# Draft Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 - 2020

## Appendix 5 Gamma

Submitted by DBNGP (WA) Transmission Pty Limited

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Economic Regulation Authority
WESTERN AUSTRALIA

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# Contents

# Appendix 5 Gamma

1. The Authority is required by the 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 the estimated cost of corporate income tax of a service provider for each regulatory year of an access arrangement period ($ETC_t$) to be estimated in accordance with formula (1).

$$ETC_t = (ETI_t \times r_t)(1-\gamma) \quad (1)$$

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

$\gamma$ 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 (including the revenue and pricing principles) and the NGR.

## *DBP's Proposed Revisions*

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

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

7. Under this Monkhouse formulation, 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.

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

12. With regard to the distribution rate, DBP accepts 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 does not agree with the Authority's estimate of the utilisation rate. DBP considers that the estimate should be derived on the basis of a particular dividend drop off study. DBP considers that SFG Consulting's 2011 study provides a basis for the estimate, as it has 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 draws on SFG's 2014 update of that study for its estimate of

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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 $\theta$ 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).

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

4 Ibid.

gamma.[5] DBP therefore proposes to use the value of 0.35 for the utilisation rate reported in that study.[6]

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

## *Submissions*

595. 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.

596. 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.[7]
- DBP submitted a number of clarifications with regard to DBP positions reported in the Issues Paper.[8] 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.

## *Considerations of the Authority*

15. The Authority's has recently re-examined its method for estimating the gamma parameter. That review has resulted to the Authority adopting a different estimate to that set out in the Rate of Return Guidelines.[9]

16. In revising its position, the Authority has taken into account:

- considerations relating to 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 SFG;[10]
- Lally's November 2013 report to the AER;[11]

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5 DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission: 12*, p. 96.

6 Ibid.

7 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.

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

9 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.

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

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

- Lally's November 2013 report to the Queensland Competition Authority (**QCA**), and his responses to submissions to the QCA on that report;[12]
- the conclusions of the AER in responding to Lally's report, set out in its rate of return guidelines;[13]
- a 2013 report on tax statistics by Hathaway commissioned by the Energy Networks Association;[14]
- 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;[15]
- ATCO's submission on the Authority's Gas Distribution System Draft Decision, including the report by its consultant, SFG;[16]
- a report for the Queensland Resources Council by McKenzie and Partington;[17]and
- a report on gamma by Associate Professor John Handley for the Australian Energy Regulator.[18]

17. 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 Australian Competition Tribunal views the estimate of gamma as an 'ongoing intellectual and empirical endeavour'.[19]

18. 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 SFG's views on the Authority's revised position on gamma – as set out in its ATCO Gas Distribution System Final Decision – so as to allow due process for DBP, given the delays in the release of this Draft Decision.

**Definition of the domestic capital market**

19. 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 out in the Rate of Return Guidelines. In particular, the Authority has adopted a domestic CAPM, while allowing for the presence of foreign investors:[20]

> 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

[12] M. Lally, *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, 12 March 2014.

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

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

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

[16] 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.

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

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

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

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

markets for equity, or the influence of international lenders supplying debt finance directly to Australian firms.

20. 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**

21. The equation set out in paragraph 6 interprets the value of franking credits in the context of the Officer CAPM framework, as extended by Monkhouse to cover a non-perpetuity setting.[21]

22. The Authority considers that the benefit arising from imputation credits can be interpreted as the proportion of franking credits received that are utilised by the representative investor.[22]

597. DBP's consultant SFG considers this interpretation to be misplaced.[23] SFG states that the Authority 'has now abandoned its "value" interpretation of gamma in favour or the AER's redemption rate approach'.[24] SFG 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 utilisation rates.[25]

23. SFG has stated that the Authority has committed two errors:[26]

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.

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21 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 we just don't know 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. I continue to find the suggestion that retained imputation credits are worthless to be 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, its direction is clear.

22 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.

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

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

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

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

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.

24. 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**

25. The Authority considers that the benefit of 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 ( $\theta$ ).

26. The Authority notes that the utilisation rate is a market-level parameter, meaning that the same value applies to all firms.[27]

27. 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*. Therefore *θ* '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'.[28]

28. To this end, the Authority's previous estimation approach for estimating theta – using DDO studies – may not correctly estimate the required utilisation rate required, as, among other things:

- The required utilisation rate is a complex weighted average determined by the value of equity that investors hold and their relative wealth and risk aversion.
- Dividend drop off studies only estimate the value weighted 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 a value weighting that reflects the composition of investors around the cum and ex dividend dates, not the weighted average across the entire market over an entire year, as required.
- There are significant econometric challenges in estimating the utilisation rate from dividend drop off studies. Trading around the ex-dividend date reflects a variety of different incentives and price movements. Dividend drop off studies may not accurately separate out the effect of the taxation incentive associated with imputation credits on the share price change.

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

[28] 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.

29. 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.

30. The Authority instead considers other approaches to estimating the utilisation rate.[29]

31. In response, SFG 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.[30]

32. First, SFG 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'. SFG 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.[31] 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'.[32]

33. Second, SFG 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:[33]

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

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; and

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

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29 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.

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

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

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

33 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 $\theta$.

$IC_1$ is the distributed imputation credits over the first year.

34. However, the Authority notes that Lally quite 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:[34]

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

35. Third, SFG 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.[35]

36. SFG's core argument is that there is a cost for an investor to obtain and redeem a credit.[36] SFG considers that:[37]

- some credits that are distributed are never redeemed, for example because;
  - the investors are non-residents;
  - 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;

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

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

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

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

- a rational investor would increase the concentration of domestic shares in their portfolio until the marginal benefit of imputation is zero.

37. The Authority has noted these points, but considers that:

- analysis by the Australian Energy Regulator of tax statistics demonstrates that the amount of credits utilised is very close to the amount of credits that have been received;[38]
- the effects of the time value of money are likely to be minimal, given the period of delay;
- there is no empirical evidence on the diversification effect of imputation credits, and no clear theoretical position for the effect either.[39]

38. In addition, transactions 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. More importantly, the Authority notes that in this context Handley's view that the correct estimate of an after-company-before-personal-tax value of a distributed imputation credit should value credits before administrative costs, personal taxes and diversification costs.[40]

39. 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, wealth, and given the foregoing, the cost of redeeming credits. 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.

40. SFG's has a further argument 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:[41]

> 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:

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38 Australian Energy Regulator, *Draft Decision on Jemena Gas Network's 2015-20 Access Arrangement*, November 2014, p. 4-46.

39 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.

40 J.C. Handley, *Advice on the Value of Imputation Credits*, 29 September 2014, p. 46.

41 DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission: 12*, 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).

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.

41. SFG 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, SFG considers that the Authority's definition of the market is not a 'closed system', citing Lally in support:[42]

> 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 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.

42. This is a pivotal issue. SFG has acknowledged that:[43]

> 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

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

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

only contribution of these models is to identify the special cases in which the redemption rate would provide an estimate of value.

43. However, contrary to SFG's position, the Authority considers that there is no ambiguity regarding the presence of foreign investors, or that the Australian market is anything other than a system of *n* assets with *m* investors. The interpretation is that some of the *m* investors in that system are foreigners. To assume somehow that we cannot draw a boundary around the full Australian capital market, reflecting the actual situation with regard to the *n* assets and *m* investors in that market, and then derive a wealth and risk weighted average of those investors' redemption of credits, seems odd. SFG appears to be saying that the Australian capital market will not be able to find equilibrium prices because foreign investors are present in that market.

44. Handley concurs with the Authority's view. Importantly, he rejects the idea that the CAPM requires that the *m* investors hold no other assets in any other market, only that they price domestic assets in isolation of other assets. He puts it thus:[44]

> 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 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.
>
> … SFG's comments are based on a faulty premise – that the *m* investors can own no other assets. This is an assumption of SFG 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.

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

45. 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:[45]

> …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.

46. 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.[46]

47. The Authority considers that Handley's views relating to segmentation in the CAPM model are sensible. 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 for estimating the rate of return.[47] The Authority explicitly rejected such an approach in the Rate of Return Guidelines.[48] 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.[49]

48. It becomes clear then – consistent with SFG's view noted in paragraph 42 – that the term '*value* of franking credits' and '*proportion* of the tax paid at the company level

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

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

47 The Authority notes that the observed rate of return in a globally integrated capital market is lower than that of the partially segmented domestic capital market – indeed this is a key point of Lally's analysis for the 'conceptual goal posts'. In a full globally integrated market, the value of imputation credits would continue to be a complex weighted average over all investors, but clearly very close to zero. For a detailed discussion of this issue, and Lally's analysis with regard to the relationship between observed rates of return and the value of imputation credits, 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, p. 448.

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

49 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.

[which] is really a withholding of personal tax' are interchangeable terms for gamma.[50] 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.[51] The relevant value of an imputation credit is the after-company-before-personal-tax value.[52]

49. 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.

50. 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 $\frac{\gamma C_t}{p_{t-1}}$ 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'.[53] 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'.[54]

51. 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:[55]

- 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.

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

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

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

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

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

[55] 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.

52. The Authority endorses Handley's view that use of the CAPM and interpretation of theta as the utilisation rate (equivalent to the value of imputation credits) is entirely consistent with its definition of the domestic capital market.

53. The Authority considers that, consistent with this interpretation, the 'most important approaches to estimation in order of importance to be the equity ownership approach, the historic credit utilisation rate approach and dividend drop-off studies (being the most relevant within the class of implied market value studies)'.[56] However, the Authority agrees that 'all approaches are subject to substantial uncertainty and so the estimate of theta is imprecise'.[57]

54. The Authority agrees that there is considerable uncertainty surrounding the estimation of the utilisation rate. The Authority therefore considers that a range of approaches is desirable to determine the estimate.

55. 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 and the 'conceptual goal posts' of Lally. In what follows, these estimates are considered.

**Equity share ownership**

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

57. The resulting estimate does not account for the required risk weighting of utilisation rates. However, the Authority is not aware of any means to incorporate such a consideration.[58] Therefore, the Authority accepts that current estimates of domestic

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

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

[58] Lally observes that ignoring risk weighting may be reasonable if it is assumed that individual investors' risk aversion is uncorrelated with their utilisation rate (see M. Lally, *The Estimation of Gamma*, Report for the AER, 23 November 2013, p. 11).

investors' equity ownership share provide relevant information for determining the value of the utilisation rate.[59]

*All equity – listed and unlisted*

58. The Authority estimates 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 is held by domestic investors; [60] 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.[61]

59. SFG cautions that the estimates in unlisted equity may be unreliable, quoting the original ABS feature article from June 1992 to this effect.[62] However, the Authority notes that:

- SFG omitted to include a sentence in the ABS quote that 'Alternative information sources and methodologies for deriving these estimates are being investigated.'[63] 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.

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

61. SFG has also noted the use of 2007 ABS data, suggesting that updated estimates based on current ABS data should be used. SFG 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

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59 Queensland Competition Authority, *Final Decision: cost of capital: market parameters*, August 2014, p. 98. The Authority notes that Hathaway has recently examined this data, finding figures closer to 0.8. However, as noted by the AER: 'Given they are the primary authors of this data, the ABS reported figures might be considered more reliable.' (Australian Energy Regulator, *Explanatory Statement – Rate of Return Guideline*, December 2013, p. 172).

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

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

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

63 Australian Bureau of Statistics, *International Investment Position Australia*, June 1992, Section 4.

of foreign ownership.[64] The Authority has noted these points and derived an updated series of equity share ownership that excludes government entities.

62. 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 domestic 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 domestic investors eligible to utilise imputation credits as a proportion of the equity held by domestic investors that either use or waste imputation credits.[65]

63. The resulting domestic ownership for 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 June 2015 was 61 per cent.

64. 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.

65. 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*

66. 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

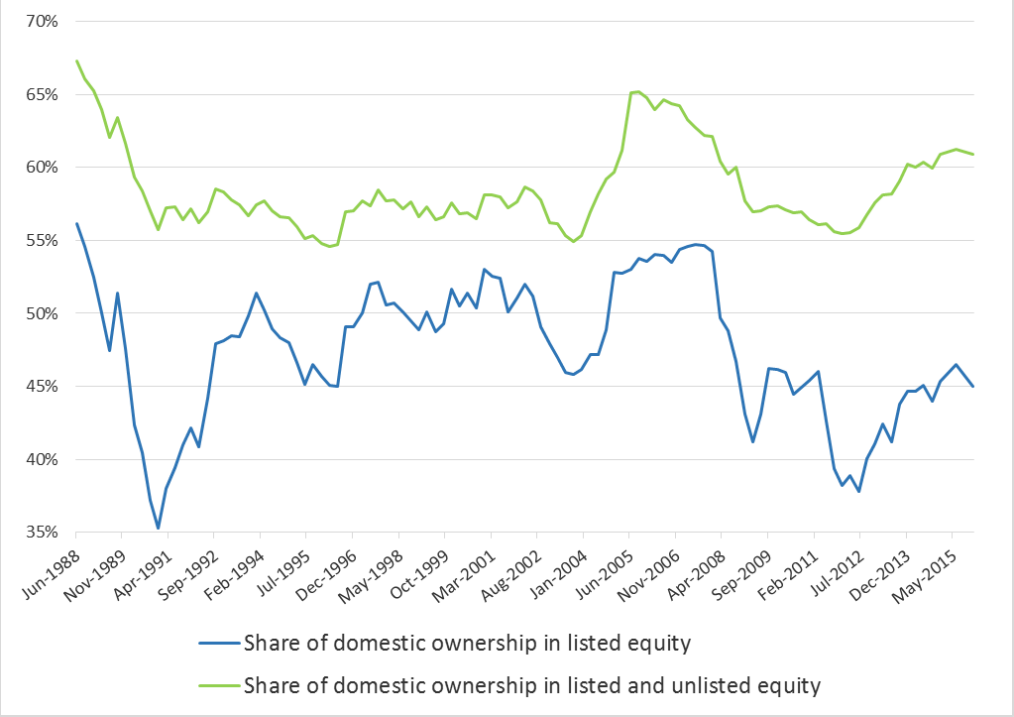
[64] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission: 12*, Appendix O, p. 42.

[65] 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.

is currently 45 per cent (based on recent ABS data for June 2015), and the average value since July 2000 has been 47 per cent (Figure 1).[66]

67. 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.

**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.

*Equity share ownership estimate of the utilisation rate*

68. 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 June 2015, and using the 'refined' approach), depending on whether the estimate is based on listed or all equity respectively.[67]

69. 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.[68] 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

[66] 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).

[67] This range has changed from that estimated for the ATCO GDS Final Decision – which was 0.48 to 0.59 – due to the inclusion of the most recent data to June 2015 slightly reducing the lower bound.

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

1988 and 2012'.[69] The Authority has not accounted for Hathaway's data, given its preference to focus on the estimates for the post-2000 period.

**Taxation statistics**

70. Taxation statistics estimate the utilisation of imputation credits, which is a measure of the imputation credits redeemed by shareholders. The method uses ATO statistics to observe the proportion of distributed imputation credits that have been used by investors to reduce their personal taxation liabilities. The approach implicitly assumes that the value of a redeemed franking credit is equal to its face value, whilst an unredeemed franking credit has no value. It follows that the average value of a franking credit is equal to the proportion of franking credits redeemed.[70]

71. 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 required utilisation rate.[71]

72. Hathaway and Officer (2004) examined national tax statistics in order to estimate the average value of redeemed imputation credits from 1988 to 2002.[72] 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. Taking these two factors into account indicated to the authors that the statutory company tax rate is reduced by a proportion of 28 to 36 per cent. This suggested that the effective rate of company taxation is around 19 to 21 per cent. They estimated a value of gamma within a range of 0.38 to 0.44. However, they noted that some of their data is not reliable.[73]

73. Handley and Maheswaran (2008) examined the reduction in individual tax liabilities due to imputation credits from 1988 to 2004.[74] Their study 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.

74. In his advice to the AER, Lally observed that SFG has previously argued that taxation statistics can only provide an upper bound on the utilisation rate, as opposed to a point estimate.[75]

75. Lally responds that as people who receive franking credits utilise them fully, SFG's view is incorrect, such that redemption rates can be used to provide a point estimate

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

70 NERA Economic Consulting, *The Value of Imputation Credits*, A report for the ENA, Grid Australia and APIA, 11 September 2008, p. 23.

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

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

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

74 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.

75 SFG Consulting, *Estimating Gamma,* Report prepared for QR National, 2012, p. 7; M. Lally, *The Estimation of Gamma,* Report for the AER, November 2013, p. 18; This argument was also previously accepted by the Authority as a consequence of the ACT decision (see Economic Regulation Authority, *Explanatory Statement for the Rate of Return Guidelines: Meeting the Requirements of the National Gas Rules*, 16 December 2013, p. 212).

of the utilisation rate (which Lally refers to as *U*). Lally demonstrates this by defining $u_i$ as the utilisation rate of investor $i$, and $t_i$ to denote their marginal taxation rate. N Lally identifies that the personal tax obligation of that investor due to dividends paid, after the taxes already paid by the company is as follows:[76]

$$Tax_i = (DIV + u_i IC)t_i - u_i IC \quad (4)$$

where

$DIV$ is the value of the dividend; and

$IC$ is is the imputation credits for that company in the relevant period.

76. Lally notes that Australian investors can be assigned to two groups, those who can and cannot utilise franking credits. Given that the taxation for those who can utilise franking credits is as follows:

$$Tax_i = (DIV + IC)t_i - IC \quad (5)$$

77. It follows that $u_i$ = 1 for these investors.

78. Therefore, as the utilisation rate is not less than 1 for these investors, taxation statistics can provide an accurate point estimate of U. Implicit in this analysis is the assumption that franking credits cannot be transferred between investors. Lally continues by observing the evidence presented by McKenzie and Partington, which indicates that even though legislation exists to prevent this, it can be overcome in some cases.[77] Lally further notes that if this practice is extensive, it may result in tax statistics overestimating the utilisation rate. The Authority considers that as the legislation to transfer the credits exists to prevent this, it is likely to constrain this activity and as a consequence this is not considered a significant issue.

79. Lally considered that the tax statistics approach lacks precision, but still preferred it as an estimate over implied market value studies.[78]

80. The Authority notes that Hathaway has observed that large discrepancies exist in relation to franking credits when comparing ATO taxation data to that of ATO company financial data.[79] Hathaway urges caution in using ATO statistics for any estimates of parameters concerned with franking credits, until a reconciliation related to the actions of state owned enterprises is conducted, which may provide an explanation.

81. Both the AER and Lally observe that using taxation statistics may be inconsistent with the interpretation of gamma under the Officer framework, where the utilisation

[76] M. Lally, *The estimation of gamma*, 23 November 2013, p. 18.

[77] M. McKenzie, and G. Partington, *Evidence and Submissions on Gamma,* report prepared for the AER, 2010.

[78] M. Lally, *The estimation of gamma*, 23 November 2013, p. 4.

[79] N. Hathaway, Imputation credit redemption ATO data 1988-2011, Where have all the credits gone?, September 2013, p. 5.

rate is required to satisfy the complex weighted average.[80] Taxation statistics produce an estimate of the utilisation rate that is weighted by the amount of imputation credits received, not by equity ownership or risk aversion. On balance, the AER noted that it considers taxation statistics have merit in informing the required utilisation rate, but given these criticisms, it does not propose relying solely on this in informing its judgement. The Authority agrees with these conclusions.

82. The Authority notes that the AER recently set out a further review the evidence for the estimate based on tax statistics, drawing on and further considering views from the experts:[81]

- evidence assembled by Hathaway points to a range of 0.4 to 0.6 for the utilisation rate;
- based on the observation that the post-2004 taxation statistics data is more reliable than prior to that date:

> 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.[82]

- informed by two estimates for the period 2004 to 2011: 0.43 and 0.61, which reflect two alternative measures of the value of credits distributed, and two alternative estimates of the distribution rate;
- the 0.43 estimate of the utilisation rate corresponds to estimates of the distribution rate of around 0.7;
- the 0.61 estimate of the utilisation rate corresponds to estimates of the distribution rate of around 0.5 respectively;
- with Hathaway's estimate of 0.43 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;[83]
- Handley considered that tax statistics provide a relevant estimate for the utilisation rate, concluding that a range of 0.4 to 0.6 is appropriate, based on the Hathaway material.[84]

83. The Authority has reviewed this evidence and considers that the Hathaway study provides the best estimate of the utilisation rate derived from taxation statistics. On

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80 Australian Energy Regulator, Better Regulation Explanatory Statement for the Rate of Return Guidelines, www.aer.gov.au, December 2013, p. 175.

81 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.

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

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

84 J. Handley, *Advice on the value of imputation credits*, 29 September 2014, p. 31.

that basis, the Authority considers that a revised range of 0.4 to 0.6 is appropriate, and that a point estimate of 0.43 should be applied given the Authority's preference to base its estimates on 'all equity', with a distribution rate of 0.7.

84. 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.[85]

**Implied market value studies**

85. Implied market value studies include:

- simultaneous price studies; and
- dividend drop off studies.

86. In the Guidelines the Authority concluded that simultaneous price studies are not appropriate for estimating the utilisation rate at the current time.[86] The Authority notes that DBP has not contested this point.

87. The range of DDO studies were considered at length in the Guidelines. 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 SFG and by the Economic Regulation Authority Secretariat.

88. Since the Guidelines, the Authority has become aware of Lally's view that the regression coefficient on franking credits estimated in dividend drop off studies may not necessarily equate to the utilisation rate 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 the utilisation rate theta and the regression coefficient on the value of the dividend in determining the resulting share price drop off.[87] This is discussed in greater detail below.

89. DBP's consultant SFG has provided the Authority with the following response with regard to its approach establishing a range for the DDO estimates:[88]

- econometric issues are not significant as to preclude use of DDO studies;
- 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 SFG DDO studies.

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

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

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

88 DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Rate of Return Supporting Submission: 12*, Appendix O, p. 47 – 50.

*Econometric issues*

90. SFG notes that:[89]

> 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.

91. The Authority agrees that econometric issues have not precluded it giving limited weight to the DDO studies. 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 investor's hold and their relative risk aversion. Dividend drop off studies, however, only estimate the value weighted 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 a value weighting that reflects the composition of investors around the cum and ex dividend dates, not the weighted average across the entire market, as required.
- There are significant econometric challenges in estimating the utilisation rate from dividend drop off studies. Trading around the ex-dividend date reflects a variety of different incentives and price movements. Dividend drop off studies may not accurately separate out the effect of the taxation incentive associated with imputation credits on the share price change.

92. 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.[90] Lally also points out that ex-dividend movements can reflect a range of factors, including tax, transactions costs and preferences, such that it is not clear that tax arbitrage would necessarily exacerbate share price differentials around ex-dividend dates. The corollary is 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.

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

*DDO coefficient adjustment*

94. Econometric problems that exist with dividend drop off studies have been well explored by the Authority,[91] which has previously noted that this is the reason for the large divergence in empirical estimates of the utilisation rate using dividend drop off studies.[92] The Authority noted that any estimate of theta is essentially a function

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

90 M. Lally, *The estimation of gamma*, 23 November 2013, p. 29; J. Handley, *Advice on the value of imputation credits*, 29 September 2014, p. 15.

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

92 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

of the most influential observations, due to the extreme multicollinearity present in the data.

95. 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.[93]

96. Lally further notes:

> 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.[94]

97. Lally also provides evidence that Australian regulators (including the Authority) and the ACT have consistently misinterpreted the results of dividend drop off studies for estimating the required utilisation rate. Lally observes that the coefficient of the regression equation in dividend drop off studies is generally assumed to be the utilisation rate, which Lally suggests is incorrect. Lally demonstrates this by first outlining the dividend drop off equation as follows:

$$P_{i,t-1} - P_{i,t}^{*} = \delta \mathrm{D}_i + \theta \mathrm{FC}_i + u_i \qquad (6)$$

Where

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

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

$\mathrm{D}_i$ is the cash dividend;

$\mathrm{FC}_i$ is the franking credit; and

$u_i$ is the regression residual.

98. 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, e.g. a cash dividend of $10 and a franking credit of $2 is equivalent to a cash dividend of $12. That is, an investor should be indifferent between the decomposition of any gross dividend received to the extent the franking credit can be utilised.[95] Lally further

and Economic Regulation Authority, *Appendices to the Explanatory Statement for the Rate of Return Guidelines* Dec 2013, Appendix 28.

93 Australian Energy Regulator, Better Regulation Explanatory Statement for the Rate of Return Guidelines, Dec 2013, p. 177.

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

95 Gross dividend refers to the sum of the cash dividend and the franking credit, $\mathrm{G}_i = \mathrm{D}_i + \mathrm{FC}_i$

observes that if all investors can utilise imputation credits, the required regression equation would be as follows:

$$P_{i,t-1} - P_{i,t}^{*} = \delta[\mathrm{D}_i + \mathrm{FC}_i] + u_i \qquad (7)$$

99. In this circumstance, $\delta$ recognises that the expected price change can differ from the paid out gross dividend,[96] as in reality, the tax rate applicable on the gross dividend can diverge from that of capital gains.[97] In order to incorporate the empirical reality of not all investors being able to utilise franking credits, Lally notes that the franking credit covariate should be multiplied by the coefficient U, to represent the average utilisation rate. The required equation is then as follows:

$$\begin{aligned} P_{i,t-1} - P_{i,t}^{*} &= \delta[\mathrm{D}_i + U.\mathrm{FC}_i] + u_i \\ &= \delta \mathrm{D}_i + U.\delta \mathrm{FC}_i + u_i \end{aligned} \qquad (8)$$

100. Based on this analysis, it is apparent that $\Theta = U.\delta$. Therefore, in order to derive the required utilisation rate, U, from dividend drop off studies, the estimated coefficient of the franking credit, $\theta$, must be divided by the estimated coefficient of the cash dividend, $\delta$, as follows, $\mathrm{U} = \frac{\theta}{\delta}$.

101. On this basis, the Authority accepts that it did not correctly estimate the required utilisation rate in the Rate of Return Guidelines. Re-estimating the required utilisation rate – from the two dividend drop off studies considered relevant – results

[96] The coefficient $\delta$, 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 average change in stock price that occurs due to payment of $1 of gross dividend.

[97] 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, 68-74. Under the assumptions of no stochastic uncertainty, no time value of money and no transaction costs, it can be shown that $\delta = \frac{(1-\mathrm{T}_d)}{(1-T_g)}$ where $\mathrm{T}_d$ is the tax rate applicable to the gross dividend, whilst $\mathrm{T}_g$ 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.

in a utilisation rate of 0.4 from the SFG analysis,[98] and an upper bound of 0.69 from the ERA Secretariat's analysis.[99]

102. However, SFG considers that the DDO coefficient does not need to be adjusted:[100]

> 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.

103. SFG considers that the proposed adjustment leads to perverse outcomes. To illustrate, SFG sets up a hypothetical example comparing two different outcomes with $\delta = 1$ and $\delta < 1$, while requiring shareholders to be equally well off. Where $\delta < 1$, investors do not value dividends as highly as $\delta = 1$. SFG argues that to be equally well off with $\delta < 1$, the value for theta would have to fall, but that this would not be the outcome dividing through by a lower $\delta < 1$.[101]

104. However, the Authority is not convinced by this argument, as it sets up a 'straw man'. It is not clear to the Authority why, if investors do not value dividends as highly, they would necessarily have exactly the same preferences and requirements of utility. It may be that they do not require to be as well off if $\delta < 1$, given that they do not value dividends as highly.

105. SFG also considers that such an adjustment would be required throughout the regulatory process, as it is implicit in the Sharpe-Lintner CAPM that $\delta = 1$. SFG notes that Lally and van Zijl develop a more complex version of the CAPM with $\delta < 1$.

106. On this point, the Authority notes that both Handley and Lally have recommended such an adjustment. Handley for example observes:[102]

> 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…

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98 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.

99 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.

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

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

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

> 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 SFG clearly tell us that this is not the case. SFG estimate 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 SFG estimates of θ by 10 – 15% to correctly interpret the results of the study. In other words, the SFG 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"…

107. 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 SFG's unadjusted finding.[103]

108. The resulting range is 0.35 to 0.69. This range is reasonably wide, reflecting the uncertainty surrounding the estimates, and the conflicting views of the experts.

*Composition of investors*

109. SFG questions the Authority's concern with the composition of investors around ex-dividend days. SFG considers that the Energy Networks Association:[104]

> …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.[105]
>
> 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.

110. This point is addressed in paragraph 92 above. The Authority considers that there remain valid concerns as to what exactly DDO studies are measuring, and that this

[103] The Authority has adopted the unrounded range as it will apply the distribution rate for listed equity, of 0.8 (see paragraph 122 below).

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

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

is a contentious area. It adds to the caution the Authority has in relying too much on DDO studies for estimating the utilisation rate.

*Relevance of the Authority's study*

111. SFG considers that the SFG DDO estimates are superior to the Authority's estimates, on the grounds that:[106]

- 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 the SFG 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 – SFG considers that 0.4 is a better representation of the Authority's results;
- The SFG studies have been subject to intense scrutiny, including by the Australian Competition Tribunal, whereas the Authority's study has not.
- The SFG theta estimates 'have been shown to be stable and reliable in the face of a battery of stability and robustness checks, whereas the ERA expresses concerns about the stability and reliability of its own results'.

112. The Authority considers that its studies have been subject to extensive scrutiny, including by regulators, experts, and DBP and SFG itself.[107]

113. SFG considers that the ERA's study produces a theta estimate of 0.34 – when the same 'ex-day market correction is applied' as is undertaken by SFG in its study.[108]

114. SFG 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.[109]

115. However, Lally has considered both studies in depth, noting:

> …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 SFG (2013a) generate some quite dramatic differences in results. In particular, for models 3 and 4 with OLS, SFG estimate 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 SFG'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 SFG'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

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

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

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

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

> set of observations. By contrast, SFG progressively remove 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 (SFG, 2013a, Figure 4).
>
> …in respect of the robust regression models used by both SFG 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 SFG's four models. For example, in respect of SFG'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.[110]

116. The Authority has also been concerned about such differences, and agrees with Lally when he states that 'these differences undermine the credibility of results from all such studies'.[111] This is an important further reason why the Authority concluded that DDO studies of the utilisation rate are vulnerable to the dividend sample, parametric form of the regression equation and regression technique used, and is a further reason why the Authority places only limited weight on the estimated range.[112]

**Distribution rate**

117. 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 Australian Competition Tribunal for example concluded that a distribution ratio of 0.7 was supported by a range of evidence and submissions.[113]

*Listed and unlisted equity*

118. There is considerable variation in estimates based on the ATO data. For example, estimates of the cumulative distribution rate from *franking account balances* in the tax statistics – from 1987 to 2011 – is 0.7.[114] However, a five year average of recent

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

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

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

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

[114] Based on tax statistics estimates updated by NERA in 2013 and submitted by the Energy Networks Association as part of the Rate of Return Guidelines process (see NERA, *The Payout Ratio*, June 2013). In addition, a five year average of the most recent annual estimates, constructed by NERA from net tax and the change in the *franking account balance*, is 0.7.

annual estimates constructed from net tax and *franked dividends distributed* is estimated by NERA Economic Consulting (**NERA**) to be 0.53.

119. Hathaway finds similar variation in results. Hathaway identifies a large discrepancy between the franking account balance and the franked dividends data as a potential contributor.[115]

120. 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. SFG (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.[116]

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

*Listed equity*

122. 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.[117]

123. Lally has developed an alternative estimate of the distribution rate, based on the financial reports of the top 20 ASX200 firms, of 0.84.[118] SFG, however, is critical of this estimate, suggesting that it does not measure the distribution rate appropriately.

124. In particular, SFG considers 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*.[119]

[115] N. Hathaway, *Imputation Credit Redemption: ATO data 1988-2011: Where have all the credits gone?,* September 2013, pp. 38-39.

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

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

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

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

125. SFG 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.

126. The Authority notes SFG's concerns. For that reason, the Authority has determined to rely on the Handley estimate alone, concluding that a reasonable estimate of the distribution rate for listed equity is 0.8.

127. In a subsequent submission on the Issues Paper, DBP suggests that adopting an estimate for listed equity – as a pairing for the listed equity estimate of theta in the calculation of gamma – is misguided.[120] DBP argues that this is because the estimate of gamma is determined as a market wide parameter. DBP submits that the estimate for all equity – listed and unlisted – should therefore be used. DBP also argues that as the benchmark firm is unlikely to be a large listed entity, the estimate of the distribution rate for the listed entity is likely to be closer to the all equity estimate in any case. However, the Authority does not accept these arguments as:[121]

- First, different investors value imputation credits differently, which leads to theta being an average across investors (see paragraph 51 above). It follows that the estimate of gamma should be derived consistent with the proxy set of investors used. That requires that the bases of the two estimates – that is, of the distribution rate and theta – should align as closely as possible.
- Second, filtering the listed equity estimate on the basis of size is arbitrary. There may be any number of characteristics which may be used. However, DBP has not demonstrated that such an approach will lead to a better estimate of the distribution rate.

*Conclusions with regard to the distribution rate*

128. It is desirable to have an estimate of gamma that is internally consistent. The Authority notes that its preferred measures of the utilisation rate (refer below), are based on estimates derived using all listed and unlisted equity. As noted, the ATO data covers both listed and unlisted firms, giving estimates for listed equity and all equity.

129. Therefore, the Authority will adopt a distribution rate of 0.7, consistent with the broad definition of all equity. Where it is required to adopt a distribution rate for listed equity, to allow consistency, the Authority will adopt a distribution rate of 0.8.

**Estimate of gamma**

130. 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.

[120] DBP, *Proposed Revisions DBNGP Access Arrangement 2016 – 2020 Regulatory Period Response to ERA Issues Paper Submission 26*, 2 June 2015, p. 11.

[121] Australian Energy Regulator, *Preliminarry Decision United Energy distribution determination 2016 to 2020 Attachment 4 – Value of imputation credits*, October 2015, p. 4-90.

*The equity share ownership estimate*

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

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

133. 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.

134. The resulting range for gamma from the equity share ownership approach is 0.38 to 0.41.

135. 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*

136. The Authority's estimate of the utilisation rate based on the taxation statistics approach is 0.43. 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*

137. 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.

138. That range for the utilisation rate combines with an estimate of the distribution rate for listed equity of 0.8.[122] The resulting range for gamma is 0.3 to 0.5, rounded to one significant figure.

*Estimate of gamma*

139. 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 0.4;
- the taxation statistics approach gives an estimate of gamma of 0.3; and
- the DDO approach gives a range for the estimate of gamma of 0.3 to 0.5.

140. The resulting range for the Authority's estimate of gamma is 0.3 to 0.5.

141. 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.

142. Taxation statistics suggest that the estimate of gamma could be lower, at 0.3. However, the Authority does not place much weight on the estimate, or on its ability

[122] 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. As the DDO estimates are (listed) market based estimates, they should be paired with an estimate of the distribution rate that is based on listed equity.

to inform a point estimate of the utilisation rate, given concerns about the robustness of the taxation data used for estimating the utilisation rate.

143. 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 supports an estimate of 0.4. The Authority gives only limited weight to the estimated 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.

144. The Authority notes that DBP has suggested that the foregoing estimates do not develop an appropriate range:[123]

> 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.[124] 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,[125] 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.

145. However, the Authority does not accept these points from 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 0.3.

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

[124] [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.

[125] [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.

- Third, the use of DDO estimates – which is preferred by DBP but which is omitted from the above list – is 0.3 to 0.5.

146. On that basis, the overall range is 0.3 to 0.5. Furthermore, the Authority considers that it *is* prudent and objective – in giving weight to those estimates – to adopt an estimate of 0.4.

147. DBP also quotes Officer to support its view that only implied market value studies are capable of estimating theta.[126] 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.

148. However, the Authority does not consider that to be the only method. The Authority considers that there is substantial evidence that Officer considered that the market value method and the utilisation method measure one and the same thing, as noted at paragraphs 48 to 52 above.

149. With reference to NERA's implied market value study,[127] which suggests that imputation credits should be valued at zero, Ainsworth, Partington and Warren have noted:[128]

> Lajbcygier and Wheatley (2012) find that the presence of imputation credits is not associated with lower realised returns. Further, they find a positive relation between realised returns and imputation credits, which is significant under some specifications. This implies an (implausible) negative value on imputation credits…The fact that the earnings yield results have the wrong sign suggests that caution needs to be applied in interpreting these findings (similar to Lajbcygier and Wheatley, 2012).

going on to conclude:[129]

> We have investigated the financial implications of Australia's dividend imputation system, including its potential impact on share prices, costs of capital and project evaluation, capital structure, payout policy and investor portfolios. Along most of these dimensions, the effects of imputation are debatable both in theory and in practice. In particular, the extent to which imputation is reflected in share prices and impacts on the cost of capital is unclear, and the evidence is mixed and inconclusive.

150. The Authority agrees with Ainsworth et al that the NERA report (which updates Lajbcygier and Wheatley 2012) produces implausible results. Furthermore, the Authority considers that Ainsworth et al's conclusion in the last quote above is apt. On that basis, the Authority considers that its approach of, first, examining a range of relevant estimates, and second, exercising judgment as to the point estimate,

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

[127] 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, p. 4.

[128] 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.

[129] Ibid, p. 37.

based on the range of outcomes implied by various approaches, is supported as being reasonable.

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

152. The Authority considers that the resulting estimate of 0.4 is consistent with its approach used elsewhere in this Draft 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;[130]
- 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).[131]

153. 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 National Gas Law and the National Gas Rules.

154. 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 National Gas Rules, and therefore requires that DBP amend its value for use in the building block model.

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

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