Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020

Submitted by DBNGP (WA) Transmission Pty Limited

Appendix 5 – Gamma

30 June 2016

Economic Regulation Authority

WESTERN AUSTRALIA

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DBNGP Final Decision Appendix 5 - Gamma

1.   The Authority is required by the National Gas Rules (**NGR**) to estimate the value of gamma, a parameter in the building block revenue model.

2.   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, all other things being equal.

Regulatory requirements

3.   Rule 87A of the NGR requires that the estimated cost of corporate income tax of a service provider for each regulatory year of an access arrangement period (ETC$_t$) is to be estimated in accordance with formula (1).

$$ETC_t = (ETI_t \times r_t)(1 - \gamma) \tag{1}$$

   Where

   ETC_t is an estimate of the taxable income for that regulatory year that would be earned by a benchmark efficient entity as a result of the provision of reference services if such an entity, rather than the service provider, operated the business of the service provider;

   ETI_t is the estimated taxable income for the regulated entity;

   r_t is the expected statutory income tax rate for that regulatory year as determined by the AER [Authority]; and

   γ is the value of imputation credits.

4.   Rule 87A accounts for the ability of imputation credits to reduce the effective corporate tax rate for equity investors.

5.   In determining the value of imputation credits, the Authority is required to account for the national gas objective, the National Gas Law (**NGL**) (including the revenue and pricing principles) and the NGR.

6. In the Rate of Return Guidelines, the Authority estimated gamma (γ) as the product of the distribution rate F and the estimate of the utilisation rate θ (theta), consistent with the approach set out in the Rate of Return Guidelines (equation 2):[1]

$$\gamma = F \times \theta \qquad (2)$$

7. Under this Officer formulation (as extended by Monkhouse), gamma depends on the degree to which imputation credits are distributed and the degree to which investors utilise those credits that are distributed.

8. Contributing to the estimate of gamma, the Rate of Return Guidelines adopted an estimate for the distribution rate, F, of 0.7. The 0.7 rate was based on Australian Taxation Office (**ATO**) data showing around 70 per cent of cumulative imputation credits created had been distributed.

9. For the utilisation rate, the Rate of Return Guidelines adopted a range of 0.35 to 0.55.[2] This estimated range was based on the results of Dividend Drop Off (**DDO**) studies.

10. The resulting range for gamma adopted for the Rate of Return Guidelines – given by the product of distribution rate and the range for the utilisation rate – was 0.25 to 0.385.

DBP's initial proposal

11. DBP accepted the formula for gamma set out above.[3]

12. With regard to the distribution rate, DBP accepted the value of 0.7 set out in the Guidelines:[4]

> …the ERA stays with an estimate for the distribution rate of 0.7 in the ATCO Draft Decision, which has been widely used by regulators in the past. This does not represent a departure from the Guidelines, and we agree with the ERA that this is the most robust value to use.

13. DBP did not agree with the Authority's estimate of the utilisation rate. DBP considered that the estimate should be derived on the basis of a particular DDO study. DBP considered that SFG Consulting's (**SFG**) (now part of Frontier

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[1] This follows the analysis by Monkhouse in relation to the impact of imputation credits on the effective tax rate of companies. See equation 2.5 in P. Monkhouse, The valuation of projects under the dividend imputation tax system, *Accounting and Finance*, 36, 1996, p. 192; Goldfields Gas Pipeline, *Access Arrangement Revision Proposal: Supporting Information*, 15 August 2014, Appendix 1.

[2] Monkhouse in his 1993 exposition stated that 'the symbol θ is used throughout to represent a 'utilisation factor'' (P. Monkhouse, The cost of equity under the Australian dividend imputation tax system, *Accounting and Finance*, November 1993, p. 5). Throughout this Chapter, "theta" and "utilisation rate" are used interchangeably because both names are employed by contributors to debate on these issues.

[3] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission: 12*, December 2014, p. 90.

[4] Ibid.

Economics[5]) 2011 study provides a basis for the estimate, as it had been accepted by the Australian Competition Tribunal (**ACT**) and as it adjusts observed dividend drop offs for the change in the overall market return. DBP engaged Gray in 2014 to update that study for its estimate of gamma.[6] On that basis, DBP therefore proposed to use the value of 0.35 for the utilisation rate reported in that study.[7]

14.   DBP's proposed estimate for gamma was therefore 0.25, being the product of a distribution rate of 0.7 and a utilisation rate of 0.35.

Draft decision

15.   The Authority in the Draft Decision did not accept DBP's proposed estimate of gamma. Instead, the Authority considered that three different approaches to estimating gamma are appropriate, based on the following methods for estimating the utilisation rate:

- the equity share approach;
- the taxation statistics approach; and
- the DDO method.

The equity share ownership estimate

16.   The Authority's estimate of the utilisation rate, based on the equity share ownership approach, was either 0.48 (listed equity) or 0.59 (all equity – both listed and unlisted).

17.   Combining the utilisation rate estimate for listed equity, of 0.48, with the estimate of the distribution rate for listed equity, of 0.8, gave an estimate of gamma of 0.38.

18.   Combining the utilisation rate estimate for all equity, of 0.59, with the estimate of the distribution rate of all equity, of 0.7, gave an estimate of gamma of 0.41.

19.   The resulting range for gamma from the equity share ownership approach was 0.38 to 0.41.

20.   Rounding that range to one significant figure gives a point estimate of 0.4 for gamma – with both listed and all equity supporting the point estimate.

The taxation statistics estimate

21.   The Authority's estimate of the utilisation rate based on the taxation statistics approach was 0.43 (based on franking account balances data. Combining that

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[5]   **The ERA will refer to the reports prepared by DBP's consultants, SFG Consulting and Frontier Economics – in the remainder of this discussion – as being by 'Gray', in order to minimise any confusion for readers, since the reports were prepared by Professor Stephen Gray, prior to and after SFG's merger with Frontier Economics.** That said, the correct reference (whether SFG or Frontier) may be determined by reference to the relevant footnote citation.

[6]   DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission: 12*, December 2014, p. 96; and also DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission: 12*, December 2014, Appendix O.

[7]   Ibid.

estimate with the relevant estimate of the distribution rate of 0.7 (all equity) gave a point estimate of gamma of 0.3, to one significant figure.

The dividend drop off estimate

22. The Authority's estimate of the utilisation rate from DDO studies was fairly broad, at 0.35 to 0.69, reflecting concerns with the robustness of the method.

23. That range for the utilisation rate was combined with an estimate of the distribution rate for listed equity of 0.8. The resulting range for gamma was 0.3 to 0.5, rounded to one significant figure.

Estimate of gamma

24. The Authority based its estimate of gamma in the Draft Decision on the following, with estimates given most weight ranked first:

    - the equity share ownership approach gave an estimate of gamma of 0.4;

    - the taxation statistics approach gave an estimate of gamma of 0.3; and

    - the DDO approach gave a range for the estimate of gamma of 0.3 to 0.5.

25. The resulting range for the Authority's estimate of gamma was 0.3 to 0.5.

26. Based on the foregoing, the Authority considered that the evidence supported a point estimate of the value of imputation credits of 0.4.

DBP response to the draft decision

27. DBP did not accept the estimate of gamma used in the Authority's Draft Decision.

28. DBP engaged Gray to prepare a report detailing the appropriate regulatory estimate of gamma, in response to the Authority's draft decision.

29. In his report, Gray stated that gamma should be estimated as the product of the distribution rate and the value of estimated credits (defined as theta), with this value being equal to the market price that investors would be prepared to pay for a dollar of credits in the market (or equivalently, the extent to which credits are capitalised into stock prices).[8]

30. Gray considered this differs from the Authority's interpretation of theta, which is simply the utilisation rate of credits.

31. Consequently, Gray did not agree with the Authority's estimate of theta, instead proposing a value of 0.35 based on market observations.[9]

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[8] Frontier Economics, *Issues in relation to the regulatory estimate of gamma: report prepared for DBP*, March 2016, p.5.

[9] Frontier Economics, *Issues in relation to the regulatory estimate of gamma: report prepared for DBP*, March 2016, p.5.

32.   Gray agreed with the Authority that the distribution rate should be interpreted as the proportion of imputation credits generated by the benchmark efficient entity distributed to investors.[10]

33.   Gray's estimate of the distribution rate for all companies (listed and unlisted) was 0.7, in agreement with the Authority's finding in the draft decision. However, Gray challenged the Authority's finding that the distribution rate for listed companies should be 0.8. In Gray's view, the top 20 listed companies should be excluded when calculating the distribution rate for listed companies, on the grounds that they differ from the benchmark efficient entity in their ability to distribute imputation credits via profits from international operations. Gray calculated that, with the top 20 companies excluded, the distribution rate for listed companies was 0.7.[11]

34.   Based on the above assumptions, Gray proposed a point estimate of 0.25, based on a distribution rate of 0.7, and a theta of 0.35. DBP adopted this estimate in its response to the Draft Decision.

Submissions

35.   Two submissions on the Authority's Issues Paper on DBP's proposed revisions referenced issues related to the estimation of gamma.   These submission are available on the Authority's website. In summary:

- United Energy and Multinet Gas (*UEMG*) submitted two papers it considered were relevant to the Authority's decision, one of which, by NERA, develops econometric evidence for the capitalisation of the value of imputation credits in stock prices.[12]

- DBP submitted a number of clarifications with regard to DBP positions reported in the Issues Paper.[13]   DBP also submitted 'new information', relating to matters in the Issues Paper, which it considered was not available at the time it submitted its proposed revisions.

36.   In March 2016, DBP provided the Authority with a further supporting submission addressing the Australian Competition Tribunal's (**ACT**) decisions in the cases of Networks NSW, ActewAGL Distribution (**ActewAGL**), and Jemena Gas Networks (NSW) Limited (**Jemena**).[14]   These decisions explicitly addressed the issue of gamma.

37.   In the cases of Networks NSW, ActewAGL, and Jemena, the ACT rejected the Australian Energy Regulator's (**AER**) approach to estimating gamma.[15] DBP states

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[10]   Frontier Economics, *Issues in relation to the regulatory estimate of gamma: report prepared for DBP*, March 2016, p.20.

[11]   Frontier Economics, *Issues in relation to the regulatory estimate of gamma: report prepared for DBP*, March 2016, p. 4.

[12]   United Energy and Multinet Gas, DBNGP (WA) Transmission Ptd Ltd (DBP): *Response to Issues Paper on Proposed Revisions to the Dampier to Bunbury Natural Gas Pipeline Access Arrangement, 2016 – 2020*, 2 June 2015.

[13]   DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Response to ERA Issues Paper Submission 26*, 2 June 2015.

[14]   DBP, Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Supporting Submission 60, 22 March 2016.

[15]   Australian Competition Tribunal, in the matter of applications by PIA, AusGrid and others, 2016.

that this is relevant to the Authority's determination in the case of DBP, as in its draft decision, the Authority applied the same approach as that used by the AER in the aforementioned determinations.[16]

38.   DBP noted that the ACT's findings supported DBP's proposed value for gamma of 0.25, and that the ACT explicitly rejected the equity share ownership approach adopted by the AER.[17] DBP also commented that, in making its decision, the ACT:[18]

   a)   rejected the AER's assertion that imputation credits ought to be valued at their face value. Instead the [ACT] concluded that they should be valued based on the behaviour of those claiming them, or, in other words, their market value;

   b)   observed that equity ownership rates likely overstate the value of imputation credits and that tax statistics and equity ownership studies can at best establish an upper bound for theta (and thus gamma), which means that market studies are the best way to establish the value of imputation credits;

   c)   rejected the adjustments made [by the AER] to the [Gray] estimate of theta to reflect the valuation of dividends as suggested by Lally;

   d)   concluded that the distribution rate should be based on past practice where all equity was used, rather than the newly introduced measure of listed equity;

   e)   observed that the maximum value for theta, based on tax statistics is 0.45 giving a gamma estimate of between 0.25 and 0.32 using the original distribution rates; and

   f)   noted that the AER will need to consider inter-relationships between the different building blocks [of the CAPM model] and gamma, but that only the direct impacts of changing gamma should be considered.

39.   DBP contended that, as the ACT found 0.45 to be the upper limit for theta, the Authority must discard any estimates from market-based studies that are higher than this figure when estimating the value of theta.[19]

40.   DBP also reiterated its concern regarding the 'non-standard economic approaches' used by the Authority in its DDO studies, asserting that these gave rise to results that were not robust. DBP noted that, were the Authority to rely only on components of the work that use standard econometric approaches, the resulting theta would be 0.35.[20]

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[16]   DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Supporting Submission 60*, 22 March 2016, p. 3.

[17]   DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Supporting Submission 60*, 22 March 2016, p. 3.

[18]   DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Supporting Submission 60*, 22 March 2016, p. 12.

[19]   DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Supporting Submission 60*, 22 March 2016, p. 12. The SFG study cited by DBP is *SFG Consulting, Dividend drop-off estimate of theta*, 21 March 2011; *SFG Consulting, An appropriate regulatory estimate of gamma*, 21 May 2014.

[20]   DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Supporting Submission 60*, 22 March 2016, p. 12. The SFG study cited by DBP is SFG Consulting, Dividend drop-off estimate of theta, 21 March 2011; SFG Consulting, An appropriate regulatory estimate of gamma, 21 May 2014.

Considerations of the Authority

41.   The Authority re-examined its method for estimating the gamma parameter for the Draft Decision. That review resulted in the Authority adopting a different estimate to that set out in the Rate of Return Guidelines.[21]

42.   The Authority has further considered its position in light of DBP's response to the Draft Decision, and also has had regard to the recent decision by the ACT. In evaluating its position, the Authority has taken into account:

- considerations relating to the theoretical framework for estimating gamma;

- the Authority's prior position, set out in the Rate of Return Guidelines, which accounted for stakeholder input and a range of consultants' reports, among other things;

- DBP's submissions on gamma, which also reference 2011 and 2014 reports by its consultant, Gray;[22]

- Lally's November 2013 report to the AER;[23]

- Lally's November 2013 report to the Queensland Competition Authority (**QCA**), and his responses to submissions to the QCA on that report;[24]

- the conclusions of the AER in responding to Lally's report, set out in its rate of return guidelines;[25]

- a 2013 report on tax statistics by Hathaway commissioned by the Energy Networks Association;[26]

- the conclusions of the QCA in its recent cost of capital determination, which also considered the foregoing material, as well as additional material with regard to the estimation of gamma;[27]

- ATCO's submission on the Authority's Gas Distribution System Draft Decision, including the report by its consultant, Gray;[28]

- a report for the Queensland Resources Council by McKenzie and Partington;[29]

- a report on gamma by Handley for the AER;[30]

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[21] Economic Regulation Authority, *Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems*, as amended 10 September 2015, p. 413.

[22] SFG Consulting, *Dividend drop-off estimate of theta, 21 March 2011; SFG Consulting, An appropriate regulatory estimate of gamma*, 21 May 2014.

[23] M. Lally, *The estimation of gamma*, 23 November 2013.

[24] M. Lally, *Estimating Gamma*, 25 November 2013: M. Lally, *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, 12 March 2014.

[25] Australian Energy Regulation, *Explanatory Statement – Rate of Return Guideline*, December 2013.

[26] N. Hathaway, *Imputation credit redemption ATO data 1988–2011: Where have all the credits gone?* September 2013.

[27] Queensland Competition Authority, *Final decision: cost of capital: market parameters*, August 2014.

[28] ATCO Gas Australia, *Response to the ERA's Draft Decision on required amendments to the Access Arrangement for the Mid-West and South-West Gas Distribution System*, 27 November 2014.

[29] M. McKenzie and G. Partington, *Report to the Queensland Resources Council: Review of Aurizon Network's draft access undertaking*, 5 October 2013.

[30] J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014.

- further analysis by Gray relating to its 2013 DDO study;[31]

- NERA's report on the distribution and utilisation rates using ATO data;[32]

- Handley's response to the NERA report;[33]

- Lally's report for the QCA, responding to submissions to the QCA arising from the QCA's Maximum Allowed Revenue for Aurizon Network;[34]

- Lally's analysis of the distribution rates of Australian companies using financial statement data;[35]

- NERA's report on the distribution and utilisation rates using ATO data;[36]

- a report on gamma by Gray for DBP;[37]

- a report on gamma by Gray for Jemena et al;[38]

- a 2016 Decision issued by the ACT; [39]

- Gray's response to the ACT Decision, for DBP;[40] and

- Lally's report for the AER in response to the ACT Decision.[41]

43.   The Authority notes that experts differ in their interpretation of the best approach to estimating gamma in the regulatory setting. This is particularly the case with regard to the value of the utilisation rate. The Authority also notes that the ACT views the estimate of gamma as an 'ongoing intellectual and empirical endeavour'.[42]

44.   DBP has raised a range of issues with regard to the Authority's position set out in the Rate of Return Guidelines. These are considered in what follows. The Authority also responds to Gray's views on the Authority's revised position on gamma.

Definition of the domestic capital market

45.   In reconsidering its estimate of gamma, the Authority takes account of the definition of the capital market used for determining the allowed rate of return, which was set

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[31] SFG Consulting, *An Appropriate Regulatory Estimate of Gamma*, 16 January 2014; SFG Consulting, *An Appropriate Regulatory Estimate of Gamma*, 21 May 2014, Appendix 9; SFG Consulting, *Estimating Gamma: Response to UT4 Draft Decision*, 2014.

[32] NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics*, March 2015.

[33] J. Handley, *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, 20 May 2015.

[34] M. Lally, *Review of Submissions on Gamma*, 27 May 2015.

[35] M. Lally, *Estimating the Distribution Rate for Imputation Credits*, July 2015.

[36] NERA, Estimating Distribution and Redemption Rates from Taxation Statistics, March 2015.

[37] Frontier Economics, *An Appropriate Regulatory Estimate of Gamma: Response to the DBP Draft Decision*, January 2016.

[38] Frontier Economics, *The Appropriate use of Tax Statistics when Estimating Gamma*, January 2016.

[39] Australian Competition Tribunal, in the matter of applications by PIA, AusGrid and others, 2016.

[40] Frontier Economics, *Issues in Relation to the Regulatory Estimate of Gamma*, March 2016.

[41] M. Lally, *Gamma and the ACT Decision*, 23 May 2016.

[42] Australian Competition Tribunal, *Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9*, 12 May 2011, paragraph 45.

out in the Rate of Return Guidelines. In particular, the Authority has adopted a domestic CAPM, while allowing for the presence of foreign investors:[43]

> In summary, the Authority's position is that the boundary should account for the full domestic data set, including any direct influences on the cost of capital for Australian domiciled firms. This may include the influence of international investors in Australian markets for equity, or the influence of international lenders supplying debt finance directly to Australian firms.

46. Therefore, to maintain internal consistency, the Authority considers that the estimate of gamma needs to take into account the presence of international investors in the Australian domestic capital market.

Interpretation of gamma

47. The equation set out in paragraph 6 interprets franking credits in the context of the Officer CAPM framework, as extended by Monkhouse to cover a non-perpetuity setting.[44]

48. As indicated by the AER,[45] Gray,[46] and Handley,[47] the Officer framework, and specifically Officer's definition of a nominal vanilla rate of return, provides the basis for the rate of return framework underpinning the NGR. The Authority has sought to maintain consistency with the Officer framework in its estimation of gamma.

49. In stating this, the AER also highlighted the challenges inherent in estimating gamma:[48]

> Estimating the value of imputation credits is a complex and imprecise task. There is no consensus among experts on the appropriate value or estimation techniques to use. Further, with each estimation technique there are often a number of ways these may be applied resulting in different outcomes. Conceptually, the value of imputation

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[43] Economic Regulation Authority, *Explanatory Statement for the Rate of Return Guidelines: Meeting the Requirements of the National Gas Rules*, *www.erawa.com.au*, December 2013, p. 30.

[44] Officer assumes all dividends and imputation credits are fully paid out each period. Monkhouse allows some retained earnings and imputation credits (R.R. Officer, The Cost of Capital of a Company under an Imputation Tax System, *Accounting and Finance*, May 1994; P.H.L. Monkhouse, The Valuation of Projects Under the Dividend Imputation Tax System, *Accounting and Finance*, 36, 1996.) Handley notes that this assumption is unrealistic, such that any estimate of gamma that ignores retained credits will be an underestimate (J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 13).

It is well understood that the value of a retained imputation credit is less than the value of a distributed imputation credit due to the delay in distribution – but the difficult question is how much less. Unfortunately the answer is unclear as there is currently no empirical evidence on the value of a retained credit. Any value attributable to credits retained in a period would be reflected in the observed capital for that period but there no known method to identify that component. The suggestion that retained imputation credits are worthless is somewhat implausible.

Estimates of gamma using the traditional approach will, therefore, be downward biased to the extent that retained imputation credits have value. Although it is not possible to reasonably estimate the magnitude of the bias, the Authority considers its direction is clear.

[45] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016–20*, Attachment 4, p. 75.

[46] SFG, *Response to submissions on the rule change proposals, Report for the AEMC*, 5 November 2012, para. 2.

[47] J. Handley, *Report prepared for the Australian Energy Regulator: Advice on the value of imputation credits*, 29 September 2014, pp. 7-8.

[48] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016–20*, Attachment 4, p. 8.

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credits must be between 0 and 1, and the range of expert views on the value of imputation credits is almost this wide.

50. The Authority also notes the AER's position that imputation credits should be valued on a pre-personal tax and pre-personal costs level, to be consistent with the Officer model.[49]

51. The Authority considers that the benefit arising from imputation credits can be interpreted as the proportion of franking credits distributed multiplied by the proportion of these that are utilised by the representative investor.[50] The Authority's interpretation is consistent with that of the AER, which describes the utilisation rate as 'the utilisation value to investors in the market per dollar of imputation credits distributed.[51]

52. DBP's consultant Gray considered this interpretation to be misplaced.[52] Gray states that the Authority 'has now abandoned its "value" interpretation of gamma in favour of the AER's taxation statistics approach'.[53] Gray bases this view on the Authority's definition of the utilisation rate, as being the proportion of imputation credits that are redeemed – the utilisation rate of the representative investor – which the Authority determined was a complex weighted average of the utilisation rates of all investors holding risky assets, where the weights involve each investor's investment in risky assets and their risk aversion.[54,55]

53. Gray stated that the Authority committed two errors:[56]

a) It has misinterpreted the advice provided in the Lally (2013) report to the AER. The ERA interprets that report as supporting its conceptual definition of theta and its use of the equity ownership approach and tax statistic redemption rates to estimate theta. However, as set out in detail in Section 10 below, Lally (2013 AER) provides no such support. That is the ERA has erred in its interpretation of the Lally (2013 AER) report; and

b) Irrespective of what might be contained in the Lally (2013) report to the AER, the regulatory task requires theta to be estimated as the value of distributed credits – as explained in Sections 2 and 5 of this report. The ERA now proposes to perform a different task and has erred in that respect.

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[49] Australian Energy Regulator, AusNet Services distribution determination final decision 2016–20, Attachment 4, p. 8.

[50] Economic Regulation Authority, *Draft Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution System*, 14 October 2014, p. 210.

[51] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016–20*, Attachment 4, p. 9.

[52] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission:* 12, December 2014, Appendix O, p. 9 (SFG Consulting, *An appropriate regulatory estimate of gamma*, 23 December 2014).

[53] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission:* 12, *December 2014*, Appendix O, p. 16.

[54] Whilst the Authority refers to 'risk aversion' throughout this discussion, it acknowledges that there may be other factors, in addition to risk aversion, that are implicit in this calculation.

[55] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission:* 12, December 2014, Appendix O, p. 21.

[56] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 17.

54. The key challenge to the Authority's revised view of gamma therefore relates to the estimate of the utilisation rate. The Authority deals with this first, in what follows, then discusses the distribution rate, before drawing the material together to provide for an overall estimate of gamma.

Utilisation rate (theta)

55. The Authority considers that the benefit of distributed imputation credits will rely on the proportion of franking credits received that are utilised by the representative investor. The estimate of this proportion is the utilisation rate, theta (θ).

56. The Authority notes that the utilisation rate is a market-level parameter, meaning that the same value applies to all firms.[57]

57. Individual investors have differing utilisation rates; investors who are able to fully use tax credits are assigned a value of one whilst investors who cannot are assigned a value of zero. These individual utilisation rates may be weighted to produce the required market-level utilisation rate θ. The Authority therefore considers that θ 'is a complex weighted average over all investors holding risky assets, where the weights incorporate each investor's investment in risky assets, and their level of risk aversion.[58,59]

58. To this end, the Authority's previous (Rate of Return Guidelines) estimation approach for estimating theta – using DDO studies – may not correctly estimate the utilisation rate required, as, among other things:

- The utilisation rate is a complex weighted average over investors, reflecting their relative wealth and risk aversion, and this need not correspond to the market value of the credits whether estimated by a DDO study or any other market based method. Even Gray accepts that, if theta is not defined as the market value of the credits, then market value studies such as DDO analysis will be of limited relevance.[60]

- DDO studies at best only estimate the utilisation rate around just two days, the cum-dividend and ex-dividend dates. As a consequence, they provide an estimate of the utilisation rate with weights that reflect the composition of

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[57] See M. Lally, *The Estimation of Gamma,* Report for the AER, November 2013, p. 11.

[58] See M. Lally, *The Estimation of Gamma,* Report for the AER, November 2013, p. 11; M. Lally. and T. van Zijl, 'Capital Gains Tax and the Capital Asset Pricing Model', *Accounting and Finance,* vol.43, 2003, pp. 187-210.

[59] The normal source of the definition of a parameter within a model is the definition provided in the paper that derives the model. However, in this case, the seminal Officer paper has been interpreted by experts in different ways. However, the Authority considers that Lally and van Zijl provide a rigorous derivation of the Officer model. In this derivation, theta is a complex weighted-average over the utilisation rates of individual investors, where the utilisation rates for individual investors are 1 if they can fully use the credits to reduce their personal tax obligations and 0 if they cannot use the credits, and the weights involve the proportion of risky assets held by each investor and other unobservable terms (M. Lally, *The Estimation of Gamma*, Report for the AER, 23 November 2013, p. 11; M. Lally. and T. van Zijl, 'Capital Gains Tax and the Capital Asset Pricing Model', *Accounting and Finance*, vol.43, 2003, pp. 187-210.). Lally notes that the unobservable terms may vary over investors but do not lend themselves to estimation and therefore one could act as if they are equal across investors in which case theta is the proportion of risky assets held by investors who can use the imputation credits (M. Lally, *Gamma and the ACT Decision*, 23 May 2016, p. 16).

[60] Frontier Economics, *An Appropriate Regulatory Estimate of Gamma: Response to the DBP Draft Decision*, January 2016, para 139.

investors around the cum and ex dividend dates, not the weighted average across all points in time, as required. Furthermore, such investors may be quite untypical of investors in general. The 'market' value in these studies are influenced by the *marginal* investor over those dates, rather than the value attributed across all investors.

- DDO studies may not accurately separate out the effect of the taxation benefits associated with imputation credits on the share price change from the effect of the cash dividend. There are a range of statistical models that could be used, choices over which data to use, and the results seem to be quite sensitive to a small number of outlying observations.[61]

- There is considerable evidence of anomalous share price behaviour around ex days, which raises the possibility that any estimate of the utilisation rate from a DDO is instead reflecting that anomalous behaviour.[62]

- Estimates of the market value of the credits from methods other than DDOs produce markedly different results, which undermines the credibility of such market-based estimates.[63]

59. For these reasons, the Authority has determined to place limited weight on the DDO estimates, and on the range of applied market value estimates more generally.

60. The Authority instead considers other approaches to estimating the utilisation rate.

61. In response, DBP's consultant Gray has argued that the Authority is in error in interpreting theta (and hence gamma) as the utilisation rate, rather than in terms of the value to the representative investor.[64]

62. First, Gray points to the revised language of NGR 87A, which states that 'gamma is the value of imputation credits', rather than the previous term 'utilisation of imputation credits'. Gray acknowledges that the Australian Energy Market Commission did not provide a detailed explanation about the changed language in its Final Determination, but considers that its apparent intention was to be clear that imputation credits did not rely on utilisation.[65] The Authority notes that the AER sought clarification from the AEMC on the reason for the change, which was unable to provide 'any further insight'.[66] In any event, the definition of a parameter within a model can only be determined from a rigorous derivation of the model.

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[61] M. Lally, *The Estimation of Gamma,* Report for the AER*, 23* November 2013, section 3.5.

[62] M. Lally, *The Estimation of Gamma,* Report for the AER*, 23* November 2013, section 3.5.

[63] M. Lally, *The Estimation of Gamma,* Report for the AER*, 23* November 2013, Table 2.

[64] DBP, Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission: 12, December 2014, Appendix O, p. 21.

[65] DBP, Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission: 12, December 2014, Appendix O, p. 21.

[66] Australian Energy Regulator, *Draft Decision on Jemena Gas Network 2015–20 Access Arrangement*, Attachment 4 Value of imputation credits, p. 4-37.

63. Second, Gray has argued that the parameter U in the following equation from Lally's analysis, specifically within the term IC_1U, is defined as the *value* that investors attribute to imputation credits:[67]

$$S_0 = \frac{Y_1 - Tax_1 + IC_1U + S_1}{(1 + E[\widehat{R}])} \qquad (3)$$

where

U is the utilisation rate or value that investors attribute to imputation credits;

Y_1 is the expected cash flows over the first year to equity holders (net of all deductions except company taxes);

Tax_1 is the expected company taxes over the first year;

S_0 is the current value of equity;

S_1 is the expected value in one year;

$E[\widehat{R}]$ is the equilibrium expected rate of return on equity; and

IC_1 is the distributed imputation credits over the first year.

64. However, the Authority notes that Lally clearly states in context that U in the equation is a market level parameter, derived as a complex weighted average over all investors holding risky assets:[68]

> So, relative to the standard form of the CAPM, the Officer CAPM and the associated cash flows requires three additional parameters: the ratio of market-level imputation credits to the value of the market portfolio (ICm/Sm), the ratio of firm-level imputation credits to firm level company tax payments (IC/TAX) and the utilisation rate (U). The second of these parameters is called the "distribution rate" and the product of the last two is called "gamma".

> The utilisation rate referred to here is a market-level parameter, i.e., the same value applies to each firm. Individual investors also have utilisation rates: one for those who can fully use the credits and zero for those who can't. Consequently it might be presumed that U is some type of weighted average over investors. Although Officer (1994) provides no clarification on this matter, because his derivation of the model is intuitive rather than formal, Lally and van Zijl (2003, section 3) provide a formal derivation of a generalisation of Officer's model (with the Officer model being a special case), in which variation of utilisation rates across investors is recognised. In this derivation, they show that U is a complex weighted average over all investors holding risky assets, where the weights involve each investor's investment in risky assets and their risk aversion. Individual investors' levels of risk aversion are not observable. Accordingly it is necessary to (reasonably) act as if risk aversion is uncorrelated with utilisation rate at the investor level, in which case the weights reduce to investors'

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[67] The source of this equation is M. Lally, *The Estimation of Gamma,* Report for the AER, November 2013, p. 9; cited by Goldfields Gas Pipeline, *Access Arrangement Revision Proposal: Supporting Information*, 15 August 2014, Appendix 1, p. 11 (SFG Consulting, *An appropriate regulatory estimate of gamma*, 21 May 2014). Lally uses *U* for the utilisation rate rather than θ.

[68] M. Lally, *The Estimation of Gamma,* Report for the AER, November 2013, p. 10.

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relative investments in risky assets, i.e., *U* is a value-weighted average over the utilisation rates of individual investors.

65. Third, Gray considers that there is a material difference between the utilisation rate (the proportion of credits that are redeemed at the tax office) and the value of those credits to shareholders.[69] Gray's core argument is that there is a cost for an investor to obtain and redeem a credit.[70] Gray considers that:[71]

- some credits that are distributed are never redeemed, for example because;
  - the investors are non-residents; and
  - the 45 day rule precludes it;
- record keeping creates administrative costs;
- there is a time delay in obtaining the benefit;
- imputation credits are taxed at their face value;
- as resident investors adjust their portfolio to hold domestic shares for imputation, their portfolios will become less diversified, at a cost; and
- a rational investor would increase the concentration of domestic shares in their portfolio until the marginal benefit of imputation is zero.

66. The Authority has noted these points, but has come to the view that:

- the first of these points is uncontroversial; it reduces both the utilisation rate as properly defined and the market value of the credits;
- the remaining points do or may give rise to a divergence between the utilisation rate as properly defined and the market value of the credits, but any such divergences make the market value of the credits less suitable as an estimator of the utilisation rate;
- these are arguments against using market prices to estimate the utilisation rate rather than arguments in support of using market prices;
- the effects of the time value of money are likely to be minimal, given the period of delay; and
- there is no empirical evidence on the diversification effect of imputation credits, and no clear theoretical position for the effect either.[72]

67. In addition, transaction and other costs are unlikely to materially affect redemption of imputation credits, as investors are required to report franked dividends and eligible imputation credits, such that the incremental cost of these other costs to shareholding is likely to be small.

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[69] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 19.

[70] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 9.

[71] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 22.

[72] The Authority notes that diversification will depend on investor's wealth and risk preferences. It may be that investors respond to the presence of imputation by holding more, less or the same value of Australian equities, depending on preferences.

68. The Authority's view then is that these considerations do not detract from the fact that some investors will redeem credits, and thus have a utilisation rate of 1, and other investors in the Australian share market will not redeem credits, and will thus have a utilisation rate of 0. In the Authority's view, there is no case here that the utilisation rate is not a complex weighted average across all investors, both domestic and international. That complex weighted average depends on risk aversion and wealth.

69. Therefore the Authority is of the view that approaches that directly inform the degree of utilisation of imputation credits will provide relevant information. Those approaches include the domestic ownership share of equity, and taxation statistics on the proportion of redeemed imputation credits.

70. Gray also argues that the complex weighted average interpretation can only be consistent with perfectly segmented or perfectly integrated capital markets – and that this is not consistent with the Authority's definition of a domestic capital market with the presence of foreign investors:[73]

> However, the ERA's definition of theta in terms of the proportion of credits that are redeemed is not consistent with any theoretical model. The theoretical models that involve "a complex weighted average over all investors" only apply to two special cases:
>
> a) The case where Australia is perfectly segmented from world capital markets; and
>
> b) The case where Australia is perfectly integrated into world capital markets.

71. Gray then argues that there is *no theoretical model* that is consistent with the Authority's definition of the boundaries of the domestic market for estimation purposes, which include the presence of foreign investors to the extent that they invest domestically. In this context, Gray considers that the Authority's definition of the market is not a 'closed system', citing Lally in support:[74]

> Lally (2013 AER) notes that there is a special case in which the proportion of imputation credits that are redeemed would be an appropriate estimate of the value of imputation credits that is reflected in the share price. He considers a class of models that includes Monkhouse (1993) and Lally and van Zijl (2003). These models all consider a setting in which there is a single market in which the m investors jointly own all of the *n* assets. In these models there is a closed system – there are no assets outside the market that are available to the *m* investors inside the market and there are no investors outside the market who can buy any of the *n* assets inside the market. That is, these models only apply in a closed system where the m investors collectively own all of the *n* assets and nothing else.
>
> The models then derive an equilibrium by solving a market clearing condition. This involves noting that: a) All of the m investors must invest all of their wealth across the n assets and nothing else; and b) All of the n assets must be owned entirely by the m investors and no one else
>
> Each of the m investors will hold a different amount of each of the n assets according to their wealth, their risk aversion and their tax status. Other things equal, wealthy

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[73] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 26. The Rate of Return Guidelines stated that 'the Authority's position is that the boundary should account for the full domestic data set, including any direct influences on the cost of capital for Australian domiciled firms. This may include the influence of international investors in Australian markets for equity…' (Economic Regulation Authority, Explanatory Statement for the Rate of Return Guidelines, 16 December 2013, p. 30).

[74] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 27.

investors will hold more of each asset than poor investors, highly risk averse investors will tend to hold safer portfolios, and investors who are eligible to redeem imputation credits will hold relatively more of the stocks that distribute larger amounts of those credits.

Because there is a closed system in which the m investors collectively own all of the n assets and nothing else, it is possible to derive the relative amount of each asset that each investor will want to hold. This will be a function of the investor's relative wealth, risk aversion and tax status. The relative demand for each asset will determine its equilibrium price and the equilibrium return that investors will require for holding it. Again, it is very important to emphasise that none of these equilibrium calculations can be performed unless the system is closed such that the m investors collectively own all of the n assets and nothing else.

These models also make the assumption that a dollar of redeemed credits has the same value as a dollar of cash dividends.

72.   This is a pivotal issue. Gray has acknowledged that:[75]

In this [closed system] case, there is equality between:

a) The extent to which imputation credits are capitalised into stock prices; and

b) The weighted-average redemption rate.

That is, there are two equivalent ways of determining the value of imputation credits, but only if the pre-requisite conditions and assumptions of the model hold. Importantly, under these special assumptions value and redemption will be equal. That is, redemption rates can be used to estimate value under these special assumptions. That is, these models do not say that redemption is the right interpretation and value is the wrong interpretation – the value interpretation is always the correct one. The only contribution of these models is to identify the special cases in which the redemption rate would provide an estimate of value.

73.   Gray's claims – that the Officer model assumes that national equity markets are completely segregated, and that the existence of foreign investors in the Australian equity market conflicts with this assumption – are not disputed. However, all models make assumptions that are unrealistic to varying degrees, and most of the other assumptions underlying the Officer model are also unrealistic (no transactions costs, infinite divisibility of assets, unlimited borrowing at the risk-free rate, *et cetera*). However, Gray's assumption that the utilisation rate is the market value, unrelated to its relationship to the utilisation rates of individual investors, essentially changes the definition of a parameter within the Officer model. If the definition of a parameter is changed within a model that has been derived from underlying assumptions, then one ceases to be using that model or any model that has been mathematically derived from underlying assumptions. Models and the definitions of their parameters are an indissoluble package.

74.   So, if the Officer model is to be used, and Gray is not proposing an alternative model, then notwithstanding the presence of foreign investors, the utilisation rate is still a complex weighted-average over the utilisation rates of individual investors rather than the market value of the credits. The only issue raised by the presence of foreign investors is whether to exclude them from the set of investors to which this weighted-average relates (consistent with the Officer assumption that national equity markets are fully segregated), or to include them consistent with the empirical fact of their existence.

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[75]   DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 28.

75. Gray's approach to this conflict between the assumptions of the Officer model and empirical reality is to define theta as the market value of the credits, and then estimate this using a DDO study. However, as stated above, the parameters in a model cannot simply be redefined. Furthermore, nothing in Gray's approach to the issue overcomes the conflict between the empirical fact of foreign investors and the use of a model (Officer) that assumes that they do not exist. In particular, Gray's estimate of theta reflects the presence of foreign investors in the Australian equity market, and therefore Gray combines a model that assumes no foreign investors with an estimate of one of its parameters that is significantly affected by their presence.

76. Gray argues that estimating theta from market prices is consistent with the way in which every other WACC parameter is estimated.[76] This could be interpreted as arguing that consistency requires that theta be estimated in this way. However, if a particular model is adopted, the parameters in the model must be defined in accordance with that model, and the only valid source of a definition is from the derivation of the model. Such derivations reveal that the utilisation rate is a complex weighted average over the utilisation rates of individual investors rather than the market value of the credits. So, market prices may be used to estimate the utilisation rate, but they are not the natural choice. The fact that other WACC parameters are market prices does not undermine this reasoning. Furthermore, the utilisation rate also appears in the cash flows, as a deduction from the corporate tax term, and this term represents the legal obligations of the firm rather than the market value of the taxes. So, some terms in the Officer model are market values and some are not, with theta being of the latter type.

77. Gray also argues that parameters should be estimated 'as they are rather than conceptualising what they would be under a particular set of assumptions'.[77] However, one cannot estimate any parameter without first defining it, and the definition of theta within the Officer model is *not* the market value of the credits but a complex weighted-average over the utilisation rates of individual investors.

78. In a recent decision on gamma, the ACT also, like Gray, concludes that the utilisation rate is the market value of the credits, and is therefore best estimated by studies using market data.[78] The source of the ACT's belief that theta is a market value is claimed to be the Officer model, but the ACT does not explain at what point this conclusion is apparent in Officer's analysis.

79. The ACT also argues that defining theta as a market value, and therefore estimating it using market data, is consistent with the processes for estimating the costs of debt and equity from market data.[79] This could be interpreted as claiming that theta must be a market value because the costs of debt and equity are market values. However, as discussed above, if a particular model is adopted, the parameters in the model must be defined in accordance with that model, and the only valid source of a definition is a rigorous derivation of the model. Such derivations reveal that theta is

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[76] Frontier Economics, *An Appropriate Regulatory Estimate of Gamma: Response to the DBP Draft Decision*, January 2016, para 52.

[77] Frontier Economics, *An Appropriate Regulatory Estimate of Gamma: Response to the DBP Draft Decision*, January 2016, para 58.

[78] Australian Competition Tribunal, *Application by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 2016, paras 1094, 1096.

[79] Australian Competition Tribunal, Application by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1, 2016, paras 1073, 1097.

a complex weighted average over the utilisation rates of individual investors rather than the market value of the credits. So, market prices may be used to estimate the utilisation rate but they are not the natural choice, and they may or may not be good estimates.

80. The Authority notes that the AER explicitly rejects Gray's view on the definition of theta as a market value, explaining that: [80]

> [W]e remain of the view that market studies that estimate the value of imputation credits are influenced by differential personal taxation of ordinary income (which includes both cash dividends and the face value of imputation credits to eligible domestic investors) relative to capital gains. These differential taxation rates heavily influence these "market values" and therefore these market value estimates neither reflect a per-personal nor post-personal tax vale of imputation credits. None of our allowed rate of return parameter estimates require an explicit adjustment to make them consistent with the Officer Framework underpinning the rules. That is, they are already appropriate post tax estimates.

81. The AER elaborates on the weaknesses of market studies in its United Energy distribution decision, noting for instance, that different investors have different DDO ratios depending on factors such as the investor's marginal income tax rate, whether the share was held for over 12 months, whether the investor is a super fund, whether the investor is foreign, and if so, how foreign income is taxed in the investor's home country.[81] It further comments that: [82]

> [T]he marginal investor's valuation is not relevant for the purposes of calculating the taxation building block. What is required is what proportion of the company tax is a prepayment of the investor's personal tax. For the taxation building block what matters is the value to all investors in aggregate and not the marginal investors that trade around the cum-dividend and ex-dividend dates. This would suggest that dividends drop off studies are not the best method for determining the gamma adjustment to the taxation building block.

82. On the issue of market segregation, the Authority has also considered Handley's view on the CAPM model in this context, where he describes the Australian market as a system of n assets with m investors, some of which are foreigners. He explains that:[83]

> The starting point for a CAPM is a given set of n assets and a given set of m investors who hold them. It is then assumed that this set of investors will trade this set of assets among themselves in order to form their optimal portfolios – with the decision criteria of each investor being to maximize his utility of end-of-period wealth, which in turn is defined over the set of n assets. The CAPM makes no explicit assumption about any other assets or any other investors but if there are other assets or investors then it is implicitly assumed that these do not matter for the purposes of determining the prices of the n assets under consideration (otherwise they should be in the model). This means that other assets held by other investors do not matter. It also means that other assets held by the m investors do not matter. This is just a form of market segmentation. By definition the system is closed because what matters for pricing

[80] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016-20: Attachment 4 – Value of imputation credits*, 26 May 2016, p. 82.

[81] Australian Energy Regulator, *United Energy distribution decision 2016-20: Attachment 4 – Value of imputation credits*, May 2016, p. 158.

[82] Australian Energy Regulator, *United Energy distribution decision 2016-20: Attachment 4 – Value of imputation credits*, May 2016, p. 159.

[83] J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 22.

purposes – the *n* assets and *m* investors – are in the model and any other assets or investors being outside the model are ignored.

This is precisely the assumption that one implicitly makes when using the CAPM in practice. Once you choose a benchmark market then you define the set of assets and investors that are relevant for pricing purposes – in other words, by choosing a particular proxy for the market, one is saying that this is the best model for estimating expected returns on assets within this market. The model is closed in the sense that it is implicitly assumed to be segmented. If one disagrees with this assumption then the solution is to bring the other assets and investors into the model.

… [Gray's] comments are based on a faulty premise – that the *m* investors can own no other assets. This is an assumption of [Gray] but is not an assumption of the CAPM. In the current context, it is not assumed that investors in the domestic market hold no other assets but rather it is assumed that investors in the domestic market price domestic assets in isolation of any other assets they may or may not hold. For this purpose, investors in the domestic market consist of domestic investors to the extent that they hold domestic assets and foreign investors to the extent that they hold domestic assets – this is the set of *n* assets and the set of *m* investors who hold those *n* assets. Foreign assets held by these domestic investors, foreign assets held by these foreign investors and foreign assets held by other foreign investors are outside the model.

83.   This position is opposed by Lally, in the context of the Officer model, who notes that regulators include foreign investors, to the extent that they invest in the Australian market, to reflect the empirical reality of their existence, but that:[84]

…this involves use of a model (the Officer CAPM) that assumes that national markets for risky assets are segmented along with the definition for a parameter (*U*) that is inconsistent with this model. Expressed more technically, the Officer model arises from the portfolio choices of a group of investors whose portfolio choices are limited to the Australian risk free asset (whose rate is determined exogenously) and Australian risky assets, and their portfolio choices determine the prices and hence the expected rates of return on these risky assets. Thus foreign investors, who by definition can hold both Australian and foreign risky assets, have no place in such a model. In addition, if Australian investors have access to foreign assets, the appropriate CAPM will reflect that fact and the equilibrium prices of Australian assets will differ.

84.   But Handley points out:

Lally (2013) adopts an unnecessarily narrow interpretation of segmentation in suggesting that foreign investors should be excluded completely. But once you choose a proxy for the market portfolio you define not only the set of assets that are relevant for pricing purposes but you also define the set of investors that are relevant for pricing purposes – in other words, it is a joint assumption. Lally's suggestion that we include the full set of *n* assets but only a subset of the of *m* investors not only contradicts the starting point of the CAPM but also does not accord with the reality that foreign investors are present in and influence the pricing of assets in the domestic market. This notion of (complete) segmentation – that only domestic assets are held by domestic investors – is an assumption of Lally but is not an assumption of the CAPM.[85]

85.   The Authority considers that Handley's statements relating to segmentation in the CAPM model provide an alternative view. While it is reasonable to consider that Australian and foreign investors' holdings of Australian assets may be influenced by the prices of assets in overseas markets, a globally integrated market is not used

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84   M. Lally, *The Estimation of Gamma,* Report for the AER*,* November 2013, p. 14.

85   J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 22.

for estimating the rate of return. The Authority explicitly rejected such an approach in the Rate of Return Guidelines.[86] While utilisation rates may change as investors in Australian capital markets change their portfolio holdings and the proportion of foreign investors changes, *at any given point in time* the utilisation rate will be a complex weighted average of the *m* investors' utilisation rates.[87]

86. It becomes clear, then, that the term 'value of franking credits' and 'proportion of the tax paid at the company level [which] is really a withholding of personal tax' are interchangeable terms for gamma.[88] From the shareholders' point of view 'distributed imputation credits are valuable to the extent that they can be used (or utilised or redeemed) to reduce personal taxes and/or have credits refunded'. Officer described gamma in both ways. Handley considers that Officer's central idea is the identification of personal tax component of the company tax paid.[89] The relevant value of an imputation credit is the after-company-before-personal-tax value.[90]

87. Handley notes that the debate about value and utilisation is a largely sterile one:

> …the relevant measure of utilisation value is that value as determined by the market – in other words it is not the utilisation value of a credit to any single investor or the utilisation value to any single class of investors that we want but rather the utilisation value to the market as a whole. In contrast, much of the current debate appears to incorrectly suggest that market value and utilisation value are alternative concepts for this purpose.

88. Handley observes that Officer concluded that the grossed up return to a company would include returns for capital accumulation, dividends and imputation. The returns to imputation may be expressed as $\dfrac{\gamma C_t}{p_{t-1}}$ where C_t is imputation credits distributed during the period and the share price p_{t-1} is the price at the start of the period. Handley quotes Officer as defining this component as the 'value of tax credits expressed as a rate or proportion of the initial value of the share'.[91] With Monkhouse's extension to a non-perpetuity setting, set out at paragraph 6, then 'γ continues to be used to refer to the personal tax proportion of company tax paid – equivalently the utilisation value of generated imputation credits, while theta is used to refer to the utilisation value of distributed imputation credits and is commonly called the utilisation rate'.[92]

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[86] Economic Regulation Authority, *Explanatory Statement for the Rate of Return Guidelines*, 16 December 2013, p. 28.

[87] Handley further notes in this context that (J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 8):

An implication of SFG's assertion is that one could validly use a "domestic" version of the CAPM say to price U.S. stocks only if you assume that investors in the U.S. stock market hold no other assets except U.S. stocks. Such an assumption would be clearly implausible.

[88] J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 9.

[89] J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 9.

[90] J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 7.

[91] J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 10.

[92] J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 11.

89. Handley notes that the utilisation rate will reflect the value of imputation credits to the market as a whole, which may be difficult to observe. In this context, Handley reiterates the key messages made by Lally, that:[93]

- the per dollar utilisation value of imputation credits embedded in equilibrium asset prices, theta, is common across all assets in the market; and

- theta may be interpreted as a complex weighted average of investor utilisation rates.

90. The Authority notes that both Handley and Lally consider that it is appropriate to assume a domestic capital market for the purpose of estimating theta. Further, both take the position – in opposition to Gray – that the complex weighted average approach is preferable to market based approaches. The main point of difference between Handley and Lally is whether or not international investors should be excluded from the model.

91. Based on the foregoing, the Authority considers, on the balance of the arguments, that use of the CAPM and interpretation of theta as the utilisation rate (as a complex weighted average) is consistent with the assumption that the CAPM applies to a domestic market that includes the presence of international investors.

92. In light of the foregoing, the Authority considers that there is considerable uncertainty surrounding the estimation of the utilisation rate. The Authority therefore considers that applying a range of approaches is desirable in determining the estimate.

Equity share ownership

93. The Authority considers that, by definition, theta is a complex weighted average over the utilisation rates of individual investors, where the utilisation rates for individual investors are 1 if they can fully use the credits to reduce their personal tax obligations and 0 if they cannot use the credits, and the weights involve the proportion of risky assets held by each investor and other unobservable terms. If these other terms are equal across investors, then the market utilisation rate is the proportion of Australian risky assets held by investors who can use the imputation credits. Furthermore, since this assumption cannot be confirmed or rebutted, because these other terms are unobservable, then pragmatically theta should be treated as if it is the proportion of risky assets held by those investors who can use the credits.

94. Assuming that all local investors can fully use the credits and foreign investors cannot use the credits, it follows that theta is the proportion of Australian risky assets held by local investors. Accordingly, an estimate of the proportion of Australian equities held by local investors is an estimate of theta.

95. Gray implies that the equity ownership approach overestimates theta because it assumes that 100 per cent of credits distributed to resident investors will be redeemed but some will not be redeemed due to the 45 day rule.[94] However, if a resident investor is unable to redeem credits because they held shares for less than 45 days around the ex-dividend date, they could not be a tax arbitrageur (such

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93 J.C. Handley, Advice on the Value of Imputation Credits, 29 September 2014, p. 20. For a summary of Lally's views, see Economic Regulation Authority, *Draft Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution System*, 14 October 2014, Appendix 8.

94 Frontier Economics, *An Appropriate Regulatory Estimate of Gamma: Response to the DBP Draft Decision*, January 2016, section 4.6.3.

parties would desist if they were not successful) and therefore would have to have other motives for holding the shares for this short period. Since the penalty for doing so in the form of not receiving imputation credits would be substantial, the set of such investors would be likely to be very small. Additionally, because they would be holding the shares for less than 45 days, their impact on the estimate of theta from the equity ownership approach would be further diluted.

96. Furthermore, there will be cases in which tax arbitrage is successful despite the 45 day rule (because shares are held for more than 45 days around the ex-dividend date) and the effect of this will be that the equity ownership approach will underestimate theta.

All equity – listed and unlisted

97. The Authority has previously estimated the domestic equity share ownership proportion of listed and unlisted equity at 0.7. That estimate is based on:

- evidence from the AER, based on 2007 evidence from the Australian Bureau of Statistics (**ABS**), that 71 per cent of Australian equity (listed and unlisted) is held by domestic investors;[95] and

- updated ABS evidence from the QCA support a foreign ownership share (listed and unlisted) of around 30 per cent, depending on the period chosen.[96]

98. Gray cautions that the estimates in unlisted equity may be unreliable, quoting the original ABS feature article from June 1992 to this effect.[97] However, the Authority notes that:

- Gray omitted to include a sentence in the ABS quote that 'Alternative information sources and methodologies for deriving these estimates are being investigated.'[98] The feature article is more than 20 years old, and the ABS has continued to refine the data in the relevant catalogue over the years.

- The ABS has continued to publish the data, so it is reasonable to consider it relevant.

- The data quality warning was not repeated in the ABS feature article from 2007.

99. The Authority is therefore not persuaded that the equity ownership estimates are undermined by data quality issues.

100. Gray has also noted the use of 2007 ABS data, suggesting that updated estimates based on current ABS data should be used. Gray also suggests that any equity share ownership estimate should be restricted to privately owned equity, else the inclusion of government owned equity will cause a systematic bias in the estimate of

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[95] Australian Bureau of Statistics, *Feature article: Foreign ownership of equity,* Available at: http://www.abs.gov.au/ausstats/abs@.nsf/featurearticlesbytitle/EDEB646A92BF2BFBCA2579B8000DF20B?OpenDocument.

[96] Queensland Competition Authority, *Final Decision: cost of capital: market parameters*, August 2014, p. 98.

[97] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 42.

[98] Australian Bureau of Statistics, *International Investment Position Australia*, June 1992, Section 4.

foreign ownership.[99] The Authority has noted these points and derived an updated series of equity share ownership that excludes government entities.

101. The Authority has also refined the equity share ownership estimates consistent with the method set out by the AER (Figure 1). The method:

- excludes from the calculation entities that are wholly owned by the public sector – including equity issued by the 'central bank', 'central borrowing authorities', 'national public non-financial corporations' and 'state and local public non-financial corporations';

- sums the equity held by those classes of domestic investor that are eligible to utilise imputation credits – 'households', 'pension funds' and 'life insurance corporations';

- sums the equity held by those classes of investor that are not eligible to utilise imputation credits – 'state and local general government', 'national general government' and the rest of the world'; and

- determines the share of equity held by investors eligible to utilise imputation credits as a proportion of the equity held by domestic investors that either use or waste imputation credits.[100]

102. The resulting domestic ownership for all (listed and unlisted) equity has tended to lie in the range between 55 and 65 per cent much of the time (Figure 1). The most recent share in December 2015 was 61 per cent.

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[99] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 42.

[100] Australian Energy Regulator, *Draft Decision, Jemena Gas Network's 2015–20 Access Arrangement*, Attachment 4 Value of imputation credits, p. 4-55. The AER observes that the case for assuming that governments 'waste' the imputation credits they receive is not clear, but that the effect of the exclusion is immaterial on the final result.

Figure 1   Share of domestic ownership in listed and unlisted equities – excluding government ownership and refined to account for use of imputation credits
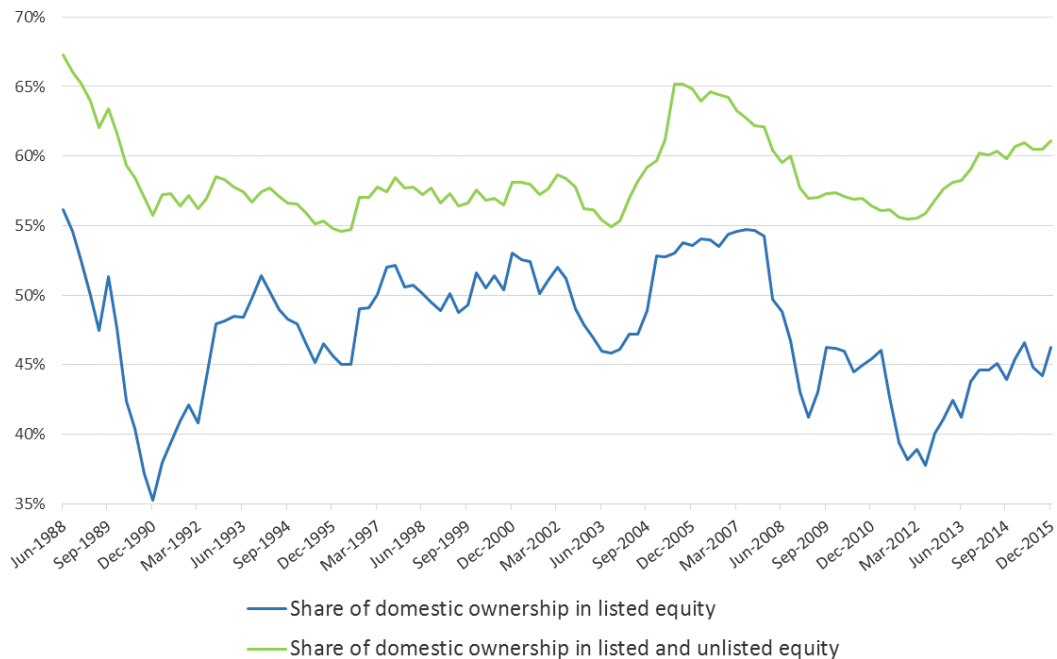
Source: Australian Bureau of Statistics*, Australian National Accounts: Finance and Wealth,* Catalogue 5232.0, Tables 47 and 48, June 2015, 24 September 2015; ERA analysis.

103.   The Authority considers that the most relevant period for making an estimate is that since July 2000, when the current regime allowing refunds of excess credits for eligible investors came into effect. Over that period, the share of domestic ownership in all equity has averaged 59 per cent**.**

104.   The Authority notes that the estimate has fluctuated over time. The Authority therefore is of the view that it is reasonable to infer an estimate around 59 per cent for domestic ownership of listed and unlisted equity, based on the average since 2000. That estimate also happens to be close to the most recent observation.

Listed equity

105.   The listed equity share has fluctuated around 50 per cent much of the time, moving in a range between 35 and 56 per cent in the observed data. The listed equity share is currently 45 per cent (based on recent ABS data for December 2015), and the average value since July 2000 has been 47 per cent (Figure 1).[101]

106.   The Authority therefore is of the view that it is reasonable to infer an estimate of around 47 per cent for domestic ownership of listed equity, based on the average since June 2000.

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[101]   The Authority does not accept DBP's argument that it should use either the most recent value, or the last five years average, given the volatility of the data (see DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Response to ERA Issues Paper Submission 26*, 2 June 2015, p. 12).

Equity share ownership estimate of the utilisation rate

107.   The Authority estimates the utilisation rate of imputation credits as being in the range of 0.47 to 0.59 at the current time (based on the most recent ABS data for December 2015, and using the 'refined' approach), depending on whether the estimate is based on listed or all equity respectively.[102]

108.   The Authority notes that this is somewhat lower than Handley's estimate, which is that the corresponding range is 0.5 to 0.7, depending on whether listed or all equity is used.[103] The Authority notes that Handley's estimate is based on earlier ABS data (March 2014), and also took account of the estimate of Hathaway, that 'domestic investors held between 75 per cent and 81 per cent of Australian equity between 1988 and 2012'.[104] The Authority has not accounted for Hathaway's data, given its preference to focus on the estimates for the post-2000 period.

109.   In respect of the choice between listed and all equity, the fact that only listed equity is used to estimate the MRP and beta suggests that the same limitation be applied to the present issue. However, Lally argues that the limitation is only imposed for the MRP and beta because data from unlisted firms is entirely inadequate for estimating returns.[105]

110.   The Authority notes this argument for the use of listed equity, but is also aware that there is a lack of consensus in relation to this point. In the recent AusNet Services decision,[106] the AER responded by considering both listed equity, and all equity (both listed and unlisted). The Authority has adopted a similar approach in this decision.

111.   In its recent PIAC-AusGrid Decision, the ACT argues that the estimate of theta from the equity ownership approach is an upper bound, due to time delays, administrative costs in distributing the credits, portfolio effects, and the effect of the 45 day rule.[107] Given the ACT's belief that theta is the market value of the credits, this would seem to follow. However, the Authority considers that the ACT's belief about theta is in error; theta is not the market value of the credits but is instead a complex weighted average over investors' utilisation rates.

112.   In addition, even if theta were the market value of the credits, the belief that the equity ownership proportion necessarily exceeds the market value of the credits due to administrative costs, time delays, portfolio effects, *et cetera* is erroneous. For example, if 50 per cent of Australian equities were foreign owned on average, tax arbitrage involving local investors buying shares shortly before dividend ex-days and selling them shortly afterwards could lead to all credits being redeemed by locals and therefore the market value on the credits could be close to 1.0. Consequently,

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[102] This range has changed from that estimated for the ATCO GDS Final Decision due to the inclusion of the most recent data to June 2015.

[103] J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 36.

[104] J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 35.

[105] M. Lally, *Review of Submissions to the QCA on the MRP, Risk-Free Rate and Gamma*, 12 March 2014, pp. 34-35.

[106] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016-20: Attachment 4 – Value of imputation credits*, 26 May 2016.

[107] Australian Competition Tribunal, *Application by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 2016, paras 1066, 1093, 1095.

the market value of the credits may be above the proportion of equity owned by Australian investors.

Taxation statistics

113. The redemption rate for a year is the total credits redeemed divided by the total credits issued. If all credits issued to investors who can use them are redeemed, it follows that the redemption rate is the total credits issued to investors who can use them divided by the credits issued to all investors. In addition, if investors who can use the credits choose Australian stocks with the same ratio of imputation credits to equity value as do investors who can't use the credits, the redemption rate would be the proportion of Australian equities held by investors who can use the credits. As discussed earlier, essentially this is theta.[108]

114. However, as argued by Lally, the second assumption is unrealistic.[109] Investors who can use the credits are likely to tilt towards stocks with high imputation credit to value ratios because only they can use the credits and the market value of these credits is unlikely to fully reflect their full face value because the influence of investors who can't use the credits is significant. Accordingly, the redemption rate would overestimate theta and this is a disadvantage for this estimator.

115. On the other hand, tax arbitrage causes the equity ownership approach to underestimate theta, as discussed earlier, and this problem does not apply to the redemption rate; that is, tax arbitrage equally raises both theta and the redemption rate. So, the redemption rate tends to overestimate theta, whilst the equity ownership approach tends to underestimate it.

116. The Authority noted in the Rate of Return Guidelines that two studies – performed by Hathaway and Officer (2004) and Handley and Maheswaran (2008) – have been considered by regulators in the past to estimate the redemption rate.[110] These reports relied on company statistics published by the ATO.[111]

117. Hathaway and Officer (2004) used ATO company statistics to estimate the proportion of redeemed imputation credits from 1988 to 2002.[112] They calculated that 71 per cent of company tax payments had been distributed as imputation credits on average and estimated that 40 to 50 per cent of the distributed credits were redeemed by taxable investors.[113]

118. Handley and Maheswaran (2008) used the same data to examine the reduction in individual tax liabilities due to imputation credits from 1988 to 2004.[114] Their study

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[108] M. Lally, *Gamma and the ACT Decision*, 23 May 2016, pp. 18-19.

[109] M. Lally, *Gamma and the ACT Decision*, 23 May 2016, p. 19.

[110] Economic Regulation Authority, *Explanatory Statement for the Rate of Return Guidelines: Meeting the Requirements of the National Gas Rules*, 16 December 2013, p. 212.

[111] See N. Hathaway, *Imputation credit redemption ATO data 1988-2011, Where have all the credits gone?* September 2013, p.6.

[112] N.J. Hathaway & R.R. Officer, *The Value of Imputation Tax Credits,* working paper, Melbourne Business School, 2004, p. 14.

[113] N.J. Hathaway & R.R. Officer, *The Value of Imputation Tax Credits,* working paper, Melbourne Business School, 2004, p. 14

[114] J. Handley and K. Maheswaran, "A Measure of the Efficacy of the Australian Imputation Tax System", *The Economic Record*, Vol. 84, No. 264, 2008, pp. 82-94.

found that 67 per cent of distributed imputation credits were used to reduce personal taxes between 1990 and 2000, and this increased to 81 per cent over 2001-2004.

119. Hathaway provides more recent estimates, using data for 2004 to 2011 – of 44 per cent or 62 per cent – depending upon whether ATO Franking Account Balance (**FAB**) data or ATO dividend data are used.[115] Rather than using ATO company statistics, which are subject to double counting errors, Hathaway provides separate estimates based on ATO FAB data and ATO dividend data,[116] and highlights the large, and apparently non-reconcilable, discrepancy between the two datasets.[117]

120. Hathaway gives more weight to the estimate based on ATO FAB data, stating that:[118]

> …I have more faith in the [ATO FAB] data than in the dividend data. The dividend data appears to be missing about $87.5 billion and the ATO has had substantial problems with the dividend data in the past.

121. Hathaway's estimate using ATO FAB data has also been updated a number of times by various parties since it was originally calculated. NERA uses data for 2004 to 2012 and updates Hathaway's estimate using tax data for one additional year to 45 per cent.[119] Similarly, Gray uses data from 2004 to 2013 to arrive at an estimate of 46 per cent[120], and the AER uses data from 2004 to 2014 to arrive at an estimate of 48 per cent[121].

122. The Authority considers that Hathaway's estimate, and the updated estimates produced by NERA, Gray, and the AER, are superior to all earlier estimates of the redemption rate, and therefore uses them to estimate the redemption rate.

123. The Authority notes that the AER recently set out the evidence for the estimate based on tax statistics in a further review, drawing on, and further, considering views from the experts:[122]

- the evidence assembled by Hathaway, NERA, Gray, and the AER points to a range of around 0.4 to 0.6 for the utilisation rate;

- based on the observation that the post-2004 taxation statistics data is more reliable than data available prior to that date:

[115] N. Hathaway, *Imputation credit redemption ATO data 1988-2011, Where have all the credits gone?* September 2013, section 1.3.

[116] N.J. Hathaway & R.R. Officer, *The Value of Imputation Tax Credits,* working paper, Melbourne Business School, 2004, p. 14.

[117] N. Hathaway, *Imputation credit redemption ATO data 1988-2011, Where have all the credits gone?* September 2013, p. 4.

[118] N. Hathaway, *Imputation credit redemption ATO data 1988-2011, Where have all the credits gone?* September 2013, p. 39.

[119] NERA, Estimating Distribution and Redemption Rates from Taxation Statistics, March 2015, section 4.

[120] Frontier Economics, *The Appropriate Use of Tax Statistics when Estimating Gamma*, 6 January 2016, pp. 31-32.

[121] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016-20: Attachment 4 – Value of imputation credits*, 26 May 2016, p. 4-138.

[122] Australian Energy Regulator, *Draft Decision, Jemena Gas Network's 2015–20 Access Arrangement*, Attachment 4 Value of imputation credits, pp. 4-58 to 4-59.

> In this current work I only consider franking credit flows for the period for 2004 onwards and can provide a much more detailed insight into the flows and utilisations of franking credits for that period
>
> I would caution anyone, including the AER, against relying on those parts of my earlier reports which focussed on ATO statistics [up to 2004]. The data was then not as clear as it is today. I had to rely on separate analyses of ATO tax data and the ATO financial data. As I am now aware with the new data, there is an extremely large discrepancy between these two subsets of data. The missing link was the data on the flows of credits between companies which is now visible after the changes of 1 July 2002. I would recommend that the AER do not rely on that earlier report.[123]

- informed by two estimates of the distribution rate for the period 2004 to 2011, being 0.43 and 0.61;

- more recently updating the 0.44 estimate to 0.48 using ATO FAB data to the 2014 tax year, with;[124]

    - the (updated) 0.48 estimate of the utilisation rate (using ATO FAB data) corresponds to estimates of the distribution rate of around 0.7;

    - the 0.61 estimate of the utilisation rate (using ATO dividend data) corresponds to estimates of the distribution rate of around 0.5; and

- with the updated 0.48 estimate based on post-2004 data being preferred as reasonable as it is consistent with an estimate of the distribution rate for 'all equity' of 0.7.[125]

124. The Authority has reviewed this evidence and considers that the Hathaway study provides the best estimate of the utilisation rate derived from taxation statistics. The Authority has also been guided by Hathaway's finding that the ATO FAB data is more reliable than the ATO dividend data. On that basis, the Authority considers that a point estimate of 0.48 (as updated by the AER[126]) should be applied, paired with a distribution rate based on all equity of 0.7.

125. However, the Authority remains mindful of Hathaway's concerns with the ATO data, and the pointed caution about relying on it for estimating utilisation rates:

> Unfortunately, there are too many unreconciled problems with the ATO data for reliable estimates to be made about the utilisation of franking credits. The utilisation rate of franking credits is based on dividend data (from the tax office) and I have demonstrated that this data is questionable.[127]

Implied market value studies

126. Implied market value studies include:

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[123] N. Hathaway, *Imputation credit redemption ATO data 1988–2011: Where have all the credits gone?*, September 2013, p. 6.

[124] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016-20: Attachment 4 – Value of imputation credits*, 26 May 2016, p. 4-138.

[125] Australian Energy Regulator, *Jemena Gas Network's 2015-20 Access Arrangement Draft Decision*, Attachment 4, p. 4-20.

[126] Australian Energy Regulator, *Jemena Gas Network's 2015-20 Access Arrangement Draft Decision*, Attachment 4, p. 4-20.

[127] N. Hathaway, *Imputation credit redemption ATO data 1988–2011: Where have all the credits gone?*, September 2013, p. 39.

- simultaneous price studies for individual stocks;

- simultaneous price studies for share indexes;

- time series analysis of returns; and

- dividend drop off studies.

127.   In the Guidelines, the Authority concluded that simultaneous price studies for individual stocks are not appropriate for estimating the utilisation rate at the current time because these studies have examined only a small number of stocks.[128] The Authority notes that DBP has not contested this point.

128.   In respect of simultaneous price studies for share indexes, these overcome the Authority's concern with studies dealing with individual stocks. However there is only one such study, using data from 2002-2005, and the resulting estimates of the coefficient on imputation credits are 0.52 and 0.55 from two different specifications.[129]

129.   In respect of time series analysis of returns, NERA regresses returns on the imputation credit yield and various control variables, using data from 2000-2012, and estimates the coefficient on the credits at -1.95.[130] Since credits are at worst worthless, the highly negative estimate is implausible as noted by Ainsworth, Partington, and Warren.[131] Accordingly, the Authority gives this study no weight.

130.   The range of DDO studies available were examined at length in the Guidelines, where the Authority considered the existing set of DDO studies. The Authority in the Guidelines adopted a range for the utilisation rate of 0.35 to 0.55, based on the results of studies by Gray and by the Economic Regulation Authority Secretariat.

131.   Since the Guidelines, the Authority has become aware of Lally's view that the regression coefficient on franking credits estimated in DDO studies may not necessarily equate to theta, given that the tax rate on gross dividends diverges from capital gains. Rather, Lally argues that the regression coefficient on franking credits may be constituted as a product of theta and the regression coefficient on the value of the dividend in determining the resulting share price drop off.[132] This is discussed in greater detail below.

132.   DBP's consultant Gray has provided the Authority with the following response with regard to its approach to establishing a range for the DDO estimates:[133]

- econometric issues are not sufficiently significant to preclude use of DDO studies;

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[128] Economic Regulation Authority, *Explanatory Statement for the Rate of Return Guidelines*, 16 December 2013, p. 214.

[129] J. Cummings and A. Frino, "Tax Effects on the Pricing of Australian Stock Index Futures", *Australian Journal of Management*, Vol. 33, 2008, pp. 391-406, Table 2 and Table 4.

[130] NERA, *Imputation Credits and Equity Prices and Returns*, 2013, section 3 and Table 3.5.

[131] A. Ainsworth, G. Partington and G. Warren, *Do franking credits matter? Exploring the financial implications of dividend imputation*, June 2015, CIFR Working Paper No. 058/2015, p. 17.

[132] Note that Lally refers to theta (θ) by the equivalent symbol *U* (see M. Lally, *Estimating Gamma*, Report for the QCA, 25 November 2013, p. 21).

[133] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, pp. 47 – 50.

- DDO estimates measure the utilisation rate directly; no adjustment is required for the coefficient on dividends;

- the composition of investors around ex-dividend dates is representative of the long term providers of equity capital; and

- greater reliance should be placed on the Gray DDO studies.

Econometric issues

133. Gray notes that:[134]

> The ATCO Gas Draft Decision raises a number of general econometric issues in relation to dividend drop-off analysis. Most of these issues have previously been considered by the ERA, with the ERA determining that they are not so severe as to impact on its total reliance on drop-off analysis for estimating theta.

134. The Authority agrees that it has given some weight, albeit limited, to the DDO studies in spite of its concerns regarding econometric issues. However, the Authority is of the view that the required utilisation rate under the Officer framework is a complex weighted average determined by the value of equity that investors hold, and by their risk aversion. DDOs, however, only estimate the utilisation rate around just two days, the cum-dividend and ex dividend dates. As a consequence, they provide an estimate of the utilisation rate with weights that reflect the composition of investors around the cum and ex dividend dates, not the weighted average across all points in time, as required.

135. The Authority notes that both Handley and Lally agree that the composition of investors around ex-dividend dates may not be representative of long term investors.[135] Lally also points out that ex-dividend movements can reflect a range of factors, including tax, transactions costs, risk aversion amongst tax arbitrageurs, market microstructure effects, and anomalous behaviour around ex days, with the result that it is not clear that DDO studies necessarily over-estimate the utilisation rate. For the same reasons, there remain valid concerns as to what exactly DDO studies are measuring.

136. The Authority also notes further concerns raised by the AER in relation to implied market value studies; specifically that:[136]

- 'these studies can produce nonsensical estimates of utilisation rate', being estimates of greater than 1 or less than 0;

- the results 'may not be reflective of the value of imputation credits to investors in the market as a whole'; and

- 'it is only the combined package of dividends and imputation credits'; that is to say, there is no expert consensus on how best to separate the market value of dividends from the market value of imputation credits.

[134] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 47.

[135] M. Lally, *The estimation of gamma*, 23 November 2013, pp. 27-29; J. Handley, *Advice on the value of imputation credits*, 29 September 2014, p. 15.

[136] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016-20: Attachment 4 – Value of imputation credits*, 26 May 2016, pp. 36-37.

137. The Authority therefore considers that this is a contentious area. It adds to the caution the Authority has in relying overly on DDO studies in estimating the utilisation rate.

DDO coefficient adjustment

138. Econometric problems that exist with DDO studies have been well explored by the Authority,[137] which has previously noted that this is the reason for the large divergence in empirical estimates of theta using DDO studies.[138] The Authority noted that any estimate of theta is essentially a function of the most influential observations, due to the extreme multicollinearity present in the data.

139. This conclusion is supported by the AER, which has noted:

> Further, even if implied market value estimates were conceptually appropriate, there are significant limitations with the accuracy and robustness of such studies.[139]

140. Lally further notes: [140]

> The AER does not consider that these estimates are useful for a number of reasons. In respect of dividend drop off studies, these include evidence that trading activity around dividend ex-days is abnormal, that correction is required for market movements, and the sensitivity of results to data, outliers and model choices. More generally these problems include the difficulties in separating the values of franking credits and dividends in these studies, the wide range of empirical results from such studies, the possibility of bias from 'bid-ask bound', and the exposure of such estimates to the tax circumstance and transaction costs of tax arbitrageurs. Many of these problems are manifest in high standard errors in the estimates of the coefficients. I concur with all of these concerns, and I have additional concerns about these studies or their interpretation.

141. In this report, Lally also contends that Australian regulators (including the Authority) and the ACT have misinterpreted the results of DDO studies for estimating the utilisation rate. Lally observes that the coefficient of the regression equation in DDO studies is generally (and wrongly) assumed to be the utilisation rate, and is typically denoted using the symbol 'theta' consistent with that assumption. To avoid this confusion, the regression coefficient on the credits in the exposition that follows is

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[137] D. Vo, B. Gellard, S. Mero. 'Estimating the Market Value of Franking Credits, Empirical Evidence from Australia', Conference Paper, Australian Conference of Economists 2013.

[138] The Authority explored the econometric issues encountered in dividend drop off studies in the Explanatory Statement for the Rate of Return Guidelines, see: Economic Regulation Authority, *Explanatory Statement for the Rate of Return Guidelines: Meeting the Requirements of the National Gas Rules,* Dec 2013, p. 216 and Economic Regulation Authority, *Appendices to the Explanatory Statement for the Rate of Return Guidelines* Dec 2013, Appendix 28.

[139] Australian Energy Regulator*, Better Regulation Explanatory Statement for the Rate of Return Guidelines*, December 2013, p. 177.

[140] M. Lally*, 'The Estimation of Gamma,* Report for the AER', November 2013, p. 20.

denoted '*b*' to avoid any presumption that it is 'theta'. Lally demonstrates the error here by first outlining the dividend drop off equation as follows:

$$P_{i,t-1} - P_{i,t}^* = \delta D_i + bFC_i + u_i \qquad (4)$$

where

$P_{i,t-1}$ is the cum-dividend price;

$P_{i,t}^*$ is the ex-dividend price corrected for the market movement;

D_i is the cash dividend;

FC_i is the franking credit; and

u_i is the regression residual.

142. Lally begins by noting that no distinction should be made regarding the cash dividend and franking credit if the franking credit can be fully utilised by all investors; a cash dividend of $10 and a franking credit of $2 is equivalent to a cash dividend of $12 if the franking credit can be fully utilised by all investors. That is, an investor should be indifferent between the decomposition of any gross dividend received to the extent the franking credit can be fully utilised.[141] Consequently, if all investors can utilise imputation credits, the required regression equation would be as follows:

$$P_{i,t-1} - P_{i,t}^* = \delta[D_i + FC_i] + u_i \qquad (5)$$

143. In this circumstance, δ, recognises that the expected price change can differ from the paid out gross dividend,[142] because the tax rate applicable to the gross dividend can diverge from that of capital gains.[143] In order to incorporate the empirical reality of not all investors being able to utilise franking credits, Lally notes that the franking

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[141] Gross dividend refers to the sum of the cash dividend and the franking credit, $\mathbf{G}_i = \mathbf{D}_i + \mathbf{FC}_i$

[142] The coefficient δ, is the gross drop-off ratio, see: Beggs D., and Skeels, C., 2006, 'Market Arbitrage of Cash Dividends and Franking Credits', *Australian Economic Papers,* vol 82, pp. 239-252. The estimated coefficient, $\hat{\delta}$, therefore measures the expected change in stock price that occurs due to payment of $1 of gross dividend.

[143] The Authority notes that the theoretical model underlying dividend drop off studies is based on Elton, E.J and Gruber, M.J (1970), 'Marginal Stock Holder Tax Rates and the Clientele Effect', *Review of Economics and Statistics,* 52, pp. 68-74. Under the assumptions of no stochastic uncertainty, no time value of money and no transaction costs, it can be shown that $\delta = \dfrac{(1 - \mathrm{T}_d)}{(1 - T_g)}$ where T_d is the tax rate applicable to the gross dividend, whilst T_g is the tax rate applicable on capital gains. It follows that $\hat{\delta}$ measures the divergence in tax rates applicable to the gross dividend and capital gains of the representative investor.

credit coefficient should be multiplied by the coefficient *U*, to represent the utilisation rate. The required equation is then as follows:

$$P_{i,t-1} - P_{i,t}^* = \delta[\mathrm{D}_i + U.\mathrm{FC}_i] + u_i$$
$$= \delta\mathrm{D}_i + U.\delta\mathrm{FC}_i + u_i$$

(6)

144. Comparison of equations (33) and (34) reveals that $b = U\delta$. Therefore, in order to estimate the required utilisation rate, *U*, from DDO studies, the estimated coefficient of the franking credit, *b*, must be divided by the estimated coefficient of the cash dividend, *δ*, as follows, $U = b/\delta$.

145. On this basis, the Authority accepts that it did not correctly estimate the utilisation rate in the Rate of Return Guidelines. Re-estimating the utilisation rate – from the two DDO studies considered relevant – results in an estimated utilisation rate of 0.4 from Gray's analysis,[144] and an upper bound of 0.69 from the ERA Secretariat's analysis.[145]

146. However, Gray considers that the DDO coefficient does not need to be adjusted:[146]

> In our view, this adjustment is not appropriate when estimating theta as the value of distributed imputation credits. When theta takes a value interpretation within the regulatory framework, what is required is an estimate of the price that investors would be prepared to pay for an imputation credit. This is because the allowed return for an investor will be reduced by theta for every dollar of imputation credits that is distributed to them. To preserve the appropriate return to investors, the regulatory framework must reduce the return to investors by an amount that is equivalent to the price investors would be prepared to pay for the credit. Dividend drop-off analysis is specifically designed to estimate the price that investors would be prepared to pay for imputation credits. It directly estimates the extent to which imputation credits are capitalised into the stock price. This is an estimate of how much the stock price has been bid up in relation to the imputation credit that is to be received. The standard dividend drop-off estimate of theta provides a direct estimate of the value of distributed credits.

147. The crucial issue here can be highlighted by considering a scenario in which all investors can fully utilise imputation credits, but where capital gains are tax free whilst gross dividends are taxed at 30 per cent, leading to a coefficient on the imputation credits in a DDO of 0.70. Expressed equivalently, $1 of imputation credits is worth $0.70 just as $1 of cash dividends is worth $0.70. In this scenario, Gray would claim that the utilisation rate is 0.70. If the utilisation rate is by definition the market value of the credits, Gray's claims would be valid. However, the utilisation rate is not the market value of the credits. By definition, it is instead a weighted average over the utilisation rates of investors, and therefore it is 1 in this case.

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[144] SFG Consulting, *Dividend drop-off estimate of theta, Final Report*, 21 March 2011, p. 32. SFG's estimate is 0.35, which is 'paired with an estimate of the value of cash dividends in the range of 0.85 to 0.90'. Dividing 0.35 by 0.875 gives 0.4.

[145] Based on adjusting the range of 0.35 to 0.55 (using robust techniques) set out in D. Vo, B. Gellard, S. Mero. 'Estimating the Market Value of Franking Credits, Empirical Evidence from Australia' Conference Paper, Australian Conference of Economists 2013, final paragraph. The corresponding value of δ in that study for the upper bound (unrounded) value with no market correction of 0.53 was 0.77 (Table 5). Dividing 0.53 by 0.77 gives 0.69.

[146] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 50.

Accordingly, the coefficient on the credits (0.70) must be divided by the coefficient on the cash dividends (0.70) in order to correctly estimate the market utilisation rate (1.0).

148. On this point, the Authority notes that both Handley and Lally have recommended such an adjustment. Handley, for example, observes:[147]

> The key message here is that other stuff (such as taxes and risk) may need to be taken into account in interpreting dividend drop-off studies…
>
> Importantly, the regression coefficients δ and θ can be interpreted in this way only if there are no other factors such as differential personal taxes and risk reflected in the estimates. But the results of [Gray] clearly tell us that this is not the case. [Gray] estimate[s] the value of cash dividends δ to be in the range of 0.85 to 0.90 but one would expect a coefficient of δ = 1 in the absence of differential personal taxes and risk, since by definition the (after-company-before-personal-tax) value of one dollar of dividends is one dollar. This means that the coefficient of θ = 0.35 does not represent the (after -company-before-personal-tax) value of one dollar of imputation credits but rather it represents the (after-company-before-personal-tax) value of one dollar of imputation credits and the impact of other factors, such as differential personal taxes and risk. We don't really need to concern ourselves with precisely identifying what these other factors are – it is sufficient to know that collectively they have reduced the estimates of the (after-company-before-personal-tax) values of one dollar of dividends and one dollar of imputation credits by 10 – 15% . Accordingly, we need to gross-up the [Gray] estimates of θ by 10 – 15% to correctly interpret the results of the study. In other words, the [Gray] studies suggest a utilisation rate of 0.39 – 0.41 rather than the 0.35 as claimed. This approach is equivalent to the "Lally Adjustment"…

149. In a recent Decision, the ACT does not favour this adjustment, and quotes from Gray, who dismisses the argument because it is based upon the belief that the coefficient on cash dividends is less than 1 due to an 'econometric bias'.[148] However, Lally argues that the coefficient on cash dividends is less than 1 because capital gains are taxed less onerously than dividends, and the same is true for the valuation of the imputation credits.[149] This is a tax issue, not an econometric issue.[150] The Authority agrees with this.

150. The Authority therefore considers that it is appropriate to use the adjusted figure for the upper bound of the range for the estimate of the utilisation rate, based on applying the Lally adjustment to the upper bound of its own study. That gives an upper bound of 0.69. The Authority will also adopt the unrounded lower bound of 0.35, which reflects the results from the Authority's unadjusted estimates and also Gray's unadjusted finding.

151. The resulting range for the utilisation rate is 0.35 to 0.69. This range is reasonably wide, reflecting the uncertainty surrounding the estimates, and the conflicting views of the experts regarding the adjustment to the coefficient on the credits.

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[147] J. Handley, *Advice on the value of imputation credits*, 29 September 2014, p. 43.

[148] Australian Competition Tribunal, *Application by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 2016, paras 1102-1103.

[149] M. Lally, *Gamma and the ACT Decision*, 23 May 2016, p. 15.

[150] M. Lally, *The Estimation of Gamma*, 23 November 2013, pp. 20-21.

Composition of investors

152.   Gray questions the Authority's concern with the composition of investors around ex-dividend days. Gray considers that the Energy Networks Association:[151]

> …demonstrated that the empirical evidence shows that the increase in trading volume around ex-dividend dates is driven by a subset of investors who value imputation credits highly. These investors purchase shares to capture the dividend and imputation credit, causing a run-up in the cum-dividend price.[152]

> To the extent that this effect is material, it results in the dividend drop-off being higher than it would otherwise be, which in turn results in the estimate of theta being higher than it would otherwise be. That is, to the extent that the increase in trading volume around the ex-dividend date has an effect, it is likely to result in an over-estimate of theta.

153.   However, whilst such activities would raise the estimated coefficient on the credits in a DDO study, various activities by investors who cannot use the credits would have the opposite effect. For example, investors who could not use the credits and were holding the shares at the cum-dividend date but were also planning to sell them would be more inclined to sell cum-dividend rather than ex-dividend if the expected price drop exceeded the cash dividend, net of the tax effects, and this would reduce the estimated coefficient on the credits in a DDO study.

154.   Furthermore, unlike the activities to which Gray refers, such activities by investors who could not use the credits would be free of any incremental transactions costs and would also involve less risk rather than more (by selling at the known cum-dividend price rather than the unknown ex-dividend price). Accordingly, the net effect of transactions around ex day that are tax motivated is unclear.

155.   Moreover, even if the net effect of these transactions were to raise the coefficient on imputation credits in a DDO study, the coefficient is also affected by market microstructure issues and the widely documented and generally accepted anomalous behaviour around ex days, and these effects could outweigh the effect of tax arbitrage.

Relevance of the Authority's study

156.   Gray considers that his DDO estimates are superior to the Authority's estimates, on the grounds that:[153]

- The Authority's estimates do not apply the 'standard market adjustment' to account for the overall movement of the market on the ex-dividend day. When the market correction is applied to the Authority's results, the outcome is very close to Gray's estimate of 0.35 for the market value of imputation credits.

- The mid-point of the Authority's range of 0.35 to 0.55 does not represent the best estimate, as the majority of estimates are below 0.45 – Gray considers that 0.4 is a better representation of the Authority's results;

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[151] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 49.

[152] The same point is made by McKenzie and Partington (2011), pp. 9-10.

[153] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 46.

- Gray's studies have been subject to intense scrutiny, including by the Australian Competition Tribunal, whereas the Authority's study has not.

- Gray's theta estimates 'have been shown to be stable and reliable in the face of a battery of stability and robustness checks, whereas the Authority expresses concerns about the stability and reliability of its own results'.

157. The Authority considers that its studies have been subject to extensive scrutiny, including by regulators, experts, and DBP and Gray themselves.[154]

158. Gray considers that the Authority's study produces a theta estimate of 0.34 when the same 'ex-day market correction is applied', as is undertaken by Gray in his study.[155]

159. Gray also disagrees with the Authority's contention that DDO studies have resulted in a wide range of estimates, or are sensitive to particular data observations.[156]

160. However, the Authority notes that Lally has considered both studies in depth, stating that:[157]

> …despite using the same methodology and data filtering rules to data from an almost identical period (July 2001 to July 2012 versus July 2001 to October 2012), Vo et al (2013) and [Gray] (2013a) generate some quite dramatic differences in results. In particular, for models 3 and 4 with OLS, [Gray] estimate[s] U at 0.15 and 0.33 respectively whilst Vo et al estimates it at 0.60 and -0.08 respectively. In addition Vo et al's standard errors on the franking credit coefficient are on average 50% larger than [Gray's]. In addition, using different (but reasonable) approaches to investigating the effect of removing outliers, the effect on the parameter estimates is quite different. For example, in respect of [Gray's] preferred approach involving model 4 and "robust regression", the effect on Vo et al's estimate of the franking credit coefficient from progressively removing the 30 most extreme observations (in absolute terms), and rerunning the model after each deletion, is to generate estimates of this coefficient that (largely) progressively increase from 0.32 to 0.53 (ibid, Table 8 and Figure 15). The associated coefficients on cash dividends are not given but it could be presumed that the range in estimates for U would be at least as great as that for the coefficient on franking credits. Importantly, these 30 observations represent less than 1% of the total set of observations. By contrast, [Gray] progressively remove[s] the 20 most extreme pairs of observations (the one that exerts the most upward effect on the franking credit coefficient and the one exerting the most downward effect) and find only trivial effect on the coefficient ([Gray], 2013a, Figure 4).

> …in respect of the robust regression models used by both [Gray] and Vo et al, the latter authors rerun the models with various values of the "tuning constant" in the model, and obtain significantly different estimates of the coefficient on franking credits across the range of values for the tuning coefficient, for each of [Gray's] four models. For example, in respect of [Gray's] model 4, the estimated coefficient varies from 0.32 to 0.64 (Vo et al, 2013, Table 11 and Figure 19). Again, the associated coefficients on cash dividends are not given but it could be presumed that the range in estimates for U would be at least as great as that for the coefficient on franking credits.

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[154] See for example, Australian Energy Regulator, *Draft Decision: Jemena Gas Networks 2015-20*, November 2014, Attachment 4, p.4-23.

[155] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 47.

[156] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 46.

[157] M. Lally, '*The Estimation of Gamma,* Report for the AER, November 2013, p. 25.

161. In response to these claims, Gray notes that his sensitivity tests are performed on results with the 'market correction' while the Authority's are not. However, Gray goes on to perform additional tests on his results with the 'market correction.[158]

162. In particular, Gray argues that deleting outliers in the same way as in the Authority's analysis does not exert a material effect upon the estimated coefficient on imputation credits, with his Figure 16 showing that this coefficient varies from 0.30 to 0.38 as the 20 most extreme observations are progressively removed. This contrasts with the Authority's conclusion that the coefficient varies from 0.32 to 0.53 as the most extreme observations are removed. However, Gray removes only the 20 most extreme observations, whilst the Authority's analysis removes the 30 most extreme cases and the additional 10 observations significantly expand the range in the Authority's analysis.[159]

163. Furthermore, the Authority's analysis referred to by Lally (in paragraph 160) relates to Gray's preferred approach (Model 4 with robust regression) whilst Gray's analysis involves Model 4 without robust regression.[160] So, Gray's sensitivity tests have failed to replicate the Authority's work, subject only to using the market correction, and therefore do not rebut the problems revealed by the Authority. Furthermore, Gray does not dispute the Authority's conclusion that alternative values for the "tuning coefficient" in robust regression produce significantly different estimates for the coefficient on imputation credits, and the failure to dispute it could reasonably be interpreted as Gray accepting that this is the case.

164. Gray is presumably aware of the points raised in the last paragraph because they have been raised by Lally.[161] However, the Authority notes that, in subsequent reports Gray has not responded to these points.[162]

165. In its most recent decision on the value of gamma, the ACT provisionally concluded that the best estimate of theta is that provided by Gray, of 0.35.[163] Given the ACT's view that theta is the market value of the credits, it is natural that the ACT would prefer market studies to other types of evidence. However, there are types of market evidence other than DDOs. Implicitly, the ACT prefers DDOs over these alternatives but fails to explain why. Furthermore, there are DDO studies other than Gray's, most particularly that by the Authority. Implicitly, the ACT prefers Gray's study but again it fails to explain why. Furthermore, even if it had explained its preference for Gray's study, it has failed to explain why it prefers the methodology favoured by Gray. Inter

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[158] SFG Consulting, *An Appropriate Regulatory Estimate of Gamma*, 21 May 2014, Appendix 9.

[159] See D. Vo, B. Gellard, and S. Mero, *Estimating the Market Value of Franking Credits: Empirical Evidence from Australia*, Figure 15.

[160] SFG never state that their sensitivity analysis is model 4 without robust regression but this can be deduced by comparing their Figure 16 with the results shown in Table 2 (OLS/GLS) and Table 3 (Robust Regression) of their earlier paper (SFG, *Updated Dividend Drop-Off Estimate of Theta*, 7 June 2013). Table 2 gives an estimated coefficient on imputation credits of 0.3044 for Model 4 whilst Table 3 gives 0.3516, and Figure 16 of their 2014 paper shows the estimated coefficient on credits of about 0.30 when no observations have been deleted. So, Figure 16 must relate to Model 4 without robust regression. Furthermore, a comparison of SFG's results for the other three models in Table 2 and Table 3 of their 2013 paper with their sensitivity results for those models (Figure 13, 14 and 15 in their 2014 paper) confirms that the sensitivity analysis has been performed on Model 4 without robust regression.

[161] M. Lally, *Review of Submissions on Gamma*, 27 May 2015, pp. 20-21.

[162] For example, see Frontier Economics, *An Appropriate Regulatory Estimate of Gamma: Response to the DBP Draft Decision*, January 2016; Frontier Economics, *Issues in Relation to the Regulatory Estimate of Gamma*, March 2016.

[163] Australian Competition Tribunal, *Application by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 2016, para 1103.

alia, that methodology involves 'robust regression' with the default value for the tuning coefficient, and the Authority's study shows that alternative choices for that tuning coefficient produce significantly different estimates of the coefficient on imputation credits. So, implicitly, the ACT favours the default option for this tuning coefficient but has not provided reasons for its preference.

166. In addition, the credibility of any statistical estimates depends upon how robust they are to the deletion of outliers. Gray's results are robust to the deletion of outliers if Gray's method of selecting them is adopted. By contrast, the Authority's results are not robust to the deletion of outliers using a different method of choosing them. This raises the possibility that Gray's results from his preferred approach would not be robust to the deletion of outliers if they were chosen by the Authority's method. So, implicitly, the ACT favours Gray's method of deleting outliers but has not explained why.

167. In addition, any estimate of theta from a DDO study is sensitive to the degree of tax arbitrage, anomalous behaviour around ex-days, and market microstructure issues. So, implicitly, the ACT favours an estimate of theta that is exposed to all of these extraneous factors but fails to explain its reasons for doing so. It may be that the ACT has sound reasons for all of these implicit views but, without revealing them, there remain valid questions around these issues.

Distribution rate

168. The Rate of Return Guidelines adopted an estimate for the distribution rate, F, of 0.7. The estimate was based on data for the cumulative payout ratio from ATO franking account balances, and related to listed and unlisted equity. The estimate has been widely accepted in recent times; the ACT, for example, concluded that a distribution ratio of 0.7 was supported by a range of evidence and submissions.[164]

169. Estimation of the distribution rate requires consideration of the following issues:

- Whether the data set used to estimate the distribution rate must be consistent with that used to estimate the utilisation rate.

- If consistency is not essential, the principles that should guide the choice of data for estimating the distribution rate.

- Whether to use data for listed equity or all equity.

- If listed equity is used, whether to use ATO data or data from the financial statements of companies.

170. In respect of the first question, the distribution rate is the proportion of a firm's imputation credits that are distributed, and therefore is a firm-specific parameter whilst theta is a market parameter. Thus, theta *must* be estimated using market-wide data, whilst the distribution rate could be estimated using firm, industry, or market-wide data according to which was judged to provide the best estimate for this firm-specific parameter. In short, consistency is *not* essential, but nor is it precluded.

171. In respect of the principles that should guide the choice of data, Lally has explained the trade-offs here.[165] At one extreme, one could use data from the firm in question

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[164] Australian Competition Tribunal, *Application by Energex Limited (Distribution Ratio (Gamma)) (No 3) [2010] ACompT9*, October 2010.

[165] M. Lally, *The Estimation of Gamma*, 23 November 2013, section 4.2.

but, if the firm's dividends are fully franked, then it will be able to manipulate (raise) its price or revenue cap by reducing its dividends (so as to reduce its distributed credits, which lowers its distribution rate, therefore raising its cost of capital estimated from the Officer model used by regulators).

172. An alternative would then be some kind of industry average, with the relevant industry being regulated businesses. However many regulated businesses are publicly owned and do not pay dividends.

173. Another alternative would be to examine a set of large private-sector Australian firms that contain significant regulated businesses. However, the set of firms is not large and therefore the choice of whether or not to include certain marginal cases is likely to materially affect the resulting estimate. All of this points to the use of some type of market-wide data. However, there is considerable variation in the distribution rate across firms and therefore any market-wide average could be a poor indicator of the situation for any firm.

174. Taking account of these competing considerations, the Authority favours the use of some type of market-wide data, and this matches the general practice to date.

175. In respect of whether to use all equity or only listed equity, Handley, for example, found that the choice is significant when using ATO tax data. His estimate for the distribution rate for listed companies is about 80 per cent,[166] whilst that for unlisted companies is about 50 per cent, leading to an estimate for all companies of about 70 per cent.[167] The choice should be based on which group is most like regulated businesses. Lally argues that, since it is always sensible to distribute credits if possible, and the only restriction on doing so is the size of the firm's cash dividends, the presumed cause of the difference in distribution rates between listed and unlisted firms is lower dividend payout rates in unlisted companies.[168]

176. Lally goes on to argue that the factors determining dividend policy in listed and unlisted businesses are different. Many unlisted companies are sole traders who have corporatised to reduce their tax rate (but only if they retain rather than distribute the profits), and many others are closely held entities with dividend policy considerations quite different to those of listed companies. Furthermore, all of the privately-owned regulated businesses in Western Australia are listed firms or subsidiaries of listed firms, and this is typical across Australia.[169] Handley similarly argues for the use of only listed firms because unlisted businesses "by definition are financed in entirely different ways".[170]

177. The Authority has reviewed the arguments for using listed equity in estimating the distribution rate and considers that the above points make a strong case for the use

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[166] Following the same cumulative payout ratio approach used by Hathaway and NERA for all equity, Handley developed an estimate for only listed equity, based on ATO tax data, of 0.8 (see J. Handley, *Advice on the value of imputation credits*, 29 September 2014, p. 28).

[167] J. Handley, *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, 20 May, 2015, p. 11.

[168] M. Lally, *Gamma and the ACT Decision*, 23 May 2016, p. 26.

[169] The privately owned businesses are the DBP, which is owned by the DUET Group (listed in Australia), the GGP, which is 88% owned by APA (listed in Australia), and the Midwest South West Gas Distribution System, which is owned by ATCO Gas Australia who in turn is owned by the ATCO Group (listed in Canada).

[170] J. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 28.

of listed equity. However, the Authority also notes that the use of listed equity, only, is not universally preferred, and that the AER considered both listed equity, and all equity (listed and unlisted) in its recent AusNet Services decision.[171] Consequently, the Authority has also considered both approaches in its decision.

178. If listed equity is to be used, the final question is whether to use ATO data or data from the financial statements of listed firms. Using the ATO data, the distributed credits, and hence the distribution rate, could be estimated using either tax data or dividend data, and the results from these two approaches are markedly different. As discussed above, Hathaway provides estimates of 71 per cent and 47 per cent using these two approaches, and notes that the difference has not been reconciled.[172] This undermines the credibility of both figures.

179. By contrast, using data from the financial statements of the 20 largest ASX200 firms, which comprise 62 per cent of the value of the ASX200 index, Lally estimates the distribution rate at 83 per cent.[173] Lally also explains how this data is protected against the problems with the ATO data: the financial statement data is audited; the researcher is able to personally identify the source data (the figures of interest for particular firms) rather than having to rely upon the aggregation exercise carried out by the ATO (and is therefore protected against double-counting and other aggregation problems); and the financial statement data is internally consistent (that is, there are no unexplained discrepancies in the financial statement data whereas there are major inconsistencies in the ATO data, which casts doubt on all of it).[174]

180. In response to this, Gray argues that:

- the regulatory framework and the Post Tax Revenue Model (**PTRM**) requires a distribution rate that is defined as the ratio of distributed credits to *corporate tax paid*; but that

- Lally has estimated the ratio of distributed credits to *imputation credits created*.[175]

181. Gray suggests that large ASX firms pay a considerable amount of corporate tax overseas, which sets up a significant difference between the denominators of the two ratios.

182. However, Lally argues that the distribution rate is not the ratio of distributed credits to corporate tax paid, but the ratio of distributed credits to corporate tax paid to the ATO, and the corporate tax paid to the ATO is the same as the credits created. So, if a business pays corporate tax of $100m to the ATO and $100m to another tax authority, and distributes $80m in imputation credits, the distribution rate is $80m/$100m = 0.80, not $80m/$200m = 0.40. This indicates that Gray's point is incorrect.[176]

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[171] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016-20: Attachment 4 – Value of imputation credits*, 26 May 2016, p. 43.

[172] N. Hathaway, *Imputation Credit Redemption: ATO data 1988-2011: Where have all the credits gone?* September 2013, section 1.3.

[173] M. Lally, *Estimating the Distribution Rate for Imputation Credits*, July 2015, Table 1.

[174] M. Lally, *Estimating the Distribution Rate for Imputation Credits*, July 2015, p. 3.

[175] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission*: 12, December 2014, Appendix O, p. 59.

[176] M. Lally, *Review of Submissions on Gamma*, 27 May 2015, pp. 5-6.

183. The Authority also notes that Hathaway's estimate of the distribution ratio is the ratio of the credits distributed to the company tax payments to the ATO.[177] The same holds for NERA.[178] The same holds for Handley.[179] The same even holds for Gray.[180] So, all analysts who have estimated the distribution rate have defined it as credits distributed divided by company tax payments to the ATO. Furthermore, the fact that Gray holds this view suggests that the earlier view expressed by Gray has been implicitly acknowledged to be in error.

184. Gray argues that the top 20 firms should be excluded in estimating the distribution rate because they have foreign-sourced profits that elevate their distribution rate for credits (by raising their dividends and hence the maximum credits they can attach but not the imputation credits that they create), and foreign-sourced profits are not a feature of the benchmark firm that is being regulated (a pure-play business operating within Australia).[181]

185. Lally has empirically assessed Gray's claim by examining (amongst the top 20 firms) the seven firms with the largest tax payments to the ATO (accounting for 79 per cent of the taxes paid to the ATO by this set of 20 firms).[182] Lally estimates the proportion of their profit from their foreign operations (from their latest Annual Report), and reports their distribution rates from his earlier paper. The proportion of profit from foreign operations is decreasing in the distribution rate, and the correlation between the two variables is -0.95.[183] This is in the opposite direction to that claimed by Gray.[184]

186. Lally also estimates the dividend payout rate for each of these firms (dividends to cash flow from operations, from the Cash Flow Statement in the latest Annual Report), and finds that the payout rate is positively correlated with the distribution rate (0.50).[185] Lally concludes that foreign operations reduce rather than increase the distribution rate because of the investment of profits in order to finance these foreign operations, which depresses the payout rate and therefore also depresses the distribution rate for credits.[186] Accordingly, the effect of these firms with foreign operations being included within the set of firms used to estimate the distribution rate

[177] N. Hathaway, *Imputation Credit Redemption: ATO data 1988-2011: Where have all the credits gone?* September 2013, section 1.3.

[178] NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics*, March 2015, Table 1. The fact that the tax payments used by NERA are only those to the ATO is evident from the notes at the bottom of the Table, and from the fact that NERA calculates the distributed credits from the Tax Paid less the change in the FAB (which would only be sensible if the Tax Paid is that to the ATO).

[179] J. Handley, *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, 20 May 2015, pp. 9-11. The fact that the tax payments used by Handley are only those to the ATO is evident from the ATO being the source of this data, and from the fact that Handley calculates the distributed credits from the Tax Paid less the change in the FAB (which would only be sensible if the Tax Paid is that to the ATO).

[180] Frontier Economics, *The Appropriate use of Tax Statistics when Estimating Gamma*, January 2016, section 3. The fact that the tax payments used by Frontier are only to the ATO is evident from the sources given for the calculations in their Table 2.

[181] Frontier Economics, *An Appropriate Regulatory Estimate of Gamma: Response to the DBP Draft Decision*, January 2016, section 3.3.

[182] M. Lally, *Gamma and the ACT Decision*, 23 May 2016, section 3.5.

[183] M. Lally, *Gamma and the ACT Decision*, 23 May 2016, p. 27.

[184] Frontier Economics, *An Appropriate Regulatory Estimate of Gamma: Response to the DBP Draft Decision*, January 2016, section 3.3.

[185] M. Lally, *Gamma and the ACT Decision*, 23 May 2016, p. 27.

[186] M. Lally, *Gamma and the ACT Decision*, 23 May 2016, p. 5.

for the benchmark firm (with only local operations) is to underestimate rather than overestimate the distribution rate for the benchmark firm. The Authority considers that this addresses the issue raised by Gray.

Estimate for all equity

187. In respect of the ACT's recent decision on gamma, the ACT states that 'it is appropriate to follow past practice', and this leads to an estimate of 70 per cent for all equities using ATO data.[187] The ACT offers no reason for this decision. As discussed above, there are concerns about the accuracy of the ATO FAB and dividend data. Additionally, the natural comparators for regulated businesses are listed companies because the private regulated businesses are typically listed companies or subsidiaries of listed companies, the distribution rates of listed companies are significantly higher than unlisted companies, and explanations for this are readily apparent. Furthermore, the ACT acknowledges that the ATO data are flawed.[188]

188. There is considerable variation in estimates based on the ATO data depending upon whether ATO FAB or ATO dividend data are used to estimate the total credits distributed. For example, using data from 2004-2011, Hathaway estimates the company tax payments at $422b, and estimates the credits distributed at $292b (using ATO FAB data) or $205b (using ATO dividend data). Accordingly, the distribution ratio is either 71% or 47%. Hathaway states that this difference between the tax and dividend data has not been reconciled.[189]

189. However, it is generally accepted that the cumulative distribution rate provides a reasonable estimate. Handley summarises the position with regard to these studies as follows:

> ...the cumulative payout approach… has been used by NERA (2013) and Hathaway (2013) and is reasonably uncontroversial. [Gray] (2014 p.57) also supports this estimation methodology. Using data from the start of the imputation tax system on 1 July 1987 and covering the twenty-four tax years from 1988 to 2011, NERA estimates the cumulative payout ratio to be 0.69. Hathaway (2013) provides an estimate of 0.71 based on the eight year period from 2004 to 2011.[190]

190. On this basis, the Authority considers it reasonable to conclude that the ATO FAB data supports an estimate for the distribution rate across all equity, listed and unlisted, of around 0.7.

Estimate for listed equity

191. Following the same cumulative payout ratio approach used by Hathaway and NERA for all equity, Handley developed an estimate for only listed equity, based on ATO tax data, of 0.8.[191]

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[187] Australian Competition Tribunal, *Application by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 2016, para 1106.

[188] Australian Competition Tribunal, *Application by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, 2016, para 1092.

[189] N. Hathaway, *Imputation Credit Redemption: ATO data 1988-2011: Where have all the credits gone?*, September 2013, section 1.3.

[190] J. Handley, *Advice on the value of imputation credits*, 29 September 2014, p. 27.

[191] J. Handley, *Advice on the value of imputation credits*, 29 September 2014, p. 28.

192. Lally has developed an alternative estimate of the distribution rate, based on the financial reports of the top 20 ASX200 firms, of 0.84.[192] Gray, however, is critical of this estimate, suggesting that it does not measure the distribution rate appropriately.

193. In particular, Gray considers that:

- the regulatory framework and the PTRM requires a distribution rate that is defined as the ratio of distributed credits to *corporate tax paid*; but that

- Lally has estimated the ratio of distributed credits to *imputation credits created*.[193]

194. Gray suggests that large ASX firms pay a considerable amount of corporate tax overseas, which sets up a significant difference between the denominators of the two ratios.

195. Since the publication of the Authority's draft decision, the AER arrived at an estimate of 0.75 in its recent AusNet Services decision.[194] In coming to this estimate, the AER reviewed a substantial set of estimates from both experts and other regulators, which ranged from 0.7 to 0.84:

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[192] M. Lally, *Estimating Gamma*, Report for the QCA, 25 November 2013.

[193] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission: 12*, Appendix O, p. 59.

[194] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016-20: Attachment 4 – Value of imputation credits*, 26 May 2016, Section A.10.

Table 1 Summary of views on the distribution rate for listed equity

Source	Distribution rate
Lally (2016)[195] (20 largest ASX companies)	0.83
AER[196] (2016)	0.75
Lally (2013a, 2013b, 2014)[197] (20 largest ASX companies)	0.84
Handley (2014)[198]	0.8
SACES (2015)[199]	0.8
Gray, for Frontier (2015)[200] (excluding 20 largest ASX companies)	0.7

Source   Various, compiled by the Australian Energy Regulator.

196. Having considered Gray's arguments, the estimates made by Handley, Lally, and other experts, the AER's recent determination, and the reliability of the data underpinning these various estimates, the Authority considers that a reasonable estimate of the distribution rate for listed equity is a rounded estimate of 0.8.

Estimate of gamma

197. The Authority considers that three different approaches to estimating gamma are appropriate, based on the following methods for estimating the utilisation rate:

- the equity share approach;
- the taxation statistics approach; and
- the DDO method.

198. The Authority considers that, consistent with this conclusion, the 'most important approaches to estimation in order of importance to be the equity ownership approach, the taxation statistics approach, and DDO studies (being the most relevant within the class of implied market value studies)'.[201] However, the Authority

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[195] Frontier Economics, *The appropriate use of tax statistics when estimating gamma*, January 2016.

[196] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016-20: Attachment 4 – Value of imputation credits*, 26 May 2016, Section A.10.

[197] M. Lally, *The estimation of gamma*, 23 November 2013; M. Lally, *Estimating gamma*, 25 November 2013; M. Lally, *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, 12 March 2014.

[198] J. Handley, *Advice on the value of imputation credits*, 29 September 2014.

[199] SA Centre for Economic Studies (2015), *Independent estimate of the WACC for SA Power Networks 2015 to 2020: Report commissioned by the SA Council of Social Services*, January 2015.

[200] Frontier Economics, *An appropriate regulatory estimate of gamma*, June 2015, and Frontier Economics, *The appropriate use of tax statistics when estimating gamma*, January 2016.

[201] J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 31.

agrees that 'all approaches are subject to substantial uncertainty and so the estimate of theta is imprecise'.[202]

199. In considering the weight to be given to each approach, the Authority notes the AER's conclusion that:[203]

> …estimating the value of imputation credits consistent with the Officer framework will best promote the National Electricity Objective/National Gas Objective (NEO/NGO) and other requirements of the [National Electricity Rules/National Gas Rules].

200. In identifying a methodology consistent with the Officer framework, the AER noted that the equity share ownership, and tax statistics approaches are reasonably consistent with the Officer framework. However, DDO studies are affected by factors such as personal taxation and other costs. As such, they are inconsistent with the Officer framework unless adjusted.[204]

201. The Authority agrees with Handley that the equity ownership and tax statistics on utilisation of imputation credits provide key evidence for the utilisation rate. The Authority has also considered DDO estimates.

202. In what follows, these estimates are considered.

The equity share ownership estimate

203. The Authority's estimate of the utilisation rate based on the equity share ownership approach is either 0.59 (all equity – both listed and unlisted) or 0.47 (listed equity).

204. Combining the utilisation rate estimate for all equity, of 0.59, with the estimate of the distribution rate of all equity, of 0.7, gives an estimate of gamma of 0.41.

205. Combining the utilisation rate estimate for listed equity, of 0.47, with the estimate of the distribution rate for listed equity, of 0.8, gives an estimate of gamma of 0.38.

The taxation statistics estimate of the redemption rate

206. The Authority's estimate of the utilisation rate based on taxation statistics approach (using ATO FAB data) is 0.48. Combining that estimate with the relevant estimate of the distribution rate of 0.7 (all equity) gives a point estimate of gamma of 0.3, at one significant figure.

The dividend drop off estimate

207. As discussed above, the Authority's estimate of the utilisation rate from DDO studies is fairly broad, at 0.35 to 0.69, reflecting concerns with the robustness of the method.

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[202] J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 32.

[203] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016-20: Attachment 4 – Value of imputation credits*, 26 May 2016, p. 4-17.

[204] Australian Energy Regulator, *AusNet Services distribution determination final decision 2016-20: Attachment 4 – Value of imputation credits*, 26 May 2016, p. 4-11.

208. That range for the utilisation rate combines with an estimate of the distribution rate for listed equity of 0.8.[205] The resulting range for gamma is 0.28 to 0.55, rounded to one significant figure.

Estimate of gamma

209. The Authority bases its estimate of gamma on the following, with estimates given most weight ranked first:

- the equity share ownership approach gives an estimate of gamma of 0.41 based on all equity, and 0.38 based on listed equity with a distribution rate of 0.8;

- the taxation statistics approach, using ATO FAB data, gives an estimate of gamma of 0.34; and

- the DDO approach gives a range for the estimate of gamma of 0.28 to 0.55 assuming a distribution rate of 0.8.

210. The resulting range for the Authority's estimate of gamma is 0.28 to 0.55, as shown in Table 2.

Table 2 Estimates of the value of imputation credits

Approach	Utilisation rate	Distribution rate	Value of imputation credits
All equity (listed and unlisted)			
Equity share ownership	0.59	0.7	0.41
Tax statistics (FAB data)	0.48	0.7	0.34
Listed equity only			
Equity share ownership	0.47	0.8	0.38
DDO studies	0.35 to 0.69	0.8	0.28 to 0.55

Source   Authority's analysis.

211. Consistent with its approach set out in the Draft Decision, the Authority places most reliance on the equity share ownership approach. It suggests a point estimate for gamma of 0.4.

212. Taxation statistics, using the ATO FAB data, suggest that the estimate of gamma could be lower, at 0.34. However, the Authority does not place much weight on the estimate, or on its ability to inform a point estimate of the utilisation rate, given concerns about the robustness of the taxation data used for estimating the utilisation rate.

213. Similarly, the DDO estimate suggests that the estimate of gamma could be higher or lower than 0.4, although the mid-point of the estimate range is reasonably consistent with an estimate of 0.4. The Authority gives only limited weight to the estimated

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[205] The Authority considers that it was in error in the Guidelines and Draft Decision in applying an estimate of the distribution rate that was based on all equity.

range, and to the point estimate, given its concerns with regard to the sensitivity of the estimates to the dividend sample, parametric form of the regression equation and regression technique used.

214. The Authority notes that DBP has suggested that the foregoing estimates do not develop an appropriate range:[206]

> DBP does not believe that the ERA ought to continue to deviate from its own Guidelines by using the AER's approach to estimating gamma. However, if it does deviate from the Guidelines in respect of gamma, it should at least do so properly, and with relevant information. Instead of ranges based on somewhat irrelevant and misleading historical data, what one actually has using the AER's preferred approach is three estimates of gamma:
>
> (a) One based on the share of ownership of all equity would give a gamma of 0.42 (0.6 for theta and 0.7 for the distribution rate).
>
> (b) One based on the share of ownership of listed equity would give a gamma of 0.315 (0.45 for theta and 0.7 for the distribution rate; based on NERA's work).
>
> (c) One based on taxation statistics would give a gamma of 0.3 (0.43 for theta, according to the AER, and 0.7 for the distribution rate).
>
> The relevant range formed by these three estimates is not 0.3 to 0.5, but 0.3 to 0.42; the larger range is only created by using ranges for theta which give equal weight to single instances of outliers far from the mean and multiple instances of data-points close to the mean, effectively giving each outlier a much greater weight compared to each point close to the mean.[207] Moreover, two of these estimates, including one which the AER's own advisor and the ERA have previously suggested forms an upper bound for gamma,[208] are towards the lower end of the range and are in fact almost the same. This would suggest that a prudent, objective regulator, having regard to the information which the AER suggests it believes is most relevant, would form an estimate of gamma in the lower half of the range between 0.3 and 0.42, not at the upper end of that range as the AER has done.

215. However, in relation to the following points raised by DBP:

- First, as noted above, the Authority does not accept DBP's view on the distribution rate for listed equity. That leaves the Authority's estimate based on the equity share ownership approach at 0.4.

- Second, DBP does not dispute that the estimate based on taxation statistics is proximate to 0.34.

- Third, the use of DDO estimates – which is preferred by DBP but which is omitted from the above list – is 0.28 to 0.55.

- On that basis, the overall range is 0.28 to 0.55. Furthermore, the Authority considers that it is prudent and objective – in giving weight to those estimates – to adopt an estimate of 0.4.

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[206] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Response to ERA Issues Paper Submission 26*, 2 June 2015, p. 13.

[207] [DBP footnote] We note that giving weight to outliers at the expense of values close to the mean (which we submit is wrong in any event) would run counter to the ERA's own approach of using so-called Robust regression in estimates of beta to limit the influence of outliers. It would be curious if the ERA adopted an approach which minimised the influence of outliers in respect of beta, and maximised the influence of outliers in respect of gamma.

[208] [DBP footnote] We note that the AER's adviser, Handley, has more recently reversed himself on this point, but his reasoning is not particularly convincing; see SFG (2015, p22-3) for a more detailed treatment.

216.   DBP also quotes Officer to support its view that only implied market value studies are capable of estimating theta.[209] The Authority does not dispute that implied market value studies, however imperfect, provide relevant information as to the value of theta. Accordingly, the Authority has taken DDO studies into account. However, as articulated above, the Authority does not consider that to be the only method available.

217.   In summary, based on the foregoing, the Authority considers that the evidence supports a prudent point estimate of gamma of 0.4. Therefore, the Authority does not accept the value of 0.25 put forward by DBP.

218.   The Authority considers that the resulting estimate of 0.4 is consistent with its approach used elsewhere in this Final Decision, and in particular the use of the value of imputation credits within the building block framework. The estimate is supported by a range of evidence, including relevant academic literature, and also the views of academic experts:

   •   the estimate is within the range set out by Handley for his preferred estimate of gamma, of 0.4 to 0.5;[210] and

   •   the estimate is primarily based on the equity share ownership approach, which is Lally's second preference as a method for estimating gamma (after a strict Officer CAPM approach, which gives a value of 0.7 based on a utilisation rate of 1).[211]

Consistency with the National Gas Law and National Gas Rules

219.   Consistent with the expert advice considered for this Final Decision, the Authority has determined that the Officer framework rightly provides the basis for the rate of return framework in the NGL and the NGR. It follows that estimating the value of imputation credits consistent with the Officer framework will best promote the NGO and the other requirements of the NGR.

220.   To this end, the Authority has considered the differing expert opinions on the proper interpretation of the gamma parameter in the Officer framework. The Authority considered Handley's expert advice for the AER on the Officer framework at length in the Draft Decision. An important aspect of that advice is that the framework is on a 'before-personal-tax and before-personal-costs' basis.

221.   By determining a value of imputation credits in a manner consistent with the Officer framework, the Authority considers that this Final Decision is made in a manner that will or is likely to contribute to the achievement of the NGO. Further, when exercising its discretion in making the relevant parts of a decision, the Authority has accounted for the revenue and pricing principles (**RPP**). The RPP provide, amongst other things, that:

   •   a service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs providing regulated services and complying with regulatory obligations;

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[209] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Response to ERA Issues Paper Submission 26*, 2 June 2015, p. 13.

[210] J. Handley, *Advice on the value of imputation credits*, 29 September 2014, p. 3.

[211] M. Lally, *The Estimation of Gamma,* Report for the AER, 23 November 2013, p. 5.

- a service provider should be provided with effective incentives in order to promote economic efficiency with respect to the regulated services it provides; and

- a price, charge or tariff for the provision of a regulated service should allow for a return commensurate with the regulatory and commercial risks involved in providing the regulated service.

222. Therefore, the gamma determined for this Final Decision will promote the achievement of the NGO (via its application in the estimated cost of corporate income tax building block) if it takes into account the RPP, being:

- not too low, in that it contributes to providing a reasonable opportunity to recover at least efficient corporate tax costs; and

- not too high, in that it contributes to a return that is not excessive and is commensurate with the relevant risks.

223. Finding the right balance in this task has been served by having regard to the merits of the full range of relevant evidence. The Authority has considered, and relied upon, the range of relevant evidence set out in this Appendix. The Authority is satisfied that the gamma balances first, the opportunity for service providers to recover at least efficient costs, and second, the relevant risks.

224. The Authority therefore considers that its estimate is fit for purpose, notwithstanding concerns with the data and the resulting robustness of the estimates. Importantly, the use of a range of approaches for estimating gamma assists in overcoming limitations associated with any particular study. This helps to ensure that the estimation method is consistent with accepted economic and financial principles, informed by sound empirical analysis. For these reasons, the Authority considers that its estimates meet the requirements of the NGL and the NGR.

225. In contrast, the Authority notes that DBP's proposed estimate is based on a single study, of questionable robustness. The Authority considers that DBP's proposed estimate does not provide the best estimate for the purposes of the NGL and the NGR, and therefore has determined to amend DBP's value of gamma for use in the building block model.