

- the Access Code and National Gas Rules are similar, which means the general rate of return method can be applied to network service providers in electricity and gas; and
- 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.

[51] Economic Regulation Authority, *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.

34. Based on the ERA's method, it is reasonable for WACC parameters to be updated to reflect current market conditions.

35. This section addresses each parameter of the rate of return. The ERA considers that current market data warrants a change to some elements of Western Power's approach for estimating the rate of return.

The benchmark efficient entity

36. A benchmark efficient entity is needed to inform WACC parameters. A single benchmark efficient entity is adopted, 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.

37. The allowed rate of return then accounts for the risks of the provision of the reference services. The ERA uses a benchmark efficient entity that is the average of a sample of firms that meet the benchmark criterion.

38. The ERA considers that companies included in the benchmark sample must have three characteristics in order to be useful as comparators for the benchmark efficient entity:

- The company must be a network service provider in the gas and/or electricity industry in Australia.
- The company must be 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 must be available.

39. Guided by the general principles set out in the ERA's 2013 Gas Guidelines,[52] the ERA has conducted a review of an appropriate benchmark sample of firms.

40. The ERA has 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.

41. 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)

42. 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 2.

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

Table 2 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

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

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

45. Western Power's proposal did not update the benchmark sample of firms. Western Power utilised the method underlying the DBNGP decision, which was in turn based on the 2013 Gas Guidelines' use of six firms (Envestra, APA, DUET, Hastings Diversified Utility Fund, AusNet Services and Spark Infrastructure).

Cost of equity

Risk free rate (cost of equity)

46. The ERA considers 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.

47. The key considerations in estimating the risk free rate are:

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

48. An important regulatory principle is the present value condition (NPV = 0), which helps ensure 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 believes that the appropriate term for the risk free rate in the current regulatory setting is five years. The rate of return is reset every five years, consistent with the term of the access arrangement.

49. 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.

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

51. As a placeholder Western Power's proposal used the 20-day averaging period to 30 June 2017. This averaging period provides a risk free rate of 1.99 per cent.

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

53. The ERA accepts Western Power's nominated period. This averaging period to 29 March 2018 provides a risk free rate of 2.37 per cent.

Equity beta

54. Western Power proposes an equity beta of 0.7, noting that this is consistent with the ERA's decision on DBNGP.

55. Equity beta is the 'slope' parameter β_i in the Sharpe-Lintner Capital Asset Pricing Model (**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.

$$R_i = R_f + \beta_i \left(R_m - R_f \right)$$

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.

56. 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.

57. The ERA uses the methods set out in Henry's advice to the Australian Competition and Consumer Commission in 2009 to define the equity beta estimation approach.[53] Henry's study was updated in 2014, but remained essentially unchanged.[54]

58. 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.

59. 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; and
- 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.[55]

60. McKenzie and Partington's conceptual analysis also supports the view that the theoretical beta of the benchmark firm is low.[56]

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

62. 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.

63. 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.

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

65. To address the influence of outliers the ERA employs the following methods to calculate beta:[57]

- the Least Absolute Deviations (**LAD**) method;

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

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

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

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

[57] 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.

- the Ordinary Least Squares (**OLS**) method;
- the Maximum Likelihood Robust (**MM**) method; and
- the Theil-Sen (**T-S**) method.

66. 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.

67. The beta estimates are then averaged, using both equal and market-weighted averages, to determine a point estimate. Equally-weighted portfolios 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.[58]

68. 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.[59] For this reason thin trading is not addressed here. Table 3 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.

69. The OLS beta estimates are lower than that 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 3 Estimates of equity beta for individual firms and the two weighted portfolios in 2018 for different estimation methods

	APA	AST	DUE	SKI	Mean of firms	Equally weighted mean[60]	Value weighted mean	Mean of portfolios	Mean of firms & portfolios
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**
Mean of techniques (OLS, LAD, MM, T-S)	**0.921**	**0.791**	**0.444**	**0.704**	**0.715**	**0.659**	**0.787**	**0.723**	**0.718**

[58] 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.

[59] 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.

[60] 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.

70. 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.[61]

Table 4 Summary bootstrap simulated statistics of OLS estimators (B=10,000, n=261)

Model	Estimator	APA	AST	DUE	SKI	Mean of firms	Equally weighted wean	Value weighted mean	Mean of portfolios	Mean of firms & portfolios
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**

71. 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 4). 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 4).

72. Standard errors were inconsistently estimated for the LAD estimator and cannot be derived by analytical means for 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.

73. The 97.5 per cent upper bound for the robust estimators was greater than for the OLS estimates (Table 5); 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.

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

74. 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 5 Summary of bootstrap simulated statistics of robust estimators (B=10,000, n=261)

Model	Estimator	APA	AST	DUE	SKI	Mean of firms	Equally weighted mean	Value weighted mean	Mean of portfolios	Mean of firms & portfolios
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 6 Summary of bootstrap simulated statistics of robust estimators (B=10,000, n=261) (Continued)

Model	Estimator	APA	AST	DUE	SKI	Mean of firms	Equally weighted mean	Value weighted mean	Mean of portfolios	Mean of firms & portfolios
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**

75. The above tables (Table 4, Table 5 and Table 6) provide the ERA with confidence in the robustness of the β estimates.

76. The ERA's recent analysis, using the updated dataset to 2018, indicates that the use of an equity beta value of 0.70 is appropriate. This is consistent with the equity beta proposed by Western Power.

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

Market risk premium

78. 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.

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

80. 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.

81. 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 over a five-year period, consistent with the term of the regulatory period.

82. The ERA's recent method to estimate the market risk premium is detailed in its 2016 DBNGP determination.[62]

83. Western Power commissioned HoustonKemp to provide advice on the market risk premium.[63] Western Power has not accepted the ERA's method to estimating the market risk premium and proposes a modified approach.

84. Western Power has 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; and
- the indicators used to determine a point estimate of the market risk premium.

85. 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.[64]

86. Western Power's proposed amendments are dealt with in turn below.

Historic market risk premium

87. 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 directly measured. 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.

88. The benefits of using an historic market risk premium, as identified by McKenzie and Partington[65], include that the method and results:

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

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[62] 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.

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

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

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

89. 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.[66]

90. There is evidence indicating 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.[67] The implication is that the long-term forward-looking market risk premium is expected to be lower over time relative to the historical estimate.

91. Despite possible upward bias, the ERA's recent practice has been to estimate the lower bound for the market risk premium through calculating a historic market risk premium.

92. 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 Brailsford, Handley and Maheswaran (**BHM**) and NERA Economic Consulting (**NERA**) datasets.[68]
- 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.
- A simple average of the lowest arithmetic and highest geometric means of the produced market risk premium matrix is then used to estimate the lower bound of the market risk premium.

93. Western Power has 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 Australian Taxation Office (**ATO**) data on credit yields from 1998 onwards;
- the sole use of the NERA dataset;
- the sole use of an arithmetic mean; and
- the sole use of the longest time series.

Tax imputation credit yields

94. Since the introduction of tax imputation credits in 1988, tax imputation credits have affected investor returns.

95. 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.

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

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

[68] 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.

96. 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.

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

- dividends are 75 per cent franked between 1988 and 1998; and
- dividends are franked consistent with the ATO data on credit yields from 1998 onward.[69]

98. Western Power correctly states BHM use average imputation credits yields on the All Ordinaries Index sourced from the ATO.[70]

99. The data quality of this ATO information on the distribution rate is good and its use is consistent with current regulatory practice in Australia.[71]

100. 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.

101. 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.

102. For the purposes of the draft decision the ERA will accept Western Power's proposed approach on tax imputation. The ERA will assume that:

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

Underlying dataset

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

104. 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 on account of 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.

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[69] ATO data on credit yields is available from 1998.
ATO, https://www.ato.gov.au/Rates/Company-tax---imputation--average-franking-credit---rebate-yields/

[70] 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.

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

105. 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.

106. Western Power proposes to rely solely on the NERA dataset to estimate the historic market risk premium.

107. Western Power's consultant HoustonKemp details a June 2015 NERA report that examines the issues raised in the past by Handley on NERA's adjustments to historic data.[72] HoustonKemp argues 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.

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

109. The AER has reviewed the underlying datasets and the June 2015 NERA report. The SA Power Networks final decision describes how there are more concerns with pre-1958 data than those that NERA attempts to address with its adjustment and this creates 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.[73]

110. 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.[74]

111. 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.[75]

112. For the draft decision the ERA will continue to equally weight the BHM and NERA datasets when estimating the historic market risk premium.

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

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

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

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

Sampling periods

113. 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.

114. Western Power proposes the sole use of the longest data period 1883-2016.

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

116. The longest data period is not necessarily the most efficient estimator. An efficient estimator that can predict may be preferred over 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.[76]
>
> 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.[77]

117. 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 are 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 are likely to provide changing information regarding changes to the taxation and current regimes.[78]

118. 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; and
- shorter periods are more affected by the current environment or one-off events.

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

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

[78] 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.

119. Based on the above strengths and weakness, and given that no one data period has been assessed as superior, the ERA will continue 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.[79]

120. The ERA further believes 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.

121. For the draft decision the ERA will continue to use the five sampling periods when estimating the historic market risk premium.

Selection of an averaging method

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

123. When applying the historic market risk premium one must select an appropriate averaging method 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.[80]

124. Western Power proposes the sole use of the arithmetic mean to calculate the historic market risk premium.

125. Western Power's consultant HoustonKemp argues that the use of the arithmetic mean avoids downward bias.

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

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

[80] 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:

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

127. An arithmetic average will tend to overstate returns, whereas a geometric average will tend to understate them. These biases are empirically significant. As Blume shows, 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.[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 the actual variability of returns over time.

128. 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] 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.

129. 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.

130. Pink Lake Analytics states:

> 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.
>
> 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.[84]

131. There are arguments for both a single-period and multi-period investment horizon. Lally argues for a single-period investment horizon,[85] while Partington and Satchell argue for a multi-period investment horizon.[86] Given the volatility of returns over time, an investor may consider both horizons.

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

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

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

[86] 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.

132. Pink Lake Analytics states:

> 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.[87]

133. Furthermore, any structural break in the data series also increases the weighting for the geometric mean to estimate the market risk premium.[88] Therefore, given possible structural breaks in the data series, it is reasonable to place some weighting on the geometric mean.

134. Academic literature has also found that the geometric mean is useful in estimating a forward looking market risk premium.[89]

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

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

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

138. Consistent with Partington and Satchell, the ERA considers that market participants operate over a multi-year investment horizon. Therefore, for the purposes of the draft decision the ERA continues the 50/50 weighting of the arithmetic and geometric means.

Historic market risk premium estimate

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

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[87] 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.

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

[89] Damodoran, *Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2016 edition*, March 2016, p. 33.

JP Morgan, *The Quest for the Market Risk Premium*, May 2008, p. 4.

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

[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.

Table 7 Estimates of the historic market risk premium

	Arithmetic			Geometric		
	BHM	NERA	Average	BHM	NERA	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

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

Forward looking market risk premium – dividend growth model

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

142. 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; and
- recent dividend growth model studies.

143. 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.

144. 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.

145. 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; and
- adjusts external market risk premium estimates to ensure internally consistent assumptions (gamma and term of risk free rate).

146. Using its adjusted dividend growth model estimates of the market risk premium HoustonKemp takes 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

147. 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]

148. 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.

149. In its evaluation of the dividend growth model the ERA has considered all available information, which includes new information not available at the time of its DBNGP decision. This new information includes 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]

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

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

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

- the sensitivity of the dividend growth model 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]; and
- that biases in analysts' forecasts can lead to a biased dividend growth model forecast of the market risk premium.

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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.

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

153. 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 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]

154. Given the concerns with the dividend growth model it was unclear to Partington and Satchell that it is appropriate to apply equal weights to the historic market risk and the dividend growth model.[98]

155. The ERA considers 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. [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.

156. 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]

157. The dividend growth model may still provide some evidence on current market conditions and may help in informing a decision on a point estimate on the market risk premium.

158. 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.

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[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, p. 27.

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

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

159. 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.

160. On the basis of available information, the ERA considers that reducing the weight placed on the dividend growth model appropriately balances the estimation weaknesses of the model with the need to consider current market conditions.

Use of other dividend growth model studies

161. 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; and
- the ERA.

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

163. HoustonKemp notes 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.

164. Therefore HoustonKemp proposes to estimate the upper bound of the market risk premium through the use of the ERA estimate and the AER estimate.

165. HoustonKemp proposes that the ERA should be including the AER's most recent dividend growth model estimate from its April 2017 final decision for TasNetworks.

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

Table 8 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

167. 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.

168. Western Power and HoustonKemp propose 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; and
- 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.

169. 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.

170. The ERA considers 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.

171. Given the weaknesses of the dividend growth model, the need to ensure consistent assumptions and the lower weighting to be applied to the dividend growth model, the ERA proposes to simplify the calculation of the dividend growth model estimate.

172. 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.

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[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.

173. 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 Dr Martin Lally.[104]

174. The AER uses the Lally 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]

175. The ERA considers the use of a point estimate of 4.6 per cent is a reasonable assumption.

- However, there is evidence that the 4.6 per cent growth rate is on the high side.[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.

176. 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 around 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 ERA's proposed reduced weight applied to the dividend growth model further decreases the small difference between the two-stage and three-stage models.

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

178. On this basis, the ERA considers the use of the two-stage dividend growth model to be reasonable.

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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.

Range for the market risk premium

179. The ERA considers 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.

180. 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.

Other indicators

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

182. To determine a point estimate for the market risk premium the ERA used four conditioning variables/forward looking indicators and regulatory discretion.

183. 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.

184. 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 ASX All Ordinaries Analyst Consensus Dividend Yield; and
- a stock market volatility index.

185. HoustonKemp supports the use of:

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

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

187. HoustonKemp considers 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.

188. Western Power also proposes that the ERA should use additional indicators in its deliberations when coming to a point estimate of the market risk premium. Specifically, HoustonKemp suggests 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; and
- independent expert reports.

Default spread

189. 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.

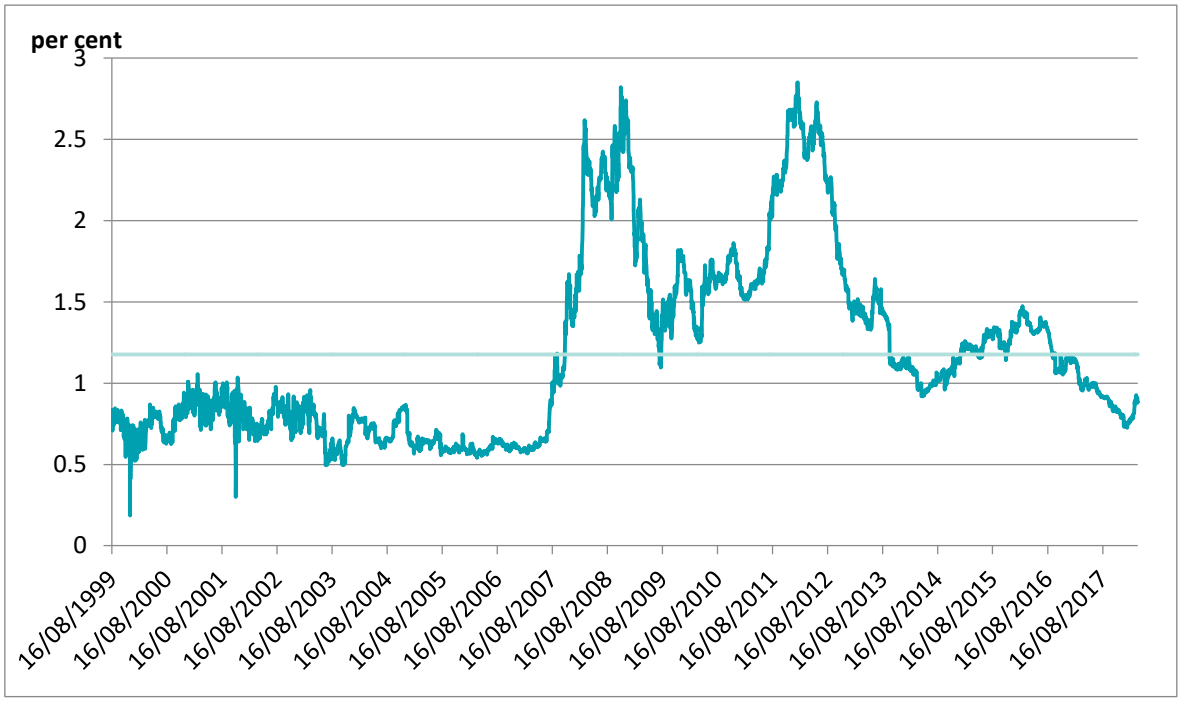
190. The default spread will tend to be high during poor economic times. Fama argues that:

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

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

192. 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

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

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

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

195. The ERA considers that the default spread therefore supports a market risk premium estimate around the lower end of its range.

Swap spread

196. 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.

197. Similar to the default spread, it is argued that there is a positive relationship between the swap spread and the market risk premium.

198. 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

199. 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 are 47 and 22 basis points.

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

201. The ERA considers that the swap spread therefore supports a market risk premium estimate around the lower end of its range.

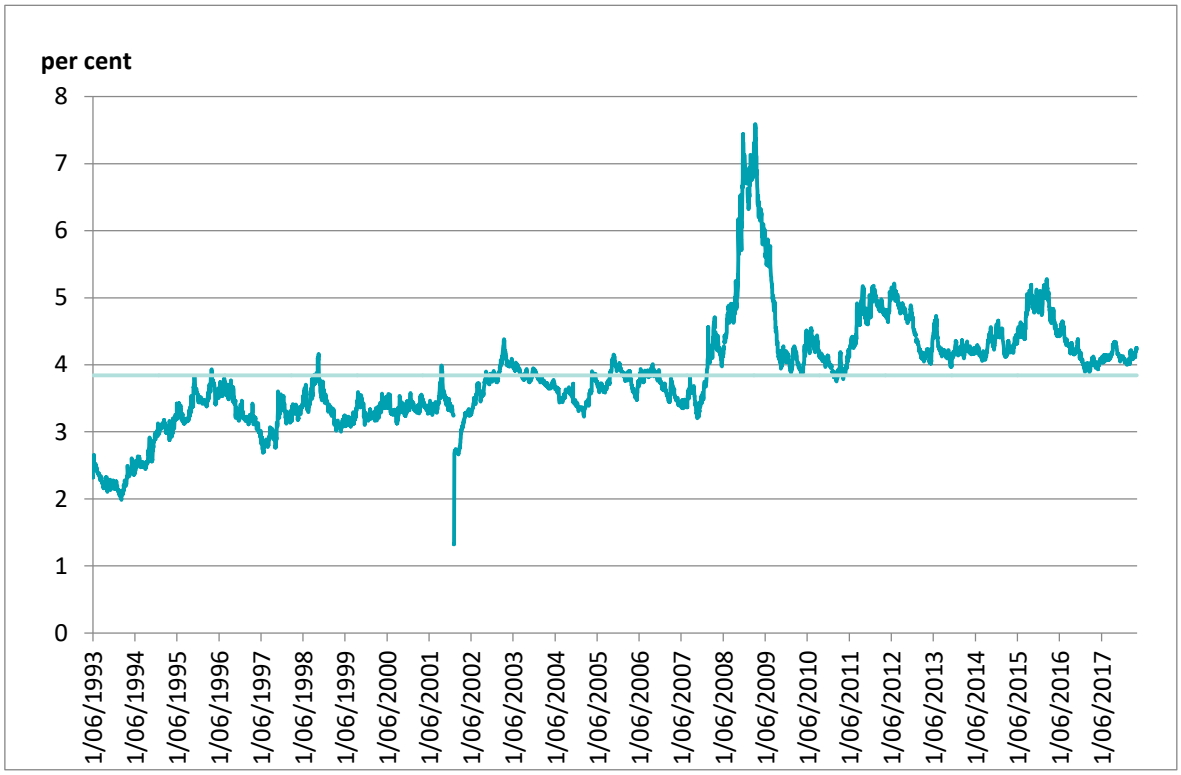
Dividend yield

202. 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.

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

204. 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

205. 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 are 3.84 and 0.78 per cent.

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

207. 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.

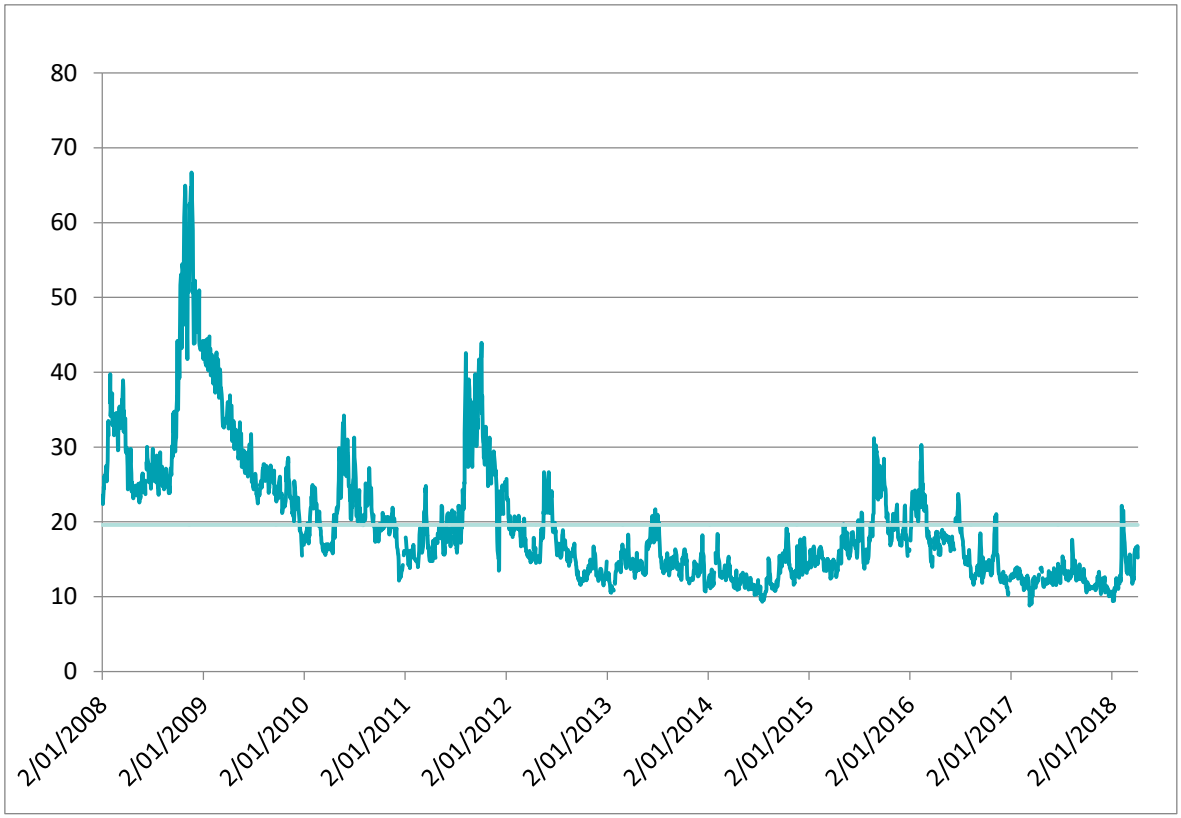
208. The ERA considers that dividend yields therefore supports a market risk premium estimate around an average value.

Implied volatility

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

210. CAPM suggests that a positive relationship 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

211. 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.

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

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

214. HoustonKemp references two reports:

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

[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.

215. While recognising that there may be some link between the market risk premium and implied volatility, HoustonKemp suggests 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 argues that little weight should be placed on the indicator.

216. 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.

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

Prevailing bill rate

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

219. In reviewing the use of the bill rate the ERA considered that there were two possibilities to explain 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.

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

221. The ERA agrees 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 it is the period of high interest rates in the seventies, eighties and nineties that are the best candidate for being abnormal, rather than the current low rates.

222. McKenzie and Partington argued that evidence suggests that bond yields were stable (and possibly even falling) in the long run for the US, UK and Australian markets. They considered that the high interest rates observed during the period seventies, eighties and nineties are clearly not representative of the longer time series.

223. The ERA considers 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.

224. The ERA will not be including 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

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

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

227. HoustonKemp calculates the Wright estimate of the market risk premium at 8.85 per cent. They suggest that the midpoint of the market risk premium range is a conservative estimate of the prevailing market risk premium.

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

229. 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); and
- provided empirical support for the Wright approach in establishing an upper bound of a market risk premium range.

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

231. 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. Partington and Satchell note that, except in very unusual circumstances, returns are stationary. 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 ERA analysis did not support the Wright approach.

232. Partington and Satchell advised the AER they are 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". [115]

233. 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.[116]

234. Furthermore, the AER has 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."[117]

235. Based on the above information, the ERA considers that there exists theoretical and empirical concerns with the Wright approach.

236. For the purposes of the draft decision the ERA will not be including the additional Wright estimate when determining its point estimate of the market risk premium.

Independent expert reports

237. HoustonKemp proposes 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.

238. HoustonKemp suggests that reports in 2016 indicate that experts are 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.

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

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

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

239. However, these incorporate 'uplifted' parameters. In this context, HoustonKemp states:

> 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.[118]

240. In contrast, Partington and Satchell have 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.[119]

241. The ERA reviewed estimates produced by independent expert reports in 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); and
- 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).[120]

242. The ERA considers that the reports presented by HoustonKemp provide 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. In particular, expert reports seek to estimate a rate of return to perpetuity, to allow equity valuations. 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.

243. Therefore, for the purposes of the draft decision the ERA will be placing a limited weight on independent expert reports when determining its point estimate of the market risk premium.

Application of a systematic approach

244. HoustonKemp proposes 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.

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

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

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

[120] 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.

246. HoustonKemp recognises 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.

247. The ERA is conscious of the limitations of conditioning variables. However, the ERA agrees that conditioning variables 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.

248. The AER uses conditioning variables in a similar manner when estimating the market risk premium.[121]

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

Determining a point estimate

250. HoustonKemp estimates 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.

251. In determining a point estimate of the market risk premium, HoustonKemp details a list of conditioning variables that the ERA should consider. HoustonKemp argues that its new proposed indicators suggest that the market risk premium currently lies above its average level.

252. 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.

253. The ERA has in the past determined a point estimate for the market risk premium through taking the mid-point between the historic estimate and the dividend growth model.

254. On the basis of the above information, the ERA now considers that it is appropriate to place more reliance on the historic market risk premium to calculate the market risk premium. 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 considers historical averages provide the best source of evidence available to estimate the market risk premium.

255. The ERA will place 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 some 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.

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

256. The ERA is to determine a final point estimate of the market risk premium by using regulatory judgement considering the relative merits of all the relevant material.

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

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

258. On this basis the ERA has determined a market risk premium of 6.2 per cent.

259. The ERA's estimate of the market risk premium differs 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.

Market risk premium and compensation of market risk.

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

261. NewGen Power Kwinana also considered that the WACC reflects a market risk premium to compensate Western Power for market risk that can drive asset write-offs.

262. 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.

263. 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).

264. 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.

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

Cost of debt

Risk free rate (cost of debt)

266. The ERA considers that Western Power's proposed method for determining the risk free rate used to calculate the cost of equity is appropriate.

267. 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.

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

269. Western Power has 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.

270. Western Power has nominated a 20-day averaging period to 29 March 2018. The ERA accepts this period. The averaging period to 29 March 2018 provides a risk free rate for the cost of debt of 2.590 per cent.

Benchmark credit rating

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

272. 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.

273. Western Power's proposed benchmark credit rating is BBB-/BBB/BBB+. Western Power proposes a rating that is consistent with the ERA's practice in the DBNGP access arrangement decision.[122]

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

275. Two approaches used by the ERA to determine credit ratings are the Standard and Poor's credit rating matrix approach and the 'median value' approach.

[122] 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. 102.

Standard and Poor's credit rating matrix approach

276. The credit ratings for the benchmark sample of firms outlined above were compiled and are presented in Table 9.

Table 9 Benchmark sample credit metrics

Company	S&P credit rating[123]
APA Group	BBB
Duet Group	BBB/BBB-
Spark Infrastructure	BBB+
SP AusNet Group	A-

Source: ERA Analysis, Bloomberg

277. 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.[124] This approach suggests a credit rating around BBB/BBB+.

Median value approach

278. 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.

279. 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.

280. 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.

281. 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 10.

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

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

Table 10 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

282. In this analysis, the ERA considers 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 11.

Table 11 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

283. 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+.

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

Other regulators' decisions

285. In its recent decisions the AER has 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.

286. The AER also applied this credit rating to decisions that were upheld before the Tribunal.[125] [126] [127] The Tribunal observed that the more recent years point towards a BBB+ credit rating for the benchmark efficient entity.[128]

287. On the basis of the analysis and cross-checks the ERA determines a benchmark credit rating of BBB+ to be appropriate for application in the cost of debt estimations.

Relevance to Western Power of State government ownership

288. Many public submissions state that the WACC should recognise Western Power's status as a monopoly State-owned entity. These submissions suggest that this results in a lower commercial risk profile and access to lower borrowing costs.

289. However, the ERA considers 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 independent 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 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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125 Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 26 February 2016, para 993.

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

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

128 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.

290. In summary, the ERA is of the view that it is appropriate to not recognise Western Power's State government ownership for the purpose of estimating the cost of capital for this business.

Debt risk premium

291. 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.

292. Western Power has proposed a hybrid trailing average approach to estimating the debt risk premium that is consistent with the ERA's approach in recent decisions.[129] The ERA considers that this approach is appropriate for this access arrangement decision.

293. 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.

294. 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.

295. 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.

296. 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 below.

297. As discussed above, the ERA has updated the benchmark credit rating to BBB+. The ERA has calculated the latest year's debt risk premium consistent with the credit

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[129] 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.

rating of BBB+. This ensures that the debt risk premium continues to reflect debt funding of a benchmark business.

298. 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 Reserve Bank of Australia credit spread to swap data.

299. Western Power has used a calendar year approach to calculate the debt risk premium consistent with the DBNGP final decision.[130] However, Western Power's access arrangement is on a financial year basis.

300. 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 has been taken from the ATCO Gas Australia final decision and where not available calculated by the ERA applying a consistent method.[131]

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

[130] 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.

[131] 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 12 ERA estimated hybrid trailing average debt risk premium[132]

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

302. 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.[133] The ERA considers Western Power's proposal for annual updating of the debt risk premium is consistent with the objectives set out in section 6.4 of the Access Code and the Code objective.

Term of debt for calculating the debt risk premium

303. 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. The ERA has used a 10-year term of debt in its recent regulatory decisions.

304. The ERA agrees with Western Power that a 10-year term of debt for calculating the debt risk premium is appropriate.

[132] 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.

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

Debt raising and hedging costs

305. Debt raising and hedging costs are the administrative costs and other charges incurred by businesses when obtaining and hedging debt financing.

306. The ERA has allowed these costs to be included as part of the return on debt.

Debt raising costs

307. 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.

308. Western Power has proposed debt raising costs of 0.125 per cent.

309. Australian regulators use benchmark estimates when determining 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.

310. The rationale for using a figure of 0.125 per cent dates back to work undertaken by the Australian Competition and Consumer Commission (**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.[134] This conclusion was consistent with the ACCC's decisions on the issue of debt raising costs in its regulatory decisions prior to 2004.[135]

311. 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 13, 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 somewhat lower estimates.

[134] 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.

[135] 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 13 Debt raising costs in Australian regulatory decisions

Regulator	Year	Allowance (bppa)
AER[136]	2017	8.4 – 9.2
ERA[137]	2016	12.5
ESCOSA[138]	2015	12.5
ACCC[139]	2014	9.8 – 10.9
IPART[140]	2014	12.5
QCA[141]	2014	10.8

Source: Compiled by the ERA

312. The ERA has investigated the allowances provided by various Australian regulators, and has given particular attention to research underpinning the QCA's 2014 *Cost of debt estimation methodology*.[142] In this report, the QCA reviewed Allen Consulting Group's 2004 findings and the origins of the 0.125 per cent estimate.

313. The QCA found that the 0.125 per cent figure was based on figures provided to the ACCC by Westpac in 2002.[143] 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;[144] and
- 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).[145]

314. The QCA also noted that the AER had recently updated its debt raising allowance, based on a 2011 analysis of debt raising costs by PricewaterhouseCoopers.[146]

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[136] AER, *Draft Decision: AusNet Services Gas access arrangement 2018 to 2022 – Attachment 3 – Rate of return*, July 2017, p. 3-446.

[137] 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.

[138] Essential Services Commission of South Australia, *SA Water Regulatory Rate of Return 2016-2020: Final Report to the Treasurer*, March 2015, p. 52.

[139] Australian Competition and Consumer Commission, *AusNet Services Gas access arrangement: 2018 to 2022 Attachment 3 – Rate of return (Draft Decision*), March 2014, p. 56.

[140] 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.

[141] Queensland Competition Authority, Cost of debt estimation methodology: final decision, August 2014, p. ii.

[142] Queensland Competition Authority, *Cost of debt estimation methodology: final decision,* August 2014, p. ii.

[143] Allen Consulting Group, Debt and equity raising transaction costs: Final report to ACCC, December 2004, p. 18.

[144] Allen Consulting Group, *Debt and equity raising transaction costs: Final report to ACCC*, December 2004, p. 28.

[145] Allen Consulting Group, *Debt and equity raising transaction costs: Final report to ACCC*, December 2004, p. xvii.

[146] Queensland Competition Authority, *Cost of debt estimation methodology: final decision*, August 2014, p. 12.

315. The QCA had concerns about the inclusion of the swap margin and the age of the 0.125 per cent estimate. Consequently, it engaged PricewaterhouseCoopers to prepare updated advice on debt raising costs. PricewaterhouseCoopers found that debt raising costs were within the range of 0.09 to 0.108 per cent. PricewaterhouseCoopers' method used the same cost categories identified by Allen Consulting Group in 2004.[147]

316. 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,[148] PricewaterhouseCoopers' 2011[149] and 2013[150] estimates, and the ERA's own estimate in 2013[151] – have adopted essentially the same approach used by 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.

317. Therefore, a debt raising cost allowance of 0.100 per cent per annum is appropriate. This falls within the range provided in the 2013 PricewaterhouseCoopers study, is comparable with estimates now used by the ACCC and QCA Authority 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.

318. Therefore, the ERA does not accept Western Power's proposed debt raising costs of 0.125 per cent.

319. The ERA considers that an allowance of 0.100 for debt raising costs is appropriate.

Debt hedging costs

320. 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.

321. In 2016, the ERA engaged Chairmont Consulting to advise on the cost of undertaking swaps.[152] Based on Chairmont Consulting's advice and work by the Competition Economists Group,[153] the ERA concluded that an allowance for hedging costs of 0.114 per cent per annum was appropriate.[154] Western Power's proposal is consistent with this finding.

322. The ERA considers that 0.114 per cent is appropriate for hedging costs.

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[147] PricewaterhouseCoopers, *Debt and Equity Raising Costs: Report for Powerlink Queensland (Appendix K)*, 2011, p. 20.

[148] Deloitte, *Envestra Limited: Debt Financing Costs*, September 2010, p. 4.

[149] PricewaterhouseCoopers, *Debt and Equity Raising Costs: Report for Powerlink Queensland (Appendix K)*, 2011, p. 20.

[150] PricewaterhouseCoopers, *A cost of debt methodology for businesses regulated by the Queensland Competition Authority*, June 2013.

[151] ERA, *Explanatory Statement for the Rate of Return Guidelines*, 16 December 2013, p. 202.

[152] Chairmont Consulting, *ERA Hedging Costs in the Cost of Debt*, 13 May 2015.

[153] Competition Economists Group, *Debt strategies of utility businesses*, June 2013.

[154] 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.

Other parameters

Gearing

323. Gearing refers to the proportions of a regulated business's assets assumed to be financed by debt and equity. Gearing is defined as the ratio of the value of debt to total capital (that is, including debt and equity) and so is generally expressed as follows:

$$Gearing = \frac{Debt}{Debt + Equity}$$

324. This ratio is used to weight the costs of debt and equity when the regulated WACC is determined.

325. 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: (i) to re-lever asset betas for the purposes of analysing the level of systematic risk across businesses in the estimate of equity beta; and (ii) as a factor in determining an appropriate credit rating for deriving the debt risk premium.

326. Western Power proposes a gearing of 60 per cent debt and 40 per cent equity. This level of gearing is consistent with the ERA DBNGP decision.

327. 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.

Gearing estimates

328. In calculating gearing the ERA has 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.

329. In its February 2018 discussion paper on gearing, the AER detailed some of the practical considerations of calculating gearing.[155]

330. The ERA has observed trends in average gearing across various definitions of debt and equity and examined the drivers of the results.

331. The ERA's recent analysis, using the updated dataset to 2017, indicates that the estimated benchmark gearing level has reduced to 55 per cent.

332. Table 14 details the gearing for the benchmark entity based on market values.

Table 14 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

333. 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.

334. 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 15).

[155] AER, *Discussion Paper - Gearing*, February 2018.

Table 15 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

335. 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.[156]

336. 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. Book values, however, are a historical measure and not representative of forward looking values.

337. Gearing decisions by regulators other than the AER are based on analysis that pre-dates December 2013, and so are too far out of date to be relevant to gearing decisions over the coming years.

338. The ERA's 2017 analysis of the efficient costs for water providers also updated the gearing estimate for energy.[157] 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; and
- on average, a decrease in gearing of five per cent points appears reasonable for Australian electricity and gas network utilities from the historic figure of 60 per cent.

[156] AER, Discussion Paper - Gearing, February 2018, pp. 15-16.

[157] ERA, *The efficient costs and tariffs of the Water Corporation, Aqwest and Busselton Water*, November 2017, pp. 337-343.

339. The ERA's general gearing method involves observing actual gearing over the last five-year period.[158] 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 in the ERA's method.

340. 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.

341. The ERA considers 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; and
- recent gearing levels of 51 per cent suggest a step change away from gearing levels of 60 per cent.

342. The ERA and AER have periodically reviewed gearing.[159] 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.[160] 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.

343. Considering all the above information, for the draft decision the ERA will use a debt to total assets ratio (gearing level) of 55 per cent and the equity to total assets ratio of 45 per cent.

Forecast inflation

344. Forecast inflation can be used to translate the nominal post-tax WACC to a real post-tax WACC.

345. The ERA considers that Western Power's proposed approach for calculating forecast inflation is appropriate.

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[158] ERA, *Explanatory Statement for the Rate of Return Guidelines,* December 2013, p. 52.

[159] 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.

[160] 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.

346. Western Power proposes using the Treasury bond implied inflation approach, which derives the expected inflation rate using the Fisher equation (shown in the equation below), from the observed yields of:

- five-year Commonwealth Government Securities, which reflect a market-based estimate of the nominal risk free rate; and
- five-year indexed Treasury bonds, which reflect a market-based estimate of a real risk free rate).

$$1+i=(1+r)(1+\pi^{e})$$

347. 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.

348. Western Power's proposal has used the 20-day averaging period to 30 June 2017 as a placeholder. This period provides a forecast inflation rate of 1.64 per cent.

349. The ERA accepts the Western Power nominated 20-day averaging period to 29 March 2018. The period to 29 March 2018 provides a forecast inflation rate of 1.84 per cent.

Value of imputation credits (gamma)

350. 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.

351. 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.

352. The ERA has used the following estimation methods to determine gamma in recent decisions:[161]

- 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; and
- the dividend drop-off study approach, which gives a range estimate of gamma of 0.28 to 0.40.

[161] 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.

353. Of these results, the ERA gives the most weight to the equity share ownership approach, and so has adopted a point estimate for gamma of 0.4.

354. 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.

355. The estimate of gamma under the National Electricity Rules and National Gas Rules has been the subject of several limited merits reviews by the 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.[162]
- In June 2016 the Tribunal found in favour of ATCO Gas Australia that gamma should be 0.25. At that time in 2016 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.[163]

356. The ERA's gamma decision in the most recent DBNGP access arrangement decision was appealed by DBNGP and the matter is currently before the Tribunal.

357. Western Power proposes 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".

358. The ERA considers 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.

359. 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 objectives reflected in the Access Code objective and the price control objectives require similar considerations to the objectives in the national frameworks.

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[162] Federal Court of Australia, Australian Energy Regulator v Australian Competition Tribunal (No 2) [2017] FCAFC 79, May 2017

[163] Federal Court of Australia, SA Power Networks v Australian Competition Tribunal (No 2) [2018] FCAFC 3, Jan 2018.

360. The estimate of gamma is an industry-wide parameter and the ERA considers the recent regulatory decisions and outstanding legal reviews are relevant to Western Power's AA4 proposal.

361. Recent analysis by the AER suggests that a gamma value may be higher than 0.4, driven by revised equity ownership data from the Australian Bureau of Statistics.[164]

362. For the purposes of the draft decision, the ERA considers that Western Power's proposed gamma of 0.4 achieves the objectives set out in section 6.4 of the Access Code and the Code objective for this draft decision. The ERA will further consider the new Australian Bureau of Statistics data before making a decision on gamma.

Draft decision on rate of return

363. 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 16 below.

- The ERA estimates the nominal after tax cost of equity as 6.71 per cent.
- The ERA estimates the nominal cost of debt as 5.42 per cent.
- The ERA's rate of return estimate is 6.00 per cent.

364. The ERA does not approve Western Power's proposed nominal after tax rate of return of 6.09 per cent.

365. For the purpose of this draft decision, the ERA adopts a nominal after tax rate of return of 6.00 per cent.

[164] AER, *Discussion paper – Value of imputation credits*, March 2018, p. 16.

Table 16 The ERA's WACC for the averaging period of 29 March 2018, compared to Western Power's proposed WACC for the averaging period of 30 June 2017

Parameter	ERA	Western Power
Averaging period	29 March 2018	30 June 2017
Cost of equity parameters		
Nominal risk free rate (per cent)	2.37	1.99
Equity beta	0.7	0.7
Market risk premium (per cent)	6.2	7.5
Nominal after tax return on equity (per cent)	**6.71**	**7.24**
Cost of debt parameters		
Five-year interest rate swap (effective yield) (per cent)	2.590	2.290
Debt risk premium (per cent)	2.613	2.790
Benchmark credit rating	BBB+	BBB-/BBB/BBB+
Term of debt for debt risk premium	10 years	10 years
Debt issuing costs (per cent)	0.100	0.125
Debt hedging costs (per cent)	0.114	0.114
Nominal cost of debt (return on debt) (per cent)	**5.42**	**5.32**
Other parameters		
Debt proportion (gearing)	55	60
Forecast inflation rate (per cent)	1.84	1.64
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**	**6.09**
Real after tax-WACC (per cent)	**4.08**	**4.38**

Source: ERA analysis