Estimating gamma: Response to ATCO Gas Draft Decision

Report for DBP NGP Pty Ltd

23 December 2014

SFG CONSULTING
Level 1, South Bank House
Cnr. Ernest and Little Stanley St
South Bank, QLD 4101

PO Box 29
South Bank, QLD 4101

Email: s.gray@sfgconsulting.com.au
Office: +61 7 3844 0684
Phone: +61 419 752 260

Contents

1. Background and conclusions

Overview and instructions

1. SFG Consulting (**SFG**) has been retained by DBP NGP Pty Ltd (**DBP**) to provide our views on issues relating to the estimation of the gamma parameter. In particular, we have been asked to respond to the ATCO Gas Draft Decision of the Economic Regulation Authority of Western Australia (**ERA**) insofar as it relates to gamma.

Preparation of this report

2. This report has been authored by Professor Stephen Gray, Professor of Finance at the UQ Business School, University of Queensland and Director of SFG Consulting, a specialist corporate finance consultancy. I have Honours degrees in Commerce and Law from the University of Queensland and a PhD in financial economics from Stanford University. I teach graduate level courses with a focus on cost of capital issues, I have published widely in high-level academic journals, and I have more than 15 years' experience advising regulators, government agencies and regulated businesses on cost of capital issues.

3. My opinions set out in this report are based on the specialist knowledge acquired from my training and experience set out above.

4. I have read, understood and complied with the Federal Court of Australia Practice Note CM7 *Expert Witnesses in Proceedings in the Federal Court of Australia*.

5. A copy of my instructions is attached as an appendix to this report.

Summary of conclusions

6. Our main conclusions are set out below.

Overall framework

7. The ATCO Gas Draft Decision proposes that gamma will be estimated as the product of two components: the distribution rate (F) and theta (θ) such that $\gamma = F \times \theta$. We agree with this general approach, which is standard and consistent with the approach previously adopted by the ERA and other regulators.

8. The ATCO Gas Draft Decision also proposes that gamma will be estimated as a market-wide parameter. This is consistent with the standard regulatory practice of using market-wide data to estimate both components of the gamma parameter, and we adopt that framework throughout this report.

The distribution rate

9. The ATCO Gas Draft Decision proposes to adopt an estimate of 70% for the distribution rate, F. This is consistent with the long-standing practice of every regulator other than the Queensland Competition Authority (**QCA**). Our view is that the evidence that is currently available supports a distribution rate estimate of 70%.

10. In its ATCO Gas Draft Decision, the ERA favourably cites the approach that has recently been proposed by the QCA. That approach is based on an analysis of 20 large companies by Lally (2014 QCA). However, there are two problems with that approach:

a) It provides an estimate of the distribution rate for listed firms whereas the ERA states that it requires an estimate for all firms;[1] and

b) It estimates the wrong thing. The estimate obtained from the QCA/Lally approach is inconsistent with the QCA's own definition of the distribution rate and it is inconsistent with the standard regulatory Post-tax regulatory Model (**PTRM**).

11. On the latter point, the QCA defines the distribution rate (in its recent Market Parameters Decision[2] at Equation (1); at p. 25; at Equation (34); and at p. 89) to be:

$$\frac{Distributed\ credits}{Corporate\ tax\ paid}.$$

12. The PTRM also requires the distribution rate to be estimated according to this definition. In particular, the PTRM assumes that *every* dollar of corporate tax paid creates a dollar of imputation credits.

13. By contrast, Lally (2013 QCA, 2014 QCA) has estimated:

$$\frac{Distributed\ credits}{Created\ credits}.$$

14. In our view, it would be an error to use an estimate of some ratio Y when the regulatory framework and PTRM require an estimate of a different ratio X – particularly in the case where X and Y are materially different for the sample in question.

15. **Recommendation: Our view is that the evidence that is currently available supports a distribution rate estimate of 70%.**

The conceptual definition of theta

16. The ATCO Gas Draft Decision distinguishes between:

a) Estimating the proportion of corporate tax paid that will end up being redeemed by shareholders via imputation credits (the *redemption rate*); and

b) Estimating the *value* that shareholders obtain from their redemption of imputation credits.

17. The redemption rate can be estimated using *ATO tax data* or the *equity ownership approach*. The value of credits can be estimated empirically from financial market data via *market value studies* such as dividend drop-off analysis.

18. The ERA recognises that there is a material difference between the *redemption* estimate of theta and the *value* estimate of theta because "investors incur costs to obtain franking credits."[3] That is, an investor will value a credit according to the net benefit that it provides – the difference between what the credit pays when redeemed and the costs incurred by the investor in obtaining and redeeming that credit.

[1] ERA ATCO Gas Draft Decision, Paragraph 949. By contrast, the QCA seeks an estimate for listed firms only, so sees this feature of the Lally approach as an advantage.
[2] QCA, 2014, Market Parameters Decision, *Cost of capital: market parameters*, August.
[3] ERA ATCO Gas Draft Decision, p. 439, Paragraph 74. A description of the relevant costs is set out in Section 5 of this report.

19. The ATCO Gas Draft Decision departs from the ERA's Rate of Return Guideline in adopting a *redemption* estimate of theta rather than a *value* estimate of theta. The ERA recognises that it is adopting an estimate of theta that exceeds the value of credits to shareholders.[4]

20. In our view, gamma should properly be estimated as the *value* of imputation credits for the following reasons:

    a) The Australian regulatory framework reduces the allowed return to shareholders by $\$\gamma$ for every \$1 of imputation credits created.[5] If shareholders do not *value* the \$1 imputation credit at $\$\gamma$, they will not receive an appropriate return;

    b) The National Gas Rules and National Electricity Rules specifically define that "γ is the *value* of imputation credits";[6]

    c) Any reasonable analysis of the relevant literature leads to the conclusion that gamma is intended to be a measure of the value of imputation credits. For example, McKenzie and Partington (2013), state that:

> Theta (θ) [one of the components of gamma] is the value to the investor of the imputation credits distributed, expressed as a fraction of face value,[7]

and:

> The standard practice has been to measure the market value of theta.[8]

and:

> The question then is how to measure the market value of the imputation credits.[9]

    d) Lally (2013) makes it clear that what he calls the *utilisation rate* (U) is the extent to which distributed imputation credits (IC) are capitalised into the stock price – the extent to which the stock price reflects the *value* of distributed imputation credits;[10]

$$S_0 = \frac{Y_1 - TAX_1 + IC_1U + S_1}{1 + R_f + \phi\beta_e}$$

    e) The ERA justifies their use of the redemption rate on theoretical models developed by Lally and others. However, the Lally model only applies to the special case where Australia is assumed to be completely segmented from world capital markets, in which case there is zero foreign investment.[11] By contrast, the ERA seeks to use the Lally model to justify its use of a redemption rate that reflects the extent to which Australian equities are owned by foreign

[4] ERA ATCO Gas Draft Decision, p. 439, Paragraph 74.
[5] The regulatory framework actually reduces the allowed return by $\$\gamma$ for every \$1 of corporate tax paid, but corporate tax paid equals imputation credits created for a domestic firm, such as regulated businesses.
[6] NER cls. 6.5.3, 6A.6.4 (current since version 53); NGR r. 87A(1) (current since version 14), emphasis added.
[7] McKenzie and Partington (2013), p. 31.
[8] McKenzie and Partington (2013), p. 32.
[9] McKenzie and Partington (2013), p. 33.
[10] Lally (2013), p. 10, Equation (3).
[11] Lally recommends that regulators should assume complete segmentation. The model also applies in the case of perfect integration (which would lead to gamma being set close to zero), but this case is not recommended.

investors. Lally (2013 AER) has advised that his model does not apply in such a setting – there is no market clearing condition and one cannot solve for any equilibrium pricing results. The ERA has either misunderstood or ignored this advice. There is no theoretical framework that supports the ERA's proposed approach.

21. **Recommendation: Gamma should be defined as the *value* of imputation credits, and should be estimated accordingly.**

The Lally "conceptual goal posts test"

22. The ERA has regard to a "conceptual goal posts test" developed by Lally (2013 AER). In our view, the Lally "test" is based on such an implausible and inherently contradictory foundation that it would be an error to place any weight on it. The reasons for this conclusion are:

    a) To our knowledge, no person or entity anywhere in the world at any time has ever adopted an estimate of the utilisation rate from within the range established by the Lally test;

    b) The test relies upon estimates of CAPM parameters as they would be in perfectly segmented and perfectly integrated worlds. The estimation of CAPM parameters in the real world (where substantial data is available to assist) is already difficult and contentious. It is simply impossible to estimate what these parameters *might be* in the theoretical worlds considered in the Lally test;

    c) The Lally test is based upon the assumption that the market risk premium in every country is equal to the same multiple of historical stock market variance. By contrast the ERA places zero weight on this method for estimating the MRP in the real world. That is, a method that warrants no weight at all in the real world is, by itself, able to provide an estimate of the MRP in two theoretical extreme worlds – to three decimal places. Moreover, the QCA has recently noted that Lally himself has previously concluded that "the statistical precision of the method is very low"; [12]

    d) The first version of the test (Lally 2013 AER) relied upon government bonds having the same yield whether or not foreign investors are allowed to buy them, which is clearly unsupportable; and

    e) The second version of the test (Lally 2014 QCA) is based on a scenario in which the market for government bonds is completely integrated while at the same time the market for all other assets is completely segmented. That is, all investors throughout the world own government bonds in all other countries in the world, whereas they are only allowed to own risky assets in their own country. This assumption is even more implausible than the one it is supposed to replace.

23. Moreover, Lally (2013 AER) concludes that the test suggests that theta must be "one or close to one."[13] The AER and QCA also conclude that the test only supports theta estimates of "one or close to one."[14] [15] By contrast, the ERA concludes that the "test" supports theta estimates as low as 0.6. However, there is no basis for such a conclusion – the ERA appears to have misinterpreted the conclusions of the "test."[16]

[12] QCA Market Parameters Decision, p. 74.
[13] Lally (2013 AER), pp. 46-47. Note that Lally uses U rather than theta to represent the second component of gamma. The ERA uses the two terms interchangeably – ATCO Gas Draft Decision, p. 429, Paragraph 27.
[14] AER Rate of Return Guideline Explanatory Statement, p. 159.
[15] QCA Market Parameters Decision, p. 99.
[16] To the extent that they should be relied upon at all.

24. The ERA then adopts a utilisation rate (0.7) that materially fails the test.

25. **Recommendation: The ERA should apply no weight to the Lally "conceptual goal posts test".**

Dividend drop-off analysis

26. In relation to dividend drop-off analysis, the ATCO Gas Draft Decision reprises a number of econometric issues that were raised by Lally (2013 AER) and Lally (2013 QCA).[17] We have previously addressed all of those issues in submissions to the AER and QCA. The relevant responses are collated in Appendix 3 to this report.

27. The ERA draws a particular comparison between the SFG dividend drop-off analysis and that of Vo, Gellard, and Mero (2013) (the ERA study). Where the ERA study applies the standard approach of using market-adjusted prices it corroborates the results of the SFG studies. The only inconsistency between the studies occurs when the ERA study uses raw prices and returns, contrary to the accepted practice in the literature.

28. In our March 2014 submission to the ERA, we compared the relative merits of these two studies.[18] We noted that the Australian Competition Tribunal has adopted the SFG study in full but that we are unaware of any external verification of the ERA study.

29. The SFG study uses all available data and a range of accepted methods, all of which support the proposed estimate of 0.35 with reasonable precision. We have also submitted an expanded set of stability analyses to the ERA which demonstrate that our results are strongly robust to the inclusion or removal of influential observations. However, the ERA persists with its claims that dividend drop-off estimates are sensitive to "the most influential observations."[19] The data and estimation methods used by SFG produce results that are *not* sensitive to influential observations. The only evidence of such sensitivity comes from the ERA study when raw returns are used, contrary to the accepted practice in the literature. Logically, if the ERA's analysis is unable to produce reliable results it should be given little weight – it should not be used to cast dispersions on *all* drop-off analyses.

30. **Recommendation: The best available dividend drop-off estimate of the value of distributed imputation credits is 0.35 – consistent with the SFG study (and with the ERA study when the standard approach of using market-adjusted prices is used).**

The interpretation of theta from dividend drop-off analysis

31. We note that, although the ERA has indicated that it will not use dividend drop-off analysis to inform its estimate of theta, it has endorsed the recommendation by Lally (2013 AER) that the dividend drop-off estimate of theta should be divided by the dividend drop-off estimate of the value of cash dividends to provide a final estimate of the utilisation rate, *U*.[20] In our view, there are a number of problems with this approach:

    a) Lally has been consistently recommending that same adjustment to regulators for over ten years[21] and it has never been adopted by any of them;

[17] ERA ATCO Gas Draft Decision, pp. 441-447.
[18] SFG (2014 ERA Gamma).
[19] ERA ATCO Gas Draft Decision, p. 443, Paragraph 92.
[20] ATCO Gas Draft Decision, pp. 443-445, Paragraphs 94-98.
[21] See, for example, Lally (2004), pp. 33-34.

b) Even if applied, the adjustment would have a negligible effect. It would result in the SFG estimate of gamma changing from 0.25 to 0.28, and the ERA mid-point estimate changing from 0.32 to 0.36;

c) 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. Dividend drop-off analysis is specifically designed to estimate the price that investors would be prepared to pay for imputation credits. The standard dividend drop-off estimate of theta provides a direct estimate of the *value* of distributed credits;

d) The proposed scaling has perverse outcomes. A decrease in the estimated value of cash dividends should (other things being equal) result in an increase in the allowed revenues – because shareholders do not value dividends as highly, they would need to receive more of them in order to be left equally well off.[22] However, under the proposed approach the only effect of a decline in the estimated value of cash dividends is that the drop-off estimate of theta would be *increased*, which would in turn result in perversely *lower* allowed revenues. That is, under the proposed approach, as the dividends paid by the firm become less valuable to investors, the allowed revenues are further reduced – which is the exact opposite of what should occur; and

e) It would be inconsistent and wrong for a regulator to adjust the estimate of theta on the basis that cash dividends were less than fully valued, but then to estimate the required return on equity in the same WACC estimation process on the basis that cash dividends are fully valued. That is, if cash dividends are less than fully valued when estimating theta, they should be less than fully valued throughout the WACC estimation process.

32. **Recommendation: In our view, the dividend drop-off estimate of theta provides a direct estimate of the value of distributed credits and the Lally adjustment should not be applied.**

Summary of advice from Lally

33. The primary recommendation from Lally (2013 AER) is that theta should be set to one on the basis of the assumption that all Australian shares are owned by resident investors who can costlessly redeem all credits that are distributed to them. This involves "ignoring foreigners" when estimating theta.[23] That is, theta should be estimated not as it is, but as it would be if foreign investors were not allowed to buy Australian shares. (Apparently the "ignoring foreigners" approach only applies to the estimation of theta and not to any other WACC parameter).

34. Lally then sets out three criteria for ranking other methods for estimating theta:

a) The estimation technique must produce an estimate of one, consistent with the "ignoring foreigners" approach;

b) The estimation technique must produce an estimate of one or close to one, consistent with the "conceptual goal posts test"; and

c) The estimation technique must produce a statistically precise estimate of whatever it is that it estimates.

[22] See for example, Lally and van Zijl (2003).
[23] Lally (2013 AER), p. 3.

35. Lally (2013 AER) reports, unsurprisingly, that no other approach satisfies either of his first two criteria – because no other approach produces an estimate close to one. Indeed he concludes that the only other approach that satisfies *any* of his criteria is the equity ownership approach which, although estimating the wrong thing, at least produces an estimate that is statistically precise.[24] However even that is disputed in Section 9 of this report.

36. In its ATCO Gas Draft Decision, the ERA proposes to estimate theta primarily on the basis of the equity ownership and tax statistic redemption rate approaches – based on new evidence provided by Lally (2013 AER). However, even if one accepts that the longstanding *value* interpretation of theta (and gamma) should be abandoned,[25] Lally (2103 AER) does not recommend or support the estimation approach adopted by the ERA.

37. **Recommendation: In our view it would be an error to conclude that Lally (2013 AER) provides support for the approach adopted by the ERA.**

[24] Lally (2013 AER), pp. 3-4.

[25] As set out above, and throughout this report, we would consider such an abandonment of the value interpretation to be an error on economic grounds and to be inconsistent with the NGR.

2. The overall framework for estimating gamma

Gamma is the product of two components

38. In its ATCO Gas Draft Decision, the ERA confirms that it will maintain the approach to estimating gamma as the product of two components, consistent with the standard regulatory approach:

> It follows that gamma can be represented by the formula set out in equation (3) below:
>
> $$\gamma = F \times \theta.$$ [26]

The interpretation of the distribution rate

39. The ERA defines the first component, *F*, as the "distribution rate."[27] Under the regulatory framework, the distribution rate is the proportion of corporate tax payments that are distributed as imputation credits. If a regulated company paid $100 tax and distributed imputation credits with a face value of $70, the distribution rate would be 70%.

The interpretation of theta

40. The second component of gamma is theta, θ.

41. Prior to August 2013, every Australian regulator in every determination had interpreted theta to be the value of distributed imputation credits, where "value" took its standard meaning of "worth" or "price." Every regulator had always sought an empirical estimate of the market value of distributed credits.

42. In its August 2013 Draft Guideline, the AER proposed that it would no longer define theta to be the value of distributed imputation credits, but rather as the proportion of distributed credits that are redeemed by shareholders. This new interpretation of theta is referred to interchangeably as the "utilisation" or "redemption" rate.

43. In every one of its decisions to date, the ERA has adopted the standard *value* interpretation of theta. In its Draft Guideline and it its Final Guideline the ERA adopted the standard *value* interpretation of theta. However, in its ATCO Gas Draft Decision, the ERA now proposes to define theta in terms of the utilisation/redemption rate. In particular, the ERA defines theta to be:

> the proportion of imputation credits distributed that are redeemed – the utilisation rate. [28]

44. It is this material change in the ERA's definition of theta, and the consequential material change in the ERA's estimate of theta, that is the primary focus of this report.

Value and redemption are materially different

45. The ERA's Guideline explains that there is a material difference between the face value of a credit that is redeemed and the value that the shareholder receives from redeeming that credit. This is because it is costly to obtain and redeem a credit. The ERA notes that redemption rates provide an indication of the number of credits that are redeemed, but no indication of the *value* of those credits

[26] ERA ATCO Gas Draft Decision, p. 426, Paragraph 12.
[27] ERA ATCO Gas Draft Decision, p. 426, Paragraph 12.
[28] ERA ATCO Gas Draft Decision, p. 426, Paragraph 11.

to the investors who redeem them. This is because the redemption rate ignores the costs that investors must bear to obtain and redeem their credits:

> The Authority considers that tax statistics, while not suffering methodology issues, are irrelevant for the direct estimation of theta because they fail to take into account the costs investors incur in obtaining franking credits. **These costs result in franking credits being valued at less than their face value**. In order to qualify for franking credits, investors must take on risk by purchasing and/or holding stocks. In addition, domestic investors forgo the benefits of international diversification and incur transaction costs by qualifying for franking credits.[29]

46. These costs include the time delay in redeeming credits, administrative and record-keeping costs, and importantly the cost of holding a more concentrated portfolio to obtain imputation credits. We explain these costs in detail in Section 5 below.

47. By way of analogy, suppose you were given a voucher that could be redeemed for $100 cash, but that:

    a) You can only redeem the voucher if you are an Australian resident;

    b) The $100 is taxable as income;

    c) You cannot redeem the $100 for another two years;

    d) You need to drive 50km to the specified redemption point; and

    e) You are only allowed to redeem the credit if you buy a certain number of shares in a company that you would not otherwise hold.

48. That is, even the before-tax value of a voucher to a resident is less than the face value because of the costs that must be borne to obtain and redeem the credit. A person situated in the redemption office could count the number of vouchers that are redeemed, and would observe each voucher being exchanged for $100 of cash. However, it would be wrong to conclude that each voucher had a *value* of $100 to the redeemer.

49. Moreover, suppose every individual who was entitled to redeem a voucher had $100 automatically deducted from their bank account. Those individuals would be left worse off because the *value* of the credit to them (in terms of the *worth* to them, or the *price* they would be prepared to pay for it) is less than the $100 face value.

50. The ERA clearly recognises the difference between the *redemption rate* and the *value* of credits to shareholders in the quote above. This also makes a material difference to the estimation of theta:

    a) The ERA adopts a theta estimate of 0.45 when estimating the value of distributed credits;[30] but

    b) The ERA adopts a theta estimate of 0.7 when estimating the proportion of distributed credits that are redeemed.

[29] ERA Rate of Return Guideline Explanatory Statement, p. 213, Paragraph 932, emphasis added.

[30] This is the mid-point of the range set out by the ERA in its ATCO Gas Draft Decision, p. 215, Paragraph 968. In our view, a more reliable and appropriate estimate is 0.35. However, the point here is that the *value* estimate (however computed) is materially lower than the *redemption* estimate.

51. That is, the ERA recognises (correctly in our view) that the value of distributed credits to investors (as in the usual meaning of *worth* or *price*) is materially lower than the redemption rate.

Value, redemption and the regulatory framework

52. Next, we note that in the regulatory setting the return that is paid to shareholders is reduced according to the regulatory estimate of gamma. Consequently, if investors *value* a credit at 45 cents in the dollar,[31] but the regulator sets gamma on the basis of a redemption rate of 70 cents in the dollar,[32] the shareholders will be short-changed. That is, shareholders will have their allowed return reduced by 70 cents in respect of credits that are worth only 45 cents to them. In this case, shareholders will not receive a fair return commensurate with their risks.

53. Nevertheless, in its ATCO Gas Draft Decision, the ERA abandons its previous value interpretation of theta in favour of a redemption rate interpretation:

> Therefore, the previous argument employed by the Authority in disregarding taxation statistics does not hold. In particular, the argument used by the Authority – that investors incur costs to obtain franking credits – is irrelevant for the calculation of the utilisation rate, as this is not required under the Lally interpretation of the gamma parameter. That is, the required gamma parameter under the Officer framework refers only to the proportion of personal taxation reduced by corporate taxation paid, and need not reflect any costs incurred to obtain the imputation credits.[33]

54. In summary, the ERA is quite clear about the fact that, in relation to imputation credits, it intends to reduce the allowed return to shareholders by an amount that exceeds the value of those credits to the shareholders. This results in the shareholders being short-changed – by the ERA's own figures. In our view, this is a clear error.

55. We address the difference between the value of imputation credits and the utilisation/redemption rate in more detail in Section 5 of this report.

Use of market-wide estimate

56. The ERA clearly states that it considers gamma to be a market-wide parameter such that the same value would be used for every firm and every industry:

> It is accepted regulatory practice to adopt a market average, as this avoids regulatory gaming at the firm level, and sample issues at the industry level.[34]

57. This is all consistent with the standard regulatory practice of using market-wide data to estimate both components of the gamma parameter, and we adopt that framework throughout this report.

[31] According to the ERA's own estimate, which we consider to be materially too high, as set out below.
[32] According to the ERA's ATCO Gas estimate.
[33] ERA ATCO Gas Draft Decision, p. 439, Paragraph 74.
[34] ERA ATCO Gas Draft Decision, p. 436.

3. The distribution rate

The ERA estimate is consistent with mainstream regulatory practice

58. In its ATCO Gas Draft Decision, the ERA proposes to adopt a distribution rate of 70%.[35] We note that, but for the QCA, there is universal regulatory endorsement of 0.7 as an appropriate estimate of the distribution rate. For example:

    a) The Australian Competition Tribunal uses 0.7;

    b) The AER uses 0.7; and

    c) IPART uses 0.7.

The Lally estimate is an estimate of the wrong thing

59. Having adopted the standard distribution rate estimate of 70%, the ERA provides some endorsement of an alternate estimate, due to Lally (2013 QCA, 2014 QCA), that has recently been adopted by the QCA. In particular, the ERA states that:

> Lally has developed an alternative estimate of the distribution rate F based on the financial reports of the top 20 ASX200 firms, of 0.84. The Authority agrees with the QCA that this provides a robust estimate of the distribution rate, albeit for listed firms.[36]

60. We do not agree that the QCA/Lally "sample of 20" approach provides a robust estimate of the distribution rate. In our view, the QCA/Lally approach does not provide an estimate of the distribution rate at all. Rather, the estimate obtained from the QCA/Lally approach is inconsistent with the QCA's own definition of the distribution rate and it is inconsistent with the standard regulatory Post-tax Regulatory Model (**PTRM**).

61. Specifically, the QCA defines the distribution rate (in its recent Market Parameters Decision[37] at Equation (1); at p. 25; at Equation (34); and at p. 89) to be:

$$\frac{Distributed\ credits}{Corporate\ tax\ paid}.$$

62. The PTRM also requires the distribution rate to be estimated according to this definition. In particular, the PTRM assumes that *every* dollar of corporate tax paid creates a dollar of imputation credits.

63. By contrast, Lally (2013, 2014) has estimated:

$$\frac{Distributed\ credits}{Created\ credits}.$$

64. The denominators in the two formulas above differ materially for the 20 companies in the Lally sample. In particular, very large multinational companies, such as those in the Lally sample, pay material amounts of corporate tax to foreign governments (in relation to their overseas operations).

[35] ERA ATCO Gas Draft Decision, Paragraph 949.
[36] ERA ATCO Gas Draft Decision, Paragraph 949.
[37] QCA, 2014, Market Parameters Decision, *Cost of capital: market parameters*, August.

These corporate tax payments do not create imputation credits, but are available for distribution to shareholders. For the Lally sample, only 56% of corporate tax payments generate imputation credits.[38]

65. In summary, the regulatory framework and PTRM require an estimate of $\frac{Distributed\ credits}{Corporate\ tax\ paid}$ whereas Lally has estimated $\frac{Distributed\ credits}{Created\ credits}$ for a sample of firms where the difference between the two quantities is substantial. In our view, it would be an error to use an estimate of some ratio Y when the regulatory framework and PTRM require an estimate of a different ratio X – particularly in the case where X and Y are materially different for the sample in question.

66. However, since the ERA ultimately decides to have no regard to the QCA/Lally approach to the distribution rate, we do not consider the issue further in this report.

67. We also note that two days after his report to the QCA recommending an 85% distribution rate on the basis of his sample-of-firms estimate, Lally (213 AER) advised the AER that a 70% distribution rate was within the reasonable range. The AER interpreted Lally's advice to them as supporting its 70% estimate.[39]

The reliability of the 0.7 estimate

68. The ERA raises some questions about the reliability of the Australian Tax Office data that forms the basis of the standard 0.7 estimate of the distribution rate. Specifically, the ERA cites potential issues identified in the NERA (2013) report, which the AER currently uses as the basis for its 0.7 estimate. There are three issues identified in that report:

    a) The empirical estimate of 0.7 may be somewhat overstated because:

        i) The data set effectively assumes that the franking account balances of companies that become bankrupt during the year are distributed, when they are not; and

        ii) Credits that flow from one company to another via a trust are effectively double counted;[40]

    b) It is possible that the estimate in a given year might be affected by firms failing to report their franking account balances, but only to the extent that the non-reporting firms happened to have systematic increases or decreases in their franking account balances in that year;

    c) There is a material change in the distribution rate for the last year of the NERA sample because that estimate is a preliminary one that has not yet been finalised by the ATO.[41]

69. In our view, none of these data issues are particularly concerning:

    a) The first issue is likely to be immaterial and results in a conservative *upward* bias in the distribution rate in any event;

[38] Source: Morningstar data, SFG calculations.
[39] AER (2013), Rate of Return Guideline – Explanatory Statement, p. 165.
[40] NERA (2013), pp. 5-6.
[41] NERA (2013), pp. 8-9.

b) The second issue is also likely to be immaterial in any given year (since non-reporting firms tend to be very small) and will certainly have no material effect on the cumulative distribution rate computed over many years; and

c) To the extent that there are any concerns about the preliminary data in the final year of the sample, that year can be omitted. The inclusion or removal of that year from the sample has no material effect on the cumulative estimate of 0.7.

70. As noted above, the AER has recently relied upon the NERA (2013) study in affirming its use of the standard 0.7 estimate. In relation to the quality of the data and the estimation techniques applied to it, the AER has concluded that:

> We consider this is a reasonable approach to estimate the payout ratio. In particular, we consider it is simple, fit for purpose, transparent, replicable and based on reliable and publicly accessible data sets.[42]

Conclusion

71. For the reasons set out above, our view is that the evidence that is currently available supports a distribution rate estimate of 70%.

[42] AER Draft Rate of Return Guideline – Explanatory Statement, p. 236.

4. The evolution of the ERA's interpretation of theta

Prior to August 2013

72. Prior to August 2013, every Australian regulator in every determination had interpreted gamma (and consequently theta) in terms of the value of imputation credits, where "value" took its standard meaning of "worth" or "price." For theta, regulators had always sought an empirical estimate of the market value of distributed credits.

The AER Draft Guideline: August 2013

73. In its August 2013 Draft Guideline, the AER proposed that it would no longer estimate gamma in terms of the value of imputation credits, but rather in terms of the utilisation/redemption of imputation credits. In particular, the AER proposed that in relation to theta it would no longer seek an empirical estimate of the *value* (as in worth or price) of distributed credits, but would instead seek an estimate of the proportion of distributed credits that are redeemed.

74. In relation to the conceptual definition of gamma, the AER's Draft Guideline concluded that:

> [gamma] is the proportion of company tax paid that investors redeem. [43]

and elsewhere that gamma is:

> the expected proportion of company tax which is returned to the representative investor through utilisation of imputation credits.[44]

and further that:

> the value of imputation credits is an estimate of the expected proportion of company tax which is returned to the representative investor through utilisation of imputation credits.[45]

75. That is, in its Draft Guideline the AER proposed that gamma represents the proportion of company tax that is redeemed via imputation credits. Consequently, theta must be estimated as the redemption rate of distributed credits. By contrast, the previous regulatory approach was to seek an estimate of the *value* of distributed credits, rather than the proportion of them that were redeemed. This led the AER to conclude that "market value estimates" were not "conceptually appropriate." [46]

76. A key component of the AER's "conceptual re-definition" of gamma is the notion of a representative investor, which the AER's Draft Guideline defines as follows:

> The representative investor is a weighted average of investors in the defined market. Specifically, investors are weighted by their value weight (equity ownership) and their risk aversion.[47]

[43] AER Draft Rate of Return Guideline Explanatory Statement, p. 234.
[44] AER Draft Rate of Return Guideline Explanatory Statement, p. 118.
[45] AER Draft Rate of Return Guideline Explanatory Statement, p. 124.
[46] AER Draft Rate of Return Guideline Explanatory Statement, p. 134.
[47] AER Draft Rate of Return Guideline Explanatory Statement, pp. 119-120.

77. This definition of the representative investor, and the fact that the AER considered that market value studies were not "conceptually appropriate," led the AER to estimate theta on the basis of its equity ownership estimate and Tax Office redemption rates.

The ERA Guideline: December 2013

78. The ERA published its Rate of Return Guideline in December 2013, approximately three and a half months after the publication of the AER's Draft Guideline. In its Guideline, the ERA concluded that the AER's conceptual re-definition of gamma was wrong and that the long-standing market value interpretation of gamma was correct.

79. For example, the ERA's Guideline states that:

> The Authority considers that it is appropriate to estimate gamma as the product of two components: (i) the payout ratio (F); and (ii) **the market value of imputation credits (θ)**.[48]

and notes that:

> The Australian Completion Tribunal (the Tribunal) has recently adopted a market value of imputation credits. [49]

80. The ERA ultimately concludes that:

> The Authority considers that dividend drop-off studies offer a key advantage in that they calculate an observed **market value for franking credits**. [50]

81. The Guideline also notes that the ERA has rejected:

> The AER's position of using taxation statistics to inform the value of theta.[51]

82. That is, the ERA considered the AER's conceptual re-definition of gamma and rejected it.

83. The ERA then went on to conclude that theta should be estimated using the dividend drop-off method:

> The Authority considers that dividend drop-off studies offer a key advantage in that they calculate an observed market value for franking credits. The Authority therefore considers that the dividend drop-off methodology is the most appropriate methodology for estimating theta. [52]

and it rejected the equity ownership and tax statistic redemption rate methods concluding that:

[48] ERA Rate of Return Guideline Explanatory Statement, p. 209, Paragraph 916, emphasis added.
[49] ERA Rate of Return Guideline Explanatory Statement, p. 209, Paragraph 917.
[50] ERA Rate of Return Guideline Explanatory Statement, p. 209, Paragraph 920, emphasis added.
[51] ERA Rate of Return Guideline Explanatory Statement, p. 213, Paragraph 933.
[52] ERA Rate of Return Guideline Explanatory Statement, p. 209, Paragraph 920.

> The Authority considers that tax statistics…are irrelevant for the direct estimation of theta. [53]

and that the AER's equity ownership approach is not even one of the "three methodologies [that] exist for estimating theta." [54]

84. It is hard to imagine a more comprehensive rejection of the approach to gamma that was set out in the AER's Draft Guideline some three and a half months earlier.

The ATCO Draft Decision: October 2014

85. In its ATCO Gas Draft Decision, the ERA announced that it has now abandoned its "value" interpretation of gamma in favour of the AER's redemption rate approach.[55] Whereas the ERA's Guideline used dividend drop-off analysis to estimate theta and rejected the equity ownership approach and tax statistic redemption rates entirely, the reverse is true in the ATCO Gas Draft Decision.

86. In particular, the ATCO Gas Draft Decision directly defines theta in terms of a particular estimation method, stating that theta is:

> the proportion of imputation credits distributed that are redeemed – the utilisation rate (θ). [56]

87. The ATCO Gas Draft Decision also precisely follows the AER's Draft Guideline in its references to a representative investor:

> The benefit arising from imputation credits can be interpreted as the proportion of franking credits received that are then redeemed by the representative investor.[57]

88. Indeed the ATCO Gas Draft Decision adopts language that is almost identical to the AER's Draft Guideline from August 2013:

> 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'.[58]

The basis for the ERA's reversal

89. The ATCO Gas Draft Decision sets out the "new evidence"[59] that the ERA has considered and notes that:

> That new evidence relates principally to two reports by Lally in late 2013:

[53] ERA Rate of Return Guideline Explanatory Statement, p. 213, Paragraph 932.
[54] ERA Rate of Return Guideline Explanatory Statement, p. 209, Paragraph 919.
[55] ERA ATCO Gas Draft Decision, beginning at p. 207.
[56] ERA ATCO Gas Draft Decision, p. 426, Paragraph 11.
[57] ERA ATCO Gas Draft Decision, p. 201, Paragraph 942.
[58] ERA ATCO Gas Draft Decision, p. 210, Paragraph 943.
[59] ERA ATCO Gas Draft Decision, p. 428, Paragraph 20.

> • the first, for the Australian Energy Regulator (AER), explores the theoretical underpinnings of gamma, and evaluates the appropriateness of various methodologies for estimating the utilisation rate parameter, θ; and
>
> • the second, for the Queensland Competition Authority (QCA), provides new estimates of the distribution rate parameter, F.[60]

90. The ATCO Gas Draft Decision rejects the Lally estimate of the distribution rate that has been adopted by the QCA, so it seems that the ERA's reversal in relation to gamma is based on the Lally (2013 AER) report to the AER. In particular, the ERA attributes its new conceptual definition of theta to the Lally (2013 AER) report, rejecting its own previous "value" interpretation of theta and quoting Lally as follows:

> 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'. [61]

91. However, in its August 2013 Draft Guideline, the AER had already rejected *its* previous "value" interpretation and concluded that theta should be estimated on the basis of:

> A weighted average investor by summing across all investors [where] the weightings… should account for…the proportion of equity in the market that they own and their risk aversion.[62]

92. That is, the Lally (2013 AER) report contains nothing about the conceptual definition of theta that had not already been set out in the AER's Draft Guideline in August 2013.

93. Moreover, as set out in Section 8 below, Lally (2013 AER) does *not* endorse the redemption rate interpretation of theta and advises *against* the adoption of the equity ownership and tax statistic redemption rate estimates of theta.

94. In our view, the ERA has committed two errors here:

    a) It has misinterpreted the advice provided in the Lally (2013 AER) report to the AER. The ERA interprets that report as supporting its conceptual definition of theta and its use of the equity ownership approach and tax statistic redemption rates to estimate theta. However, as set out in detail in Section 8 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.

New material in the Lally (2013) report for the AER

95. Lally (2013 AER) was commissioned by the AER to provide a critical review of the approach that was proposed in its Draft Guideline in August 2013. The Terms of Reference required the consultant to:

[60] ERA ATCO Gas Draft Decision, p. 428, Paragraph 20.
[61] ERA ATCO Gas Draft Decision, p. 210, Paragraph 943.
[62] ERA ATCO Gas Draft Decision, p. 210, Paragraph 943.

> Provide a critical review of the AER's approach to setting the value of imputation credits in the draft guideline, as set out in the explanatory statement. In your review, please provide a critical review of the reasonableness of the AER's draft guideline position on:
>
> a. The conceptual framework
>
> b. The sources of evidence, including the analysis of their strengths and weaknesses
>
> c. The approach to drawing on the body of evidence, as opposed to seeking definitive single sources of evidence. [63]

96. Consistent with these terms of reference, Lally (2013 AER) opines on the material that had already been set out in the AER's August 2013 Draft Guideline, which the ERA had already considered and rejected in its December 2013 Guideline. Lally (2013 AER) also rejects the AER's proposed approach – in favour of his longstanding preference for setting theta to one on the basis of his own theoretical reasoning. As explained in Section 8 below, it would be an error to interpret Lally (2013 AER) as providing support for the AER's approach of using the equity ownership approach and tax statistic redemption rates to estimate theta.

97. The only new material introduced in the Lally (2013) report for the AER is what Lally calls "a test for reasonableness" [64] and which the ERA now refers to as a "conceptual goal posts test." [65] Our view is that this "test" has no foundation whatsoever, such that it would be an error to rely on it for any purpose. The reasons for this conclusion are set out in Section 7 below.

[63] Lally (2013 AER), p. 58.
[64] Lally (2013 AER), p. 38.
[65] ERA ATCO Gas Draft Decision, p. 210, Paragraph 448.

5. The conceptual definition of theta

The ERA approach to theta

98. As set out above, in its ATCO Gas Draft Decision the ERA proposes to replace its long-standing *value* interpretation of theta with a utilisation/redemption rate interpretation. In particular, the ERA now defines theta to be:

> the proportion of imputation credits distributed that are redeemed – the utilisation rate. [66]

99. That is, the ERA has decided that the appropriate task is not to estimate the *value* of distributed credits at all, but that the appropriate task is to estimate the proportion of distributed credits that investors are able to redeem – the redemption rate.

100. The ERA considers two methods for estimating the redemption rate: the equity ownership approach and tax statistics studies. The equity ownership approach estimates the proportion of Australian shares that are owned by resident investors, and then assumes that all imputation credits distributed to those resident investors will be redeemed. The tax statistic studies use ATO data to estimate the ratio of (a) the quantity of imputation credits redeemed in a given year, to (b) the quantity of imputation credits distributed in that year. Both of these methods are designed to estimate the redemption rate. The ERA concludes that the evidence from these two approaches supports a redemption rate of 70% – that 70% of the credits that are distributed end up being redeemed by resident investors.[67]

There is a material difference between the *redemption rate* and the *value* of distributed imputation credits

101. As set out in Section 2 above, there is a material difference between the redemption rate (the proportion of credits that are redeemed) and the value of credits to shareholders. Redemption rate studies and market value studies consistently produce materially different estimates – because they seek to estimate materially different things. For example:

a) The ERA adopts a theta estimate of 0.45 when estimating the value of distributed credits;[68] but

b) The ERA adopts a theta estimate of 0.7 when estimating the proportion of distributed credits that are redeemed.

102. That is, the ERA recognises (correctly in our view) that the value of distributed credits to investors (as in the usual meaning of *worth* or *price*) is materially lower than the redemption rate.

Value or redemption rates?

The regulatory framework requires a value interpretation

103. In the regulatory setting the return that is paid to shareholders is reduced according to the regulatory estimate of gamma. Consequently, if investors *value* a credit at 45 cents in the dollar,[69] but the

[66] ERA ATCO Gas Draft Decision, p. 426, Paragraph 11.
[67] ERA ATCO Gas Draft Decision, p. 210, Paragraph 944.
[68] This is the mid-point of the range set out by the ERA in its ATCO Gas Draft Decision, p. 215, Paragraph 968. In our view, a more reliable and appropriate estimate is 0.35. However, the point here is that the *value* estimate (however computed) is materially lower than the *redemption* estimate.
[69] According to the ERA's own estimate, which we consider to be materially too high, as set out below.

regulator sets gamma on the basis of a redemption rate of 70 cents in the dollar,[70] the shareholders will be short-changed. That is, shareholders will have their allowed return reduced by 70 cents in respect of credits that are worth only 45 cents to them. In this case, shareholders will not receive a fair return commensurate with their risks.

104. Appendix 1 to this report explains in detail how the estimate of gamma affects the allowed return to shareholders through the regulatory process and post-tax revenue model.

The National Gas Rules require a value interpretation

105. Prior to the latest rule change, the Rules stated that:

> γ is the assumed utilisation of imputation credits.[71]

106. At the time of the latest Rule change, all regulators (including the ERA) had always interpreted this provision to require an estimate of the *value* of imputation credits, where "value" was interpreted as "worth" or "price" or "value to the market". In this context, the AEMC amended the Rules to now state that:

> γ is the value of imputation credits.[72]

107. In our view, the clear intention of the AEMC was to clarify that the prevailing regulatory practice should be continued. That practice is to estimate the *value* (as in "worth") of imputation credits. It seems highly unlikely that the AEMC could have had any other intention given that the wording in the new Rule accords precisely with the standard practice of all regulators at the time the Rule change was made.

108. Moreover, there are two reasons why it would seem to be quite fanciful to suggest that the intention of the AEMC was to *change* the interpretation of gamma *away* from the standard long-standing practice of all regulators at the time:

    a) The AEMC inserted the word "value," the ordinary meaning of which corresponds precisely to the practice of all regulators at the time of the change; and

    b) The AEMC did not provide a detailed explanation about why such as change was necessary in its Final Determination. This is consistent with a mere tidying up of a Rule to properly reflect the existing practice, but inconsistent with an intention to fundamentally change the Rules away from the longstanding adopted practice.

109. In its ATCO Gas Draft Decision, the ERA seems to imply that the Rule which states that "γ is the value of imputation credits" should not be interpreted as affirming the existing regulatory practice and that the term "value" in the Rules should not be interpreted as taking its common meaning of "worth" or "price," but rather:

> this 'value' is not a market value, but instead a 'numerical value.' [73]

[70] According to the ERA's ATCO Gas estimate.
[71] NER cls. 6.5.3, 6A.6.4 (as at version 52).
[72] NER cls. 6.5.3, 6A.6.4 (current since version 53); NGR r. 87A(1) (current since version 14).
[73] ERA ATCO Gas Draft Decision, p. 210, Paragraph 942.

110. That is, the Draft Decision implies that "value" should be interpreted as "the number used for" where "the number used for" is determined on the basis of utilisation/redemption rates, rather than approaches that seek to estimate value in the standard sense of the worth or price of imputation credits. In our view, this is clearly inconsistent with the apparent intention of the AEMC given the context of the Rule change set out above. Moreover, it is also inconsistent with economic and regulatory principles, as set out below.

111. In our view, the Rule which states that "γ is the value of imputation credits"[74] should be interpreted as requiring an estimate of the value of imputation credits in the ordinary sense of the word "value" meaning "worth" or "price." Our view is that it would be an error to interpret "value" otherwise.

The ERA's own equation requires a value interpretation

112. In its ATCO Gas Draft Decision, the ERA sets out the following equation: [75]

$$S_0 = \frac{Y_1 - TAX_1 + IC_1U + S_1}{1 + E\left[\hat{R}\right]}.$$

113. The ERA states that this equation shows that the firm's stock price will be equal to the present value of the after-tax distribution received during the year, the present value of the imputation credit received during the year, and the present value of the stock price at the end of the year:

> …the sum of the expected [pre-tax] cash flows to equity holders (Y_1), less the expected company taxation over the year (Tax_1), plus **any value derived** from the distribution of franking credits. The latter term is defined as $UxIC_1$, where IC_1 is the distributed imputation credits. [76]

114. We agree entirely with this characterisation – the stock price will reflect the *value* that investors attribute to imputation credits. The relevant task is to determine the extent to which the distributed credits are reflected in the stock price. For example, suppose there is a dollar of imputation credits to be distributed so that IC_1=1. Also suppose that 70% of distributed credits are redeemed and that the distributed credits are *valued* at 45 cents per dollar, consistent with the ERA's estimates. Clearly, the stock price will reflect the *value* of the credits, not the proportion of them that might be redeemed. That is, investors will not increase the stock price by 70 cents in relation to a credit that is worth only 45 cents to them.

115. The ERA's own equation above clearly demonstrates the fallacy of the redemption rate approach. That approach implies (using the ERA's own figures) that investors would be prepared to pay (via the stock price) 70 cents for a credit they value at 45 cents. In our view, it would be an error to rely on an approach that has such an implausible implication.

Reasons for the difference between the redemption rate and the value of distributed credits

116. The ERA's Guideline explains why there is a material difference between the face value of a credit that is redeemed and the *value* that the shareholder receives from redeeming that credit. This is because it is costly to obtain and redeem a credit. The ERA notes that redemption rates provide an indication of the number of credits that are redeemed, but no indication of the *value* of those credits

[74] NER cls. 6.5.3, 6A.6.4 (current since version 53); NGR r. 87A(1) (current since version 14).
[75] ERA ATCO Gas Draft Decision, Equation (6), p. 431, Paragraph 34.
[76] ERA ATCO Gas Draft Decision, pp. 430-431, Paragraph 33, emphasis added.

to the investors who redeem them. This is because the redemption rate ignores the costs that investors must bear to obtain and redeem their credits:

> The Authority considers that tax statistics, while not suffering methodology issues, are irrelevant for the direct estimation of theta because they fail to take into account the costs investors incur in obtaining franking credits. **These costs result in franking credits being valued at less than their face value.** In order to qualify for franking credits, investors must take on risk by purchasing and/or holding stocks. In addition, domestic investors forgo the benefits of international diversification and incur transaction costs by qualifying for franking credits.[77]

117. We note that there are a number of reasons why the value of distributed imputation credits that is reflected in share prices may be less than the face value of those credits, including:

a) Some of the credits that are distributed to shareholders are never redeemed. There are, in turn, a number of reasons why a distributed credit might not be redeemed, including:

   i) Credits distributed to non-resident investors cannot be redeemed under the dividend imputation legislation;

   ii) Credits distributed to resident investors who sell the shares within 45 days of their purchase cannot be redeemed;[78] and

   iii) Some credits distributed to resident investors are not redeemed because some investors fail to keep the required records and simply do not claim them. For example, Handley and Maheswaran (2008) report that, on average 8% of the credits distributed to resident individuals are never redeemed.[79]

b) There is a time delay in obtaining any benefit from imputation credits. Whereas dividends are available to the investor as soon as they are paid, the imputation credits that are attached to that dividend only have value after the investor's end-of-year tax return is filed and processed. This time delay can be up to two years for a credit that is distributed directly from a company to an individual shareholder. The time delay can be even greater when credits are distributed via other companies or trusts;

c) There are administrative costs involved in the redemption of imputation credits. The investor must maintain records of all credits that are received and redeem them by preparing the necessary schedules for the investor's tax return. This involves time and expenses such as accountant fees. By contrast, when an investor buys shares, they provide bank account details and all dividends are automatically transferred into that account without any action required of the investor. That is, it is more costly to convert imputation credits into value;

d) Imputation credits are taxed as income in the same way that dividends are taxed. When an investor receives a franked dividend, their taxable income is increased by the amount of the dividend plus the face value of the credit. Both components are then taxed at the investor's marginal tax rate; and

[77] ERA Rate of Return Guideline Explanatory Statement, p. 213, Paragraph 932, emphasis added.
[78] The so-called "45 day Rule" took effect in July 1997. It prevents resident investors from redeeming imputation credits unless they own the shares for 45 days around the payment of the relevant dividend.
[79] This figure includes credits that are not redeemed due to the 45-day Rule and, for the pre-2000 period, credits that are not redeemed because the shareholder has taxable income below the tax-free threshold. The latter is likely to be immaterial as it is unlikely that a material proportion of shares are owned by residents whose income is below the tax-free threshold.

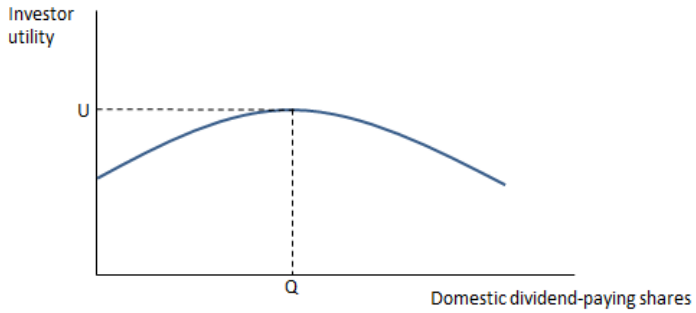
e) If dividend imputation leads resident investors to hold more domestic dividend-paying shares than they otherwise would (because they are attracted by the possibility of receiving imputation credits) their portfolios will become more concentrated and the resulting loss of diversification comes at a cost. A rational investor would continue to increase the concentration of their portfolio until the marginal benefit of the last imputation credit equalled the marginal cost of losing diversification. That is, the last imputation credit would be of no net benefit.[80]

118. This last point about portfolio diversification is particularly important and has been recognised by Lally (2013 AER) and the ERA itself:

> The ERA (2013, page 5) goes even further and asserts that even domestic investors would value franking credits less than their face value because they must incur risk, pay transaction costs, and sacrifice international diversification opportunities by purchasing Australian stocks with imputation credits.[81]

119. To explore the portfolio diversification point in more detail, first consider Figure 1 below in a market with no dividend imputation. That figure shows the utility[82] of a particular investor as a function of the proportion of their wealth that is invested in domestic dividend-paying shares (as opposed to domestic shares that do not pay dividends, international shares, or other assets such as real property, term deposits, bank balances and so on). Figure 1 shows that the optimal investment in domestic dividend-paying shares is at Q, because this maximises the investor's utility at U.

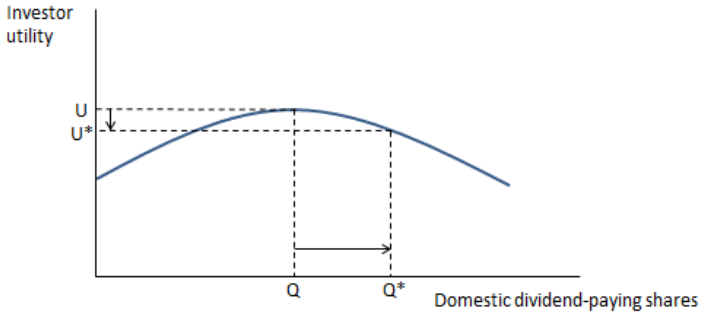
Figure 1
Optimal portfolio holding of domestic dividend-paying shares



120. If the investor moved away from their optimal investment in domestic dividend-paying shares (Point Q), the result would be a loss of utility, in which case the investor would be worse off. This is illustrated in Figure 2 below, which shows that an over-investment in domestic dividend-paying shares (at Q*) leads to a reduction in utility (U*).

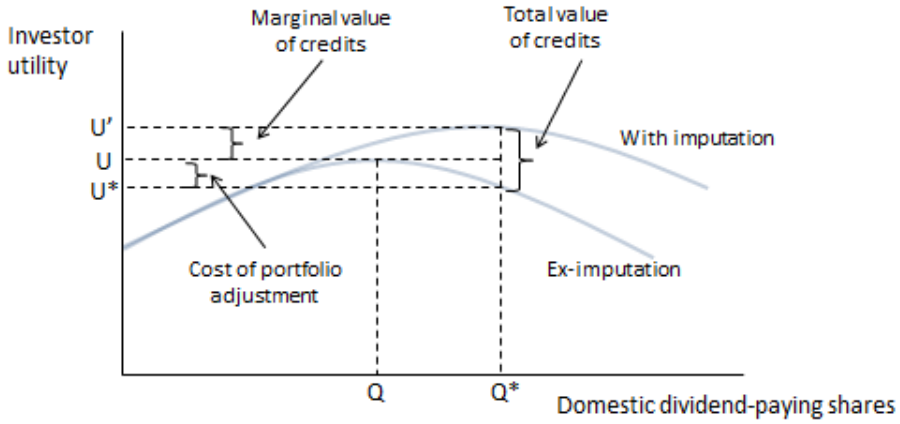
[80] This effect is explained in more detail in Paul Lajbcygier and Simon Wheatley (2012), "Imputation credits and equity returns," *The Economic Record*, 88, 283, 476-494.
[81] Lally (2013), p. 16. The reference to ERA (2013) appears to be a reference to Vo, Gellard and Mero (2013).
[82] Utility is the economic concept of well-being or satisfaction. The basis of most economic models is the notion that individuals will act to maximise their utility.

Figure 2
Sub-optimal portfolio holding of domestic dividend-paying shares



121. Now suppose that imputation is introduced into this market, as illustrated in Figure 3 below. The domestic investor is likely to alter their portfolio by increasing their investment in domestic dividend-paying shares. This causes the investor to move away from their optimal portfolio, which comes at a cost – reducing utility from U to U*. However, that cost is more than compensated by the value that the investor receives from imputation credits. When the value of imputation credits is included, the curve shifts and the optimal investment in domestic dividend-paying shares is at Q*, producing utility of U'. This optimum occurs at the point where the marginal benefit of the next imputation credit is exactly offset by the marginal cost of further concentration of the investor's portfolio. That is, the last dollar of imputation credits that the investor receives has a negligible marginal benefit.

Figure 3
Australian government bond yields and the proportion of domestic ownership



122. Figure 3 also shows clearly that the net benefit that this investor receives from imputation credits is to increase utility from U to U'. This net benefit is obtained by subtracting the cost of portfolio adjustment from the total value of the credits. In summary, the value that the investor obtains from imputation credits comes at a cost – the cost of concentrating the investor's portfolio into domestic dividend-paying shares.

Summary and conclusions

123. For the reasons set out above, our view is that the regulatory framework requires theta to be estimated in terms of the long-standing *value* interpretation rather than as a redemption rate.

124. The Australian Competition Tribunal has held that redemption rates cannot be used to estimate the value of credits. In particular, the Tribunal held that redemption rates provide no more than an

upper bound check on estimates of the value of imputation credits obtained from the analysis of market prices, and that the AER was wrong to have interpreted such an estimate as a point estimate rather than as an upper bound:

> The AER accepted that utilisation rates derived from tax statistics provide an upper bound on possible values of theta. Setting aside the manner in which the AER derived a value from the tax statistics study, it correctly considered that information from a tax statistics study was relevant. However, its relevance could only be related to the fact that it was an upper bound. No estimate that exceeded a genuine upper bound could be correct. Thus the appropriate way to use the tax statistics figure was as a check.[83]

125. That is, if it is correct to interpret gamma in terms of the value of imputation credits (which it is, for the reasons set out above) the ERA's approach of relying on redemption rates would be in error – because redemption rates do not measure value.

126. The ATCO Gas Draft Decision also refers to certain other references to utilisation rates and redemption rates in various academic papers and regulatory submissions. These are not as directly relevant as the issues set out above, but are addressed in Appendix 2 to this report.

[83] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010), Paragraph 91.

6. Theoretical justification for the redemption rate interpretation

Overview

127. The ERA relies heavily on theoretical support for its new interpretation of gamma, stating that:

> Lally considers that the correct interpretation of *U* can be found in Lally and van Zijl, in which it is shown 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' [84]

128. However, the ERA's definition of theta in terms of the proportion of credits that are redeemed is not consistent with *any* theoretical model. The theoretical models that involve "a complex weighted average over all investors" only apply to two special cases:

    a) The case where Australia is perfectly segmented from world capital markets; and

    b) The case where Australia is perfectly integrated into world capital markets.

129. Lally (2013 AER) advocates the application of the model to the former setting, recommending an approach that involves:

> ignoring foreigners, [85]

consistent with his long-standing view that:

> Since national capital markets are assumed to be segregated, it would be inconsistent to recognise foreigners. Accordingly they are omitted from consideration.[86]

130. By contrast, the ERA seeks to use the Lally model to justify its use of a redemption rate that reflects the extent to which Australian equities are owned by foreign investors. Lally has advised the AER and the QCA that his model does not apply in such a setting – there is no market clearing condition and one cannot solve for any equilibrium pricing results. As explained in detail below, there is no theoretical framework that supports the ERA's proposed approach.

The ERA's definition of the domestic capital market is not supported by any theoretical model

131. The ERA begins with its "definition of the domestic capital market"[87] which considers foreign investors to the extent that they invest in Australian equities:

> 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.[88]

[84] ERA ATCO Gas Draft Decision, pp. 431-432, Paragraph 37.
[85] Lally (2013a), p. 3.
[86] Lally (2004, pp. 44-5).
[87] ERA ATCO Gas Draft Decision, p. 210.
[88] ERA ATCO Gas Draft Decision, p. 210, Paragraph 940.

132. Lally (2013 AER) specifically disagrees with that approach, stating that it:

> believes that all CAPMs start by defining the "market", from which the "relevant" set of investors follows. Thus, if the market is Australian equities, then the relevant set of investors includes foreigners to the extent they invest in Australian equities. I do not agree.[89]

133. Lally (2013 AER) goes on to confirm that the "complex weighted average of all investors" framework only applies in the special cases of perfect segmentation and perfect integration:

> CAPMs do not start with a definition of the "market" but a set of assumptions about investor behaviour and institutional features, and the particular assumptions imply which market portfolio and set of investors are relevant. Some versions of the CAPM (such as Officer, 1994) **assume complete segmentation** of equity markets, in which case the relevant investors are Australian residents and the relevant market portfolio is all Australian risky assets (assets that can be purchased by Australian residents in a world in which there is complete segmentation of risky asset markets). Other versions of the CAPM **assume complete integration** (such as Solnik, 1974), in which case the relevant investors are those throughout the world and the relevant market portfolio would be all risky assets throughout the world. [90]

134. That is, some theoretical models apply to the case of complete integration and some apply to the case of complete segmentation – but *none* apply to the ERA's "definition of the domestic capital market."

135. Lally (2013 AER) concludes that:

> The AER (2013, page 237) also defines the utilisation rate as the proportion of distributed credits that investors redeem. This is not correct. [91]

136. In summary, the ERA has materially changed its framework for gamma, primarily on the basis of Lally (2013 AER). However, that report actually recommends against the framework and approach that the ERA has adopted.

137. The remainder of this section of the report explains in more detail why the ERA's framework and approach is actually inconsistent with the theoretical models on which the ERA says it is based.

A closed system is required

138. 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.

[89] Lally (2013 AER), p. 14.
[90] Lally (2013 AER), pp. 14-15.
[91] Lally (2013 AER), p. 13.

139. 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.

140. 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.

141. 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.

142. These models also make the assumption that a dollar of redeemed credits has the same value as a dollar of cash dividends. We discuss the reasonableness of this assumption in the next sub-section of this report.

143. A by-product of these equilibrium calculations is an estimate of the equilibrium value of the imputation credits that are distributed by each firm. This is a derived figure for the extent to which imputation credits will be capitalised into the equilibrium stock price. In these models, the equilibrium value of imputation credits (capitalised into the stock price) turns out to be a weighted-average of the extent to which each investor is able to redeem imputation credits, weighted by wealth and risk aversion. That is, under the assumptions of these models (including the assumption that a dollar of redeemed credit is equal in value to a dollar of cash dividends) the market value of imputation credits (i.e., the extent to which the credits are capitalised into stock prices) will be equal to the weighted-average redemption rate. Under the assumptions of these models, the market value of imputation credits can be estimated as the weighted-average of the utilisation rates of the *m* investors.

144. That is, in an economy where the prerequisite conditions hold (i.e., there is a closed system in which the *m* investors collectively own all of the *n* assets and nothing else) and where all of the assumptions of the model hold (including the assumption that redeemed credits and cash dividends are equally valued), it must be the case that the market value of imputation credits is equal to the weighted-average utilisation rate. In this case, there is equality between:

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

    b) The weighted-average redemption rate.

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

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

Specific cases of a closed system

145. Lally (2013 AER) considers an extreme case where:

    a) There are *m* investors who collectively own all of the *n* assets and nothing else;

    b) All of the *m* investors value a dollar of redeemed credits equal to a dollar of cash dividends, and

    c) All of the *m* investors can redeem 100% of the imputation credits that are distributed to them (i.e., there are no foreign investors).

146. He notes that (a) and (b) above establish the pre-conditions that are required for the weighted-average utilisation rate to provide an appropriate estimate of the value of distributed credits, theta. He also notes that from (c) above the weighted-average utilisation rate will be 100%. In this special case, 100% of the face value of the distributed credits will be capitalised into the stock price and theta will be equal to 1. Lally (2013 AER) recommends that the regulator should adopt the assumptions set out above and set theta to 1.

147. Of course, if theta is to be estimated not as it actually *is* in the market for equity funds, but as it *would be* in a world with no foreign investors, consistency requires that *all* WACC parameters must be estimated on the same basis. Lally (2013 AER) presents some calculations to show how one might go about estimating beta and MRP as they *would be* in such a world.

148. Lally (2013 AER) also considers the case of perfectly integrated capital markets where:

    a) The *m* investors consist of all global investors; and

    b) The *n* assets consist of all global equities.

149. This is also a closed system in which the *m* investors collectively own all of the *n* assets and nothing else. Consequently, an equilibrium exists in which the value of imputation credits capitalised into the stock price is equal to the weighted-average of the utilisation rates over the *m* investors. In this case, only a small proportion of the *m* investors are eligible to redeem imputation credits (commensurate with the small proportion of Australian investors in the global market), in which case theta will be negligibly small.

150. By contrast, the ERA considers a setting in which:

    a) The *m* investors consist of all Australian investors and those foreign investors who own some Australian shares; and

    b) The *n* assets consist of all Australian equities.

151. This is not a closed system because it is not the case that the *m* investors collectively own all of the *n* assets and nothing else. Consequently, no market clearing equilibrium can be derived and it will not be the case that an equilibrium exists in which the value of imputation credits capitalised into the stock price is equal to the weighted-average of the utilisation rates over the *m* investors.

152. In the context of these equilibrium models, if foreign investors are included, foreign assets must also be included. Alternatively, if foreign assets are not included, then foreign investors must be assumed

away. If neither of these assumptions is made, no equilibrium model will apply and the weighted-average utilisation rate cannot be used as an estimate of theta.

Lally's specific rejection of the ERA approach

153. In his advice to the QCA, Lally (2013 QCA) notes that one:

> …possible approach to estimating *U* arises from the definition of *U* as a value weighted average over the utilisation rates of individual investors, but without imposing the restriction that investors must be Australian residents. Consequently *U* would be a value weighted average over the utilisation rates of locals and foreigners. Since foreigners cannot benefit from the credits (except through tax arbitrage), then *U* would be the proportion of Australian shares held by Australians. [92]

154. It is this very approach of using an average utilisation rate that the ERA has adopted. In fact, the ERA places 100% weight on this single approach and zero weight on all other approaches. Lally (2013 QCA) goes on to advise that:

> The drawback with this approach is that the estimate is inconsistent with the use of a CAPM that assumes complete segmentation of risky asset markets. Handley (2008, section 2.2) appears to believe that there is no inconsistency and believes that all CAPMs start by defining the "market", from which the "relevant" set of investors follows. Thus, if the market is Australian equities, then the relevant set of investors includes foreigners to the extent they invest in Australian equities. I do not agree. Every CAPM starts instead with a set of assumptions about investor behaviour and institutional features rather than a "market", and the particular assumptions imply which market portfolio and set of investors are relevant. [93]

155. We agree entirely with Lally on this point. There is no version of the CAPM, and indeed no version of any equilibrium asset pricing model, that supports the taking of an average utilisation rate across Australian investors and "foreigners to the extent that they invest in Australian entities." As set out above, such an approach violates the most basic market clearing condition of equilibrium asset pricing models.

156. Lally goes on to advise that a weighted average utilisation rate is only relevant where:

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.

157. He notes that there are only two settings in which this condition holds. This first is the complete segmentation case in which:

> the relevant investors are Australian residents and the relevant market portfolio is all Australian risky assets [94]

and the second is the complete integration case in which:

[92] Lally (2013 QCA), p. 13.
[93] Lally (2013 QCA), p. 13. See also Lally (2013 AER), p. 14.
[94] Lally (2013 QCA), p. 14.

> the relevant investors are those throughout the world and the relevant market portfolio would be all risky assets throughout the world.[95]

158. By contrast, under the ERA's setting in which:

    a) The *m* investors consist of all Australian investors and those foreign investors who own some Australian shares; and

    b) The *n* assets consist of all Australian equities

    the proportion of credits that are redeemed has nothing to do with the value of those credits to shareholders. That is, there is no theoretical framework that supports the ERA's proposed approach.

159. Lally (2013 QCA) also notes that the use of redemption rates based on the proportion of foreign investors

> has the perverse consequence that as national equity markets become increasingly integrated, foreign ownership of Australian equities will rise, the resulting estimate of U will fall, and therefore the cost of equity capital estimated using the Officer model will rise. However, as markets become more integrated, investors will be holding more well diversified portfolios and therefore the cost of equity capital should fall.[96]

Conclusion

160. There is no theoretical framework that supports the ERA's proposed approach.

[95] Lally (2013 QCA), p. 14.
[96] Lally (2013 QCA), p. 14.

7. The Lally conceptual test

What does the test conclude?

161. Lally (2013 AER) develops a "conceptual test" that is designed to provide some bounds around a reasonable estimate of the utilisation rate. Before addressing the merits of the test itself, we consider the ERA's unique interpretation of the outcomes of the test.

162. Lally (2013 AER) himself concludes that the test is only satisfied by setting the utilisation rate close to one:

> ...estimates of U that are significantly less than 1 fail this test in virtually every case examined, and are therefore deficient…By contrast, if the Officer model were combined with a utilisation rate on imputation credits of 1, or close to it, the test described here would be satisfied in most cases. All of this suggests that, if the Officer model is used, the only sensible estimate of the utilisation rate is at or close to 1.[97]

163. The QCA also concludes that the test is only satisfied by setting the utilisation rate to one, or close to one:

> a utilisation rate of one (or close to one) in conjunction with the common approach of Australian regulators is reasonable (i.e. it produces a result that satisfies the test).[98]

164. The AER also concludes that the test is only satisfied by setting the utilisation rate to one or close to one:

> The conceptual goalposts approach, which suggest (sic) a utilisation rate of 0.8 to 1.0. [99]

165. By contrast, the ERA concludes that the test supports any theta estimate above 0.6:

> the Authority considers that it is reasonable to infer a range for θ of 0.6 to 1, as conceptual goal posts.[100]

166. This conclusion is apparently based on Lally (2013 AER Table 3, p. 45). That table applies the "test" to 27 various different combinations of parameters, including a "utilisation rate" of 0.625, and shows that the test is failed by 23 of the 27 parameter combinations. Lally himself concludes that:

> These four exceptions occur for extreme parameter combinations in the table.[101]

167. The "extreme parameter combinations" that Lally refers to involve:

a) A dividend yield for the average Australian firm of 2.5% (whereas Lally concludes that the data supports an estimate of 5%); or

[97] Lally (2013 AER), pp. 46-47. Note that Lally uses U rather than theta to represent the second component of gamma. The ERA uses the two terms interchangeably – ATCO Gas Draft Decision, p. 429, Paragraph 27.
[98] QCA Market Parameters Decision, p. 99.
[99] AER Rate of Return Guideline Explanatory Statement, p. 159.
[100] ERA ATCO Gas Draft Decision, p. 450, Paragraph 121.
[101] Lally (2013 AER), p. 45.

b) A market-wide estimate of the proportion of dividends that are franked of 37.5% (whereas Lally concludes that the data supports and estimate of 75%).[102]

such that:

> ...estimates of U that are significantly less than 1 fail this test in virtually every case examined, and are therefore deficient. [103]

168. For the reasons set out below, our view is that the Lally "conceptual goal posts test" is so flawed that it should be given no regard whatsoever. However, if the Lally "test" calculations are to be relied upon, those calculations support an estimate of "one or close to one." Interpreting the Lally "test" calculations as though they support estimates as low as 0.6 would be an error. Such an interpretation is inconsistent with the test calculations set out by Lally (2013 AER) and with the interpretations of Lally himself, the AER, and the QCA.

What role does the "test" play?

169. The ERA adopts a theta estimate of 0.7, which is *not* "one or close to one." That is, the ERA estimate is outside the bounds of the range established by the "conceptual goal posts test." At this point, the ERA must decide whether the Lally test does bound the reasonable values for theta or whether it does not. That is the ERA must decide whether:

a) The test provides reliable bounds such that all reasonable values of theta rate must fall within those bounds; or

b) The test does not provide reliable bounds such that reasonable values for theta may be taken from outside the bounds established by the test.

170. It is important to note that the "test" is not designed to inform a point estimate for theta. Rather, it examines Lally's modelling of two extreme end-points of a theoretical spectrum.

171. Logically:

a) If the ERA considers that the test does provide reliable bounds, they must reject (as unreasonable) any estimate from outside of those bounds; and

b) If the ERA considers that the test does not provide reliable bounds, it should not be given any weight in its decision-making process.

172. In our view, in its Final Decision the ERA should either:

a) Adopt an estimate of theta that is "one or close to one" consistent with the conceptual goal posts "test"; or

b) Reject the "test" as being unreliable and place no weight on it.

[102] Lally (2013 AER) p. 40.
[103] Lally (2013 AER), pp. 46-47. Note that Lally uses U rather than theta to represent the second component of gamma. The ERA uses the two terms interchangeably – ATCO Gas Draft Decision, p. 429, Paragraph 27.

The merits of the conceptual test

Overview

173. In our view, the Lally conceptual goal posts test does not establish a reasonable range for the utilisation rate and it should be afforded no weight at all. The reasons for this conclusion are:

a) To our knowledge, no person or entity anywhere in the world at any time has ever adopted an estimate of the utilisation rate from within the range established by the Lally test;

b) The test relies upon estimates of CAPM parameters as they would be in perfectly segmented and perfectly integrated worlds. The estimation of CAPM parameters in the real world (where substantial data is available to assist) is already difficult and contentious. It is simply impossible to estimate what these parameters *might be* in the theoretical worlds considered in the Lally test;

c) The Lally test is based upon the assumption that the market risk premium in every country is equal to the same multiple of historical stock market variance. By contrast the ERA places zero weight on this method for estimating the MRP in the real world. That is, a method that warrants no weight at all in the real world is, by itself, able to provide estimate of the MRP in two theoretical extreme worlds – to three decimal places. Moreover, the QCA has recently noted that Lally himself has previously concluded that "the statistical precision of the method is very low";[104]

d) The first version of the test (Lally 2013 AER) relied upon government bonds having the same yield whether or not foreign investors are allowed to buy them, which is clearly unsupportable; and

e) The second version of the test (Lally 2014 QCA) is based on a scenario in which the market for government bonds is completely integrated while at the same time the market for all other assets is completely segmented. That is, all investors throughout the world own government bonds in all other countries in the world, whereas they are only allowed to own risky assets in their own country. This assumption is even more implausible than the one it is supposed to replace.

Parameter estimation

174. In our view it is simply impossible to estimate CAPM parameters as they *would be* in the theoretical worlds that form the basis of the Lally test. It is already difficult to estimate the expected return on the market in the real world. Estimating (with any degree of precision) what it might be in two different theoretical worlds is impossible. By way analogy, it is difficult to predict the winner of Melbourne Cup, but we can make reasonable forecasts based on the form of horses over previous races – for which some data is available. But it is impossible to make an estimate with any precision about which horse might win if the race were held on ice, or if the horses had to run backwards – because there is no data about these theoretical worlds to inform any estimate.

175. Lally (2013 AER) undertakes the estimation task by starting with estimates of WACC parameters from the real world and making adjustments to determine what those parameter estimates would be if markets were perfectly segmented and what they would be if markets were perfectly integrated. In our view, this is an impossible task. Estimating beta and MRP in the real world (reflecting the actual impact that foreign investors have on asset prices) is extremely difficult and a matter of great

[104] QCA Market Parameters Decision, p. 74.

controversy, thousands of pages of expert submissions, and almost continual litigation. The task of estimating what beta and MRP *would be* if there no foreign investment was allowed, and what they would be if markets were perfectly integrated is impossible.

176. Even if was possible to derive point estimates of beta and MRP as they would be in these theoretical scenarios, the reasonable ranges (or confidence intervals) around the point estimates would be very wide indeed – reflecting not just statistical estimation error, but also the extent to which the theoretical adjustments to convert estimates from their real world values to their theoretical world values were not perfectly accurate. Indeed properly constituted ranges would likely be so wide as to be of no use whatsoever. For example, the ERA's own estimate of the reasonable range for MRP is currently 250 basis points wide and for beta the width is 200 basis points.

177. However, Lally (2013 AER) produces point estimates of the required return on equity to three decimal places and uses these point estimates to rule out all estimates of theta other than his own theoretically reasoned value of 1. He does not consider the possibility of *any* estimation error or of *any* model error in converting real-world estimates to their theoretical world values.[105]

Estimates are based on an estimation approach that has been rejected by the ERA

178. The technique that Lally (2013 AER) uses to estimate the MRP in his theoretical worlds is materially different to the techniques that the ERA uses to estimate MRP in the real world. Lally proposes to estimate MRP as a fixed multiple of the historical variance of the market return in each of his theoretical worlds. However, the ERA has rejected that approach for estimating MRP in the real world – the ERA places zero weight on this method for estimating the MRP.

179. If the ERA intends to persist with its reliance on the Lally conceptual goal posts test, it should explain why it considers that the multiple-of-variance approach is a suitable method for estimating the MRP in Lally's theoretical worlds when that same method is unsuitable for use in the real world.

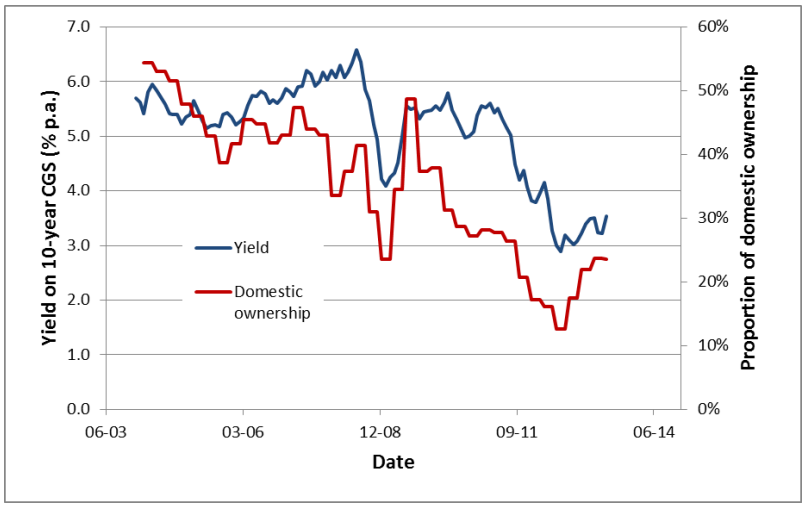
Treatment of risk-free rates

180. The most important aspect of the test set out in Lally (2013 AER) is the assumption that the risk-free rate would not change in a segmented market. In our view, this assumption is untenable. The Reserve Bank reports that more than 80% of all Australian government bonds are owned by foreign investors. If that demand were removed from the market, the price would surely be lower and the yield would surely be higher. Yet the Lally (2013 AER) test is based on the risk-free rate being the same in a perfect segmentation world as in a perfect integration world.

181. Given that at any point in time there is a fixed supply of Commonwealth government bonds, basic supply/demand dynamics indicates that the material reduction in demand caused by the withdrawal of all foreign ownership would result in a reduction in the price of government bonds and a consequential increase in yields. The relationship between foreign ownership and government bond yields is illustrated in Figure 4 and Figure 5 below.

[105] Lally (2012, 2013) does consider different values for certain parameters that are used to convert from the real world to the theoretical worlds, but he assumes that his approach for converting between worlds is perfectly accurate.

Figure 4
Australian government bond yields and the proportion of domestic ownership

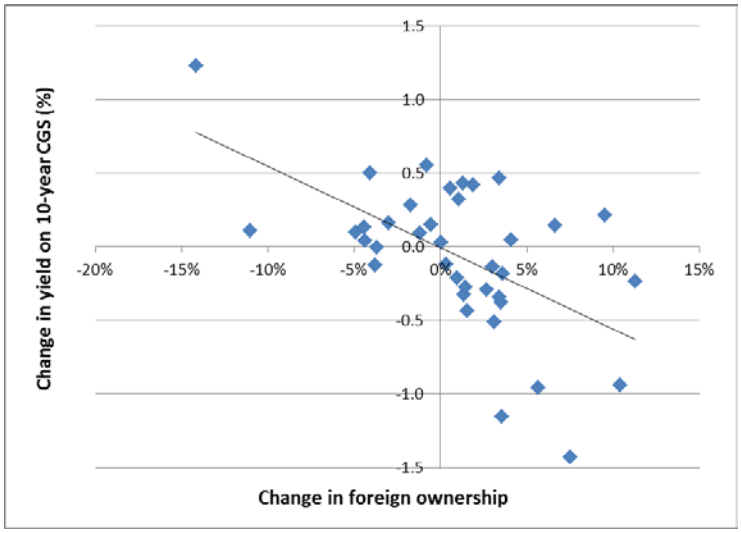


Source: RBA Statistical Tables E3 and F2.

182. Figure 4 shows that, over the last ten years, movements in government bond yields have closely mirrored movements in the proportion of domestic ownership. When the proportion of foreign investment increases (causing a reduction in domestic ownership) yields tend to fall. Conversely, when foreign investment falls, yields tend to rise. This is consistent with increases in foreign investment bidding up the price of government bonds and lowering yields.

183. Figure 5 shows the relationship between changes in government bond yields and changes in the proportion of foreign ownership over the last ten years. Increases in foreign investment are associated with decreases in government bond yields and the relationship is statistically and economically significant.[106]

Figure 5
RBA estimates of the ownership of Australian equity



Source: RBA Statistical Tables E3 and F2

[106] *T*-statistic is -3.97, *p*-value is less than 1%, *R*-squared value is 33%.

184. Of course CGS yields vary for many reasons in addition to changes in the demand from foreign investors and correlation does not imply causation. However, the data from the last ten years is consistent with the basic economic principle that (other things being equal) a reduction in demand leads to a reduction in price. By contrast, the notion that the government bond yield would be unchanged if all foreign investment were withdrawn is inconsistent with basic economic principles and with the empirical data.

185. Lally (2013 AER) explains that his "test" is based on the assumption that government bond yields would remain the same even if all foreign investment were withdrawn on the basis that:

> CAPMs treat the risk free rate as exogenously determined, and therefore the same empirically observed rate applies to both the Officer and Solnik models.[107]

186. The risk-free rate is determined by the demand/supply dynamics of government bonds. The CAPM then takes the resulting risk-free rate as an exogenously determined input. However, this does not imply that the *same* risk-free rate should be used independent of the demand for government bonds. In a setting where there is high demand, the exogenously determined risk-free rate would be low and a low figure would be employed in the CAPM. In a setting where there is low demand, the exogenously determined risk-free rate would be high and a high figure would be employed in the CAPM. Logically, it does not follow that because the risk-free rate is exogenously determined the same value should be used in materially different settings.

187. By analogy, suppose we have a model for estimating the winning time in a marathon race. The weather conditions would be an obvious exogenous input variable – analogous to the risk-free rate in the CAPM.[108] But this does not imply that we should assume the same weather conditions for the Boston and Brisbane marathons. That is, "exogenous" means "determined by factors outside the model" – it does not mean "equal in all circumstances."

188. Moreover, if the perfect segmentation risk-free rate is increased by just 1% above the perfect integration risk-free rate, our proposed theta estimate of 0.35 would *pass* the Lally test. That is, even setting aside all of the problems with such a test, our proposed estimate of 0.35cannot be ruled out unless one assumes that government bond yields would be identical whether or not foreign investors are admitted.

189. In our view it would be an error to rely on a "test" that is based on such an implausible assumption.

Revised treatment of risk-free rates

190. In his recent report for the QCA, Lally (2014 QCA) simply defines the obvious difference in government bond yields in the two cases as being an irrelevant consideration that has no impact at all on the conclusions. The basis for this treatment is that the:

> CAPM only assumes that the market for *risky* assets is completely segmented. No assumption is made in this model about the market for the risk-free asset.[109]

191. That is, the new version of the Lally test is based on a scenario in which the market for government bonds is completely integrated while at the same time the market for all other assets is completely segmented. That is, all investors throughout the world own government bonds in all other countries

[107] Lally (2012) Footnote 18 and Lally (2013) Footnote 23.
[108] Like the risk-free rate, weather conditions are relevant and they are exogenous in the sense that they are independently determined. For example, the number or quality of runners in the race does not affect what sort of weather might eventuate.
[109] Lally (2014), p. 29.

in the world, whereas they are only allowed to own risky assets in their own country. This assumption is even more implausible than the one it is supposed to replace.

Conclusion

192. Such an inherently contradictory framework should not be used to determine the bounds for reasonable estimates of the utilisation rate. Indeed such a framework is not fit for any purpose at all. In our view, it would be an error to place any weight whatsoever on any analysis that is based on such a nonsensical foundation.

8. Summary of advice from Lally

Preferred estimate of one

193. The primary recommendation from Lally (2013 AER) is that theta (or what he calls "the utilisation rate") should be set to one on the basis of the assumption that all Australian shares are owned by resident investors who can costlessly redeem all credits that are distributed to them. Lally states that his "preferred estimate" [110]:

> …arises from the definition of the parameter as a weighted average across all investors; coupled with ignoring foreigners (consistent with the Officer CAPM), this yields an estimate of 1 (the utilisation rate of local investors). [111]

194. In its ATCO Gas Draft Decision, the ERA does not adopt this primary recommendation from Lally, apparently because it is based on an implausible assumption that is clearly contradicted by the observable data – it "ignores foreigners" when in fact there is significant foreign investment in Australian equity.

Ranking of other estimates

195. Lally (2013 AER) sets out three criteria for ranking the possible estimates of theta (what he calls "U"):

> that the estimate be consistent with the definition of *U*, as a value-weighted average over the utilisation rates of all investors who are relevant to the Officer CAPM, that the parameter estimate is likely to give rise to an estimated cost of equity from the Officer model that lies within the bounds arising from either complete segmentation or complete integration of equity markets, and that the estimate is reasonably precise. [112]

196. The first of Lally's criteria is that theta (or U) must be a value-weighted average over the utilisation rates of domestic investors, because we should "ignore foreigners." That is, the first criteria is that theta (or U) must be 1. Indeed, Lally (2013 AER) notes that the only estimation approach that satisfies this criteria is his theoretically assumed estimate of 1.

197. The second criterion is that the estimate must pass the conceptual goal posts test, which requires an estimate of one or close to one. Again, Lally (2013 AER) notes that the only estimation approach that satisfies this criterion is his theoretically assumed estimate of 1.

198. The third criterion is precision – the extent to which whatever is being estimated can at least be estimated precisely.

199. The ERA proposes to estimate theta by placing primary reliance on the equity ownership and tax statistic redemption rate approaches. Lally (2013 AER) states that both of these approaches violate his first two criteria, and should be rejected in favour of his theoretical value of 1.

[110] Lally (2013 AER), p. 5.
[111] Lally (2013 AER), p. 3.
[112] Lally (2013 AER), p. 3.

200. He goes on to state that the only redeeming feature of the equity ownership approach is that, even though it is an estimate of the wrong thing, it is at least a statistically precise one.[113] However even that is disputed in Section 9 below.

201. Lally (2013 AER) concludes that the redemption rate approach produces an imprecise estimate, and therefore violates every one of his criteria.

Conclusion

202. The equity ownership and tax statistic redemption rate approaches on which the ERA now seeks to rely are not endorsed by Lally (2013 AER). Lally does not recommend either of these approaches. Indeed these approaches violate every one of Lally's evaluation criteria, save for the fact that the equity ownership approach provides a reasonably precise estimate – albeit of the wrong thing. In our view it would be an error to conclude that Lally (2013 AER) provides support for the approach adopted by the AER.

[113] Lally (2013 AER), pp. 3-4.

9. Current equity ownership estimate

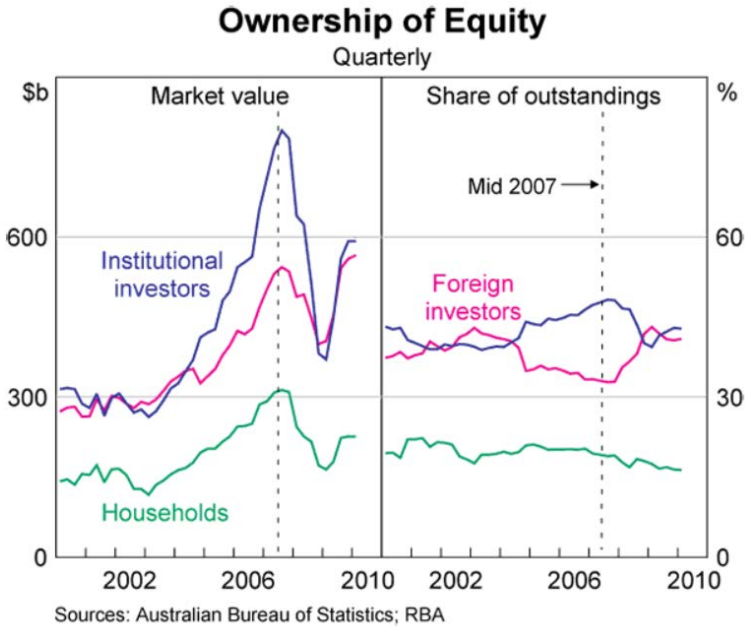
Source of the ERA estimate

203. In its ATCO Gas Draft Decision, the ERA adopts an equity ownership estimate of 0.7.[114] This figure was first reported in the AER's Draft Guideline in August 2013, which in turn refers to a 2007 estimate from the Australian Bureau of Statistics (**ABS**).[115]

Updated estimates

204. A more recent RBA paper shows that the 2007 ABS estimate of the proportion of foreign equity ownership is materially lower than previous and subsequent estimates. That is, the 2007 estimate happens to produce the lowest estimate of foreign equity ownership (and consequently the highest estimate of theta) of any point in the last 10 years – as illustrated in Figure 6 below.

Figure 6
RBA estimates of the ownership of Australian equity



Source: Black and Kirkwood (2010), RBA.

205. If the ABS aggregate equity ownership estimate is to be used, the 2007 estimate should not be preferred to the updated estimates – which indicate a materially higher proportion of foreign ownership.

The reliability of the 0.7 estimate

206. Moreover, there are a number of reasons why the aggregate ABS equity ownership estimate is inappropriate and should not be used at all. First, in additional to privately-owned equity the ABS aggregate estimate includes equity in government-owned trading enterprises, general government and

[114] ERA ATCO Gas Draft Decision, p. 214, Paragraph 963.
[115] AER Explanatory Statement, Footnote 367, p. 130 cites the source of the 70% figure as being Australian Bureau of Statistics, *Feature article: Foreign ownership of equity*, Available at: http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/5302.0Feature%20Article10Sep%202007?opendocument&tabname=Summary&prodno=5302.0&issue=Sep%202007&num=&view.

the Reserve Bank. If the purpose is to determine what proportion of imputation credits (which are distributed with the dividends paid by non-government corporations) are likely to be redeemed by the recipients, the data should be restricted to privately-owned equity. The inclusion of equity in GOCs will cause a systematic downward bias in the estimate of foreign ownership. The ASX has recognised that issue and has presented foreign ownership estimates for privately-owned listed equity. Lally (2012) refers to the ASX (2011) estimate of 46% foreign ownership and concludes that "the proportion of Australian equities held by Australians" is 54%.[116] ASX (2013) provide the most recent estimate of the proportion of privately-owned equity that is owned by foreign investors, concluding that the best estimate remains at 46%.[117]

207. The ASX estimate is based on data for privately-owned equity. However, this estimate apparently includes listed and unlisted equity.[118] The ABS warns that its estimates in relation to unlisted equity are unreliable. In particular, the ABS warns that:

> The estimated market value of equity issued by some sectors is considered to be of poor quality. In particular, estimates of the market value of the amount issued by private corporate trading enterprises are considered poor because they are largely built up from counterpart and other information obtained from ABS Surveys of Foreign Investment and Balance Sheet Information. This sector covers equity issued by both listed and unlisted private corporate trading enterprises, of which there are over half a million.
>
> In terms of the analysis undertaken here, errors in the estimated market value of equity on issue will impact on the accuracy of estimates of the proportion of that equity owned by non-residents.
>
> A further concern relates to valuation. While both financial accounts and international investment statistics (from which the rest of the world data are sourced) are on a market value basis in principle, collection and estimation methods differ between the two sets of statistics…Because of the differences in the methodologies used, it is possible that there could be more variability in the market value estimates of equity held by the rest of the world than in the estimated market value of the equity on issue, thus causing some variation in the foreign ownership series derived from these data.[119]

Conclusions and recommendations

208. In summary:

a) The 30% estimate of foreign ownership that is adopted in the ATCO Gas Draft Decision is unreliable and should not be relied upon because it is:

   i) Based on data from 2007 that is data and has been superseded;

   ii) Includes equity in GOCs, general government and the Reserve Bank; and

   iii) Is subject to a warning from the ABS about data problems and inaccuracies.

[116] Lally (2012), p. 6.
[117] ASX (2013), p. 2. The ASX figures are based on ABS series 5232.0, Table 32 for the September quarter 2012.
[118] See the data description for ABS series 5232.0 at http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/5232.0Explanatory%20Notes1Jun%202013?OpenDocument.
[119] See the ABS feature article that first explains the foreign ownership calculations at http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/5306.0Feature%20Article150Jun%201992?opendocument&tabname=Summary&prodno=5306.0&issue=Jun%201992&num=&view=.

10. Dividend drop-off analysis

The basis for dividend drop-off analysis

209. In its ATCO Gas Draft Decision, the ERA sets out the following equation, based on Lally (2013 AER): [120]

$$S_0 = \frac{Y_1 - TAX_1 + IC_1U + S_1}{1 + E\left[\hat{R}\right]}.$$

210. The ERA states that this equation shows that the firm's stock price will be equal to the present value of the after-tax distribution received during the year, the present value of the imputation credit received during the year, and the present value of the stock price at the end of the year:

> …the sum of the expected [pre-tax] cash flows to equity holders (Y_1), less the expected company taxation over the year (Tax_1), plus **any value derived** from the distribution of franking credits. The latter term is defined as $UxIC_1$, where IC_1 is the distributed imputation credits. [121]

211. In this equation, shareholders receive a distribution equal to the "cash flows to equity" less corporate tax. Defining this to be Div_1, we have:

$$S_0 = \frac{Div_1 + IC_1U + S_1}{1 + E\left[\hat{R}\right]}$$

212. This equation can be rearranged with some basic algebra to yield:

$$S_0\left(1 + E\left[\hat{R}\right]\right) - S_1 = Div_1 + U \times IC_1.$$

213. This is the very equation that is implemented in a dividend drop-off analysis. The left hand side of the equation is the regressor – the change in the stock price over the ex-dividend day (with the standard market adjustment). The right hand side sets out the two regressands – the cash dividend and the imputation credit. That is, the equation that is estimated via drop-off analysis is derived precisely from the equation the ERA purports to adopt.

ATCO Gas Draft Decision

214. In its ATCO Gas Draft Decision, the ERA states that it will apply *limited* weight to approaches that estimate the *value* of distributed credits, preferring approaches that estimate the proportion of credits that are redeemed:

> the Authority has determined to place **limited weight** on the dividend drop off estimates, and on the range of applied market value estimates more generally. The Authority has instead considered other approaches to estimating θ. [122]

[120] ERA ATCO Gas Draft Decision, Equation (6), p. 431, Paragraph 34.
[121] ERA ATCO Gas Draft Decision, pp. 430-431, Paragraph 33, emphasis added.
[122] ERA ATCO Gas Draft Decision, p. 213, Paragraphs 959-960, emphasis added.

215. In its ATCO Gas Draft Decision, the ERA also states that it will apply *no* weight to approaches that estimate the *value* of distributed credits, and that it will have no regard to such approaches:

> Given that this market value is irrelevant to the required utilisation rate, the Authority has **disregarded them** for informing the required utilisation rate. The Authority notes this is a significant departure from the view held in the Rate of Return Guidelines, with dividend drop off studies being the sole evidence to inform the required utilisation rate.[123]

216. We are unable to reconcile these two positions – it is not clear to us how "limited weight" can be applied to evidence that has been "disregarded."

217. In our view, theta should be interpreted as the value of distributed imputation credits and should be estimated accordingly. For the reasons set out throughout this report, our view is that it is only *value* estimates of theta that are consistent with the regulatory framework, the PTRM, and the NGR requirement that "γ is the value of imputation credits." In our view, the only question that remains is the relative weights that should be applied to different market value studies.

The relative merits of the SFG and ERA studies

External verification

218. In its Rate of Return Guideline, the ERA considered two dividend drop-off studies when estimating theta as the value of distributed credits – the SFG study and the study by Vo, Gellard, and Mero (2013) (the ERA study). In our March 2013 submission to the ERA, we compared the relative merits of these two studies. We noted that the Australian Competition Tribunal was effusive in its praise for the SFG study stating that:

> The Tribunal is satisfied that the procedures used to select and filter the data were appropriate and do not give rise to any significant bias in the results obtained from the analysis. Nor was that suggested by the AER.[124]
>
> In respect of the model specification and estimation procedure, the Tribunal is persuaded by SFG's reasoning in reaching its conclusions. Indeed, the careful scrutiny to which SFG's report has been subjected, and SFG's comprehensive response, gives the Tribunal confidence in those conclusions.[125]

219. The Tribunal went on to conclude that:

> The Tribunal is satisfied that SFG's March 2011 report is the best dividend drop-off study currently available for the purpose of estimating gamma in terms of the Rules.[126]

and

> No other dividend drop-off study estimate has any claims to be given weight vis-à-vis the SFG report value.[127]

[123] ERA ATCO Gas Draft Decision, p. 447, Paragraph 105, emphasis added.
[124] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraphs 18-19.
[125] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 22.
[126] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 29.
[127] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 38.

By contrast, we are unaware of any external verification of the ERA study.

The differences between the SFG and ERA results

220. In our March 2014 submission to the ERA[128] we noted that the SFG study performs a standard market adjustment of all returns. The standard approach in dividend drop-off studies is to assume that, but for the dividend, the stock price would have followed the movement in the broad market over the ex-dividend day. That is, if the broad market index increases by 2% over the ex-dividend day, it is assumed that, but for the dividend, the particular stock would also have increased by 2%. We are unaware of any recent paper in a peer-reviewed journal that does not make such an adjustment.

221. The ERA study also reports results where this standard approach has been applied, confirming the results from the SFG studies. In particular, the SFG studies conclude that an appropriate value for theta is 0.35. The ERA study reports that, when the standard market correction is applied, the average estimate of theta is 0.34. The estimate using robust regression and Model Specification 4 (which the ERA considers to be the most reliable estimate) is 0.33.[129]

222. The ERA study goes on to estimate theta *without* the standard market adjustment. These calculations are based on the implausible notion that on days when the return on all other stocks averages 2%, the expected return on the stock in question is 0%. If someone asks you to think of a particular stock, then they tell you that on a particular day the average return on stocks was +2%, what is your best estimate of the return on your stock – the +2% that applied to the average stock, or 0%?

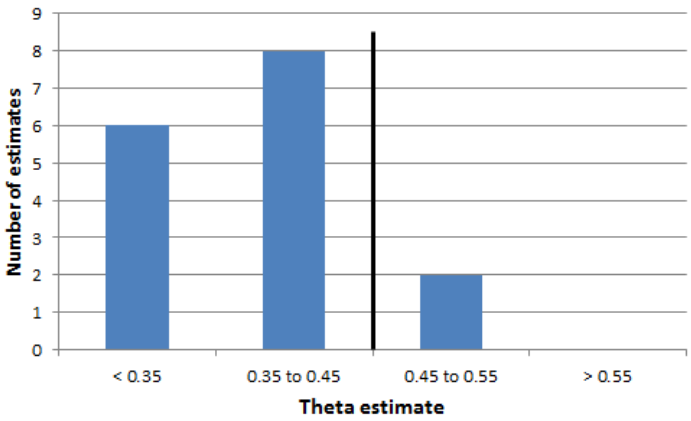
223. The ERA provides two reasons for persisting with its unique approach of assuming that a given stock would have an expected return of 0% on days when all other stocks averaged a return of +2%. The first is that it is easier. However, applying the standard market adjustment is not difficult and the ERA itself was able to include results estimated on that basis. The second reason is that it is acceptable to mis-measure variables, because regression analysis includes an error term.[130] If this claim were true, it would be unnecessary to take any care when estimating variables because any mis-measurement would be "already in the error term."[131] This would seem to be at odds with the great care that is taken in statistics and econometrics to measure variables as accurately as possible, and with the uniformly accepted view that proper estimation of variables improves the reliability of the resulting estimates.

224. Even when no market correction is applied, the ERA reports an average theta estimate of 0.40 and a robust regression estimate from its preferred Model Specification 4 of 0.32.

225. In fact, there is very little evidence to support the ERA's mid-point estimate of 0.45 at all. The ERA's estimates of theta are summarised in Figure 7 below. This figure summarises the ERA's point estimates for all different model specifications and estimation methodologies (with and without the standard ex-day market correction) except for the OLS estimates, which the ERA deems to be inappropriate.[132] The figure shows that the vast majority of estimates fall below the ERA's mid-point estimate (marked as a line). Moreover, whereas a material number of estimates fall below the bottom of the range (less than 0.35) there are no estimates above the top end of the range (0.55).

[128] SFG (2014 Gamma ERA).
[129] Vo, Gellard and Mero (2013), Table 5.
[130] ERA ATCO Gas Draft Decision, p. 211, Paragraph 951.
[131] ERA ATCO Gas Draft Decision, p. 211, Paragraph 951.
[132] Vo, Gellard and Mero (2013), p. 9.

Figure 7. Distribution of ERA theta estimates



Source: Vo et al (2013), Table 5.

226. Another issue raised in the ATCO Gas Draft Decision is what the ERA refers to as a "large divergence in empirical estimates of the utilisation rate using dividend drop off studies."[133] However, this is an inaccurate characterisation of the evidence. The SFG study uses all available data and a range of accepted methods, all of which support the proposed estimate of 0.35 with reasonable precision. We have also submitted an expanded set of stability analyses to the ERA which demonstrate that our results are strongly robust to the inclusion or removal of influential observations. However, the ERA persists with its claims that dividend drop-off estimates are sensitive to "the most influential observations."[134] The data and estimation methods used by SFG produce results that are *not* sensitive to influential observations. The only evidence of such sensitivity comes from the ERA study when raw returns are used, contrary to the accepted practice in the literature. Logically, if the ERA's analysis is unable to produce reliable results it should be given little weight – it should not be used to cast dispersions on *all* drop-off analyses

Conclusions in relation to dividend drop-off evidence

227. In our view, there are a number of reasons to prefer the SFG studies to the ERA study:

a) The SFG approach has been subjected to intense scrutiny. All data and computer code was supplied to the AER. All issues that the AER has identified have been considered by the Tribunal. The Tribunal has endorsed and adopted the results. By contrast, the ERA study has not been subjected to any scrutiny;

b) The SFG studies employ the standard, Tribunal-approved and AER-approved approach of correcting prices for market movements over the ex-dividend day; and

c) 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.

228. In any event, there is little evidence to support the ERA's mid-point estimate of 0.45 from within its range of 0.35 to 0.55:

a) The ERA's own estimates are overwhelmingly below 0.45 (see Figure 7 above), and a significant proportion of those estimates are below 0.35;

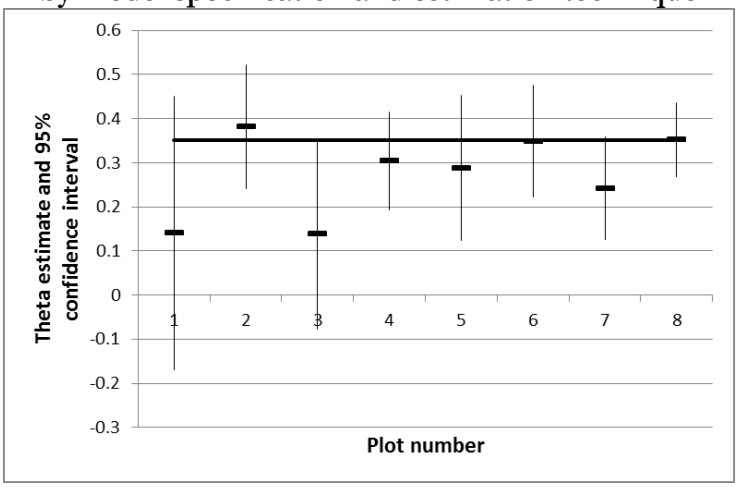
[133] ERA ATCO Gas Draft Decision, p. 443, Paragraph 92.
[134] ERA ATCO Gas Draft Decision, p. 443, Paragraph 92.

b) The ERA study reports a theta estimate of 0.34 when the standard ex-day market correction is applied;

c) The ERA estimate increases only to 0.4 when the standard ex-day market correction is removed; and

d) The SFG (2013) estimates indicate that, if anything, the 0.35 estimate is towards the upper end of the reasonable range. See for example Figure 8 below, which is reproduced from SFG (2013), Figure 5.

Figure 8
Summary of point estimates and confidence intervals for theta by model specification and estimation technique



For each estimate, the narrow line represents the 95% confidence interval for theta and the solid black marker represents the point estimate. The solid black horizontal line represents the recommended point estimate of 0.35.
Plot 1: Model specification 1, OLS estimation; Plot 2: Model specification 2, OLS estimation;
Plot 3: Model specification 3, OLS estimation; Plot 4: Model specification 4, OLS estimation;
Plot 5: Model specification 1, RR estimation; Plot 6: Model specification 2, RR estimation;
Plot 7: Model specification 3, RR estimation; Plot 8: Model specification 4, RR estimation.

229. In our view, there is no reasonable basis for adopting a dividend drop-off estimate of theta above 0.35.

Econometric issues

230. 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. However, three specific issues are raised that the ERA says it has "not previously considered." [135]

The impact of foreign investors

231. In its ATCO Gas Draft Decision, the ERA states that the regulatory framework that it intends to adopt:

[135] ATCO Gas Draft Decision, p. 442, Paragraph 88.

> assumes a segmented domestic capital market [136]

whereas dividend drop-off analyses:

> reflect the empirical reality of foreign investors. [137]

in which case:

> any estimate of the utilisation rate using the dividend drop off method is incompatible with the Officer CAPM framework and by extension the NGR, [138]

notwithstanding the fact that Officer himself has been a pioneer of the dividend drop-off method.

232. That is, dividend drop-off analysis relies on market prices that have been contaminated by foreign investors, and therefore cannot be used.

233. But of course *all* WACC parameters are estimated with reference to market data that has been contaminated by foreign investors. If market data cannot be used to estimate theta, consistency requires that it cannot be used to estimate other WACC parameters. Consequently, no WACC parameter could be estimated on the basis of a market value interpretation – *all* would have to be estimated on the basis of some conceptual re-definition that does not require the use of any financial market data.

234. By contrast, our view is that all WACC parameters should be estimated with reference to financial market data, consistent with standard commercial practice. The observed prices of financial securities provide direct evidence about the prevailing conditions in the market. What the prevailing conditions might be in a different market where there was no foreign investment is simply irrelevant.

Trading around the ex-dividend date

235. The ERA questions whether the trading activity around the ex-dividend date is representative of long-term providers of equity capital.[139] This issue was raised in the AER's Draft Guideline in August 2013 and responded to in detail by the ENA submission in October 2013, so it is surprising that the ERA has not previously had regard to it.

236. This point appears to be based on the issue raised in the AER's Guideline materials which note that trading volumes tend to increase around ex-dividend dates and that dividend drop-off studies will estimate the value of imputation credits to those investors who are active in the market, in which case:

> By largely reflecting the abnormal trading conditions on the two relevant trading days, dividend drop off studies may not identify the market value for the representative investor. [140]

[136] ATCO Gas Draft Decision, p. 442, Paragraph 90.
[137] ATCO Gas Draft Decision, p. 442, Paragraph 90.
[138] ATCO Gas Draft Decision, pp. 442-443, Paragraph 90.
[139] ATCO Gas Draft Decision, pp. 442-443, Paragraphs 89 and 91.
[140] AER Rate of Return Guideline, Explanatory Statement, Appendix H, p. 170.

237. The ENA submission on the AER's Draft Guideline contained a detailed discussion on this point,[141] none of which has been addressed or acknowledged in the Final Guideline materials. In that discussion, the ENA 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.[142]

238. 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.

239. A detailed response on this issue is set out in Appendix 3 to this report.

The interpretation of theta

Background and context

240. In its ATCO Gas Draft Decision, the ERA endorses the recommendation by Lally (2013 AER) that the dividend drop-off estimate of theta should be divided by the dividend drop-off estimate of the value of cash dividends to provide a final estimate of the utilisation rate, *U*.[143]

241. The ERA indicates that it has not previously considered the adjustment to dividend drop-off estimates of theta that Lally (2013 AER) recommends.[144] This is surprising, given that Lally has been consistently recommending that same adjustment to regulators for over ten years.[145]

242. For the reasons set out below, our view is that the adjustment is inappropriate, which is consistent with the fact that no regulator has ever adopted it.

Quantification of the effect

243. The effect of applying the proposed scaling adjustment is summarised as follows:

a) The ERA notes that the approach would result in the SFG theta estimate being scaled up from 0.35 to 0.4;[146]

b) The ERA notes that the approach would result in the mid-point of its own theta range being scaled up from 0.45 to 0.51;[147] and

c) Where the ERA has used standard market-adjusted returns, its overall estimate of theta scales from 0.34 to 0.39, and its range scales from 0.21-0.44 to 0.22-0.53.

244. In summary, even if this adjustment is applied, the effect is to increase the best available estimate of theta from 0.35 to 0.40.

---

[141] ENA Submission, 11 October 2013, Section 7.9, pp. 119-123.
[142] The same point is made by McKenzie and Partington (2011), pp. 9-10.
[143] ATCO Gas Draft Decision, pp. 443-445, Paragraphs 94-98.
[144] ERA ATCO Gas Draft Decision, p. 445, Paragraph 98.
[145] See, for example, Lally (2004), pp. 33-34.
[146] ATCO Gas Draft Decision, p. 445, Paragraph 98. We note that the ERA proposes a revised range of 0.40-0.63 on p. 445 and a range of 0.38-0.69 for exactly the same thing on p. 212.
[147] ATCO Gas Draft Decision, p. 445, Paragraph 98. We note that the ERA proposes a revised range of 0.40-0.63 on p. 445 and a range of 0.38-0.69 for exactly the same thing on p. 212.

The proposed adjustment is not required

245. 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.

The proposed adjustment produces perverse outcomes

246. Moreover, the proposed scaling has perverse outcomes. To see this, first recall that the proposed adjustment is to divide theta by the estimated value of cash dividends, which the ERA defines to be δ. Suppose the regulator applies the scaling approach, but that the dividend drop-off analysis suggests that $\delta = 1$, so that the scaling has no effect. The regulator then determines the allowed revenue for the firm of say $X.

247. Now consider a case that is identical in all respects to the one above, except that the drop-off analysis produces an estimate of $\delta < 1$. In this case, everything is identical to the previous case, except that shareholders do not value dividends as highly. If anything, this should require an increase in the allowed revenues – because shareholders do not value dividends as highly, they would need to receive more of them in order to be left equally well off.[148] However, under the proposed approach the drop-off estimate of theta would be increased (by dividing by $\delta < 1$) which would in turn result in *lower* allowed revenues.

248. Under the proposed approach, as the dividends paid by the firm become less valuable to investors, the allowed revenues are further reduced – which is the exact opposite of what should occur.

The proposed adjustment would need to apply throughout the regulatory process

249. In using the Sharpe-Lintner CAPM to estimate the required return on equity, the ERA imposes an estimate of $\delta = 1$ – it estimates the required return on the basis that shareholders value dividends at their full face value. There are more complex versions of the CAPM that allow for $\delta < 1$, but the ERA does not use them. For example, Lally and van Zijl (2003) develop a version of the CAPM that allows for the case where $\delta < 1$. These more complex models simplify to the Sharpe-Lintner CAPM for the case where $\delta = 1$.

250. It would be inconsistent and wrong for a regulator to adjust the estimate of theta on the basis that $\delta < 1$, but then to estimate the required return on equity in the same WACC estimation process on the basis that $\delta = 1$. That is, if $\delta < 1$ when estimating theta, $\delta < 1$ throughout the WACC estimation process.

[148] See for example, Lally and van Zijl (2003).

Summary and recommendations

251. In our view, the proposed scaling adjustment should not be applied. The drop-off estimate of theta already provides a direct estimate of the value of distributed credits, and the adjustment would have the perverse effect of *reducing* the allowed revenues as dividends become less valuable.

252. If, however, a particular value of $\delta < 1$ is to be used to adjust the estimate of theta, consistency requires that the same value of $\delta < 1$ would have to be used throughout the WACC estimation process. It would be inconsistent and wrong to estimate theta on the basis that $\delta < 1$ and r_e on the basis that $\delta = 1$ in the same WACC estimation process.

Conclusion

253. Our view is that theta should be interpreted as the value of distributed credits and that dividend drop-off analyses are designed to provide a direct estimate of that value. In our view, the SFG estimate of 0.35 should be preferred to any other estimate.

11. Declaration

254. I confirm that I have made all the inquiries that I believe are desirable and appropriate and no matters of significance that I regard as relevant have, to my knowledge, been withheld from the Court.

_____

Professor Stephen Gray

References

Australian Bureau of Statistics, 2007, *Feature article: Foreign ownership of equity*, www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/5302.0Feature%20Article10Sep%202007?opendocument&tabname=Summary&prodno=5302.0&issue=Sep%202007&num=&view.

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

Australian Competition Tribunal, 2010, Application by Energex Limited (Distribution Ratio (Gamma)) (No 3) [2010] ACompT 9, 24 December.

Australian Competition Tribunal, 2010, Application by Energex Limited (No 2) [2010] ACompT 7, 13 October.

Australian Energy Regulator, 2013, *Rate of return guideline*, December.

Australian Energy Regulator, 2013, *Draft rate of return guideline*, August.

Australian Securities Exchange, 2011, "Australian cash equity market," www.asx.com.au/documents/resources/australian_cash_equity_market.pdf.

Black, S. and J. Kirkwood, 2010, "Market arbitrage of cash dividends and franking credits," *Reserve Bank of Australia Bulletin,* September, http://www.rba.gov.au/publications/bulletin/2010/sep/4.html.

Economic Regulation Authority, 2013, *Rate of Return Guidelines for Gas Transmission and Distribution Networks – Final Guidelines*, December.

Economic Regulation Authority, 2013, *Draft Rate of Return Guidelines for Gas Transmission and Distribution Networks*, August.

Feuerherdt, S. Gray and Hall, 2010, 'The value of imputation tax credits on Australian hybrid securities', *International review of finance,* Vol. 10, No. 3, pp. 365-401.

Frank, M. and R. Jagannathan, 1998, "Why do stock prices drop by less than the value of the dividend? Evidence from a country without taxes," *Journal of Financial Economics*, Vol. 47, No. 2, February 1998, pp. 161–188.

Handley, J., 2008, "A note on the value of imputation credits," report for the AER, December, www.aer.gov.au/content/ index.phtml/itemId/722190.

Handley, J.C., and K. Maheswaran, 2008. "A measure of the efficacy of the Australian imputation tax system," *The Economic Record,* 84 (264), 82 – 94.

Hathaway, N., 2013, *Imputation credit redemption ATO data 1988-2011: Where have all the credits gone?* Capital Research, September.

Hathaway, N. and R. R. Officer, 1999, *The value of imputation tax credits*, Capital Research.

Hathaway, N. and R. R. Officer, 2004, *The value of imputation tax credits*, Capital Research.

IPART, 2013, Review of WACC Methodology: Final Report, December.

KPMG, 2005, "The Victorian Electricity Distribution Businesses Cost of Capital - Market practice in relation to imputation credits Victorian Electricity Distribution Price Review 2006 – 10."

KPMG, 2013, Valuation Practices Survey 2013, www.kpmg.com.au.

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

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

Lally, M., 2013 AER, *The estimation of gamma*, Report for the AER, 23 November.

Lally, M., 2012, *The estimated utilisation rate for imputation credits*, Report for the QCA, 12 December.

Lally, M., 2004, "The Cost of Capital for Regulated Entities: Report prepared for the Queensland Competition Authority," School of Economics and Finance (Victoria University of Wellington).

Lally, M. and T. van Zijl, 2003, "Capital Gains Tax and the Capital Asset Pricing Model," *Accounting and Finance*, 43, pp. 187-210.

Lonergan, W., 2001. "The Disappearing Returns: Why Imputation Has Not Reduced the Cost of Capital," *JASSA*, Autumn 1, 1–17.

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

McKenzie, M. and G. Partington, 2011, *Response to questions related to the estimation and theory of theta*, Report for the AER, 7 March.

Monkhouse, P., 1993, "The cost of equity under the Australian imputation system," *Accounting and Finance*, 33, 2, 1-18.

National Electricity Rules, www.aemc.gov.au/Electricity/National-Electricity-Rules/Current-Rules.html.

National Gas Rules, www.aemc.gov.au/Gas/National-Gas-Rules/Current-Rules.html.

NERA, 2013, "Imputation credits and equity prices and returns," Report prepared for the Energy Networks Association.

Officer, R.R., 1994, "The cost of capital of a company under an imputation system," *Accounting and Finance*, 34, 1, 1-17.

QCA, 2014, Market Parameters Decision, *Cost of capital: market parameters*, August.

QCA, 2014, UT4 Draft decision, Aurizon Network 2014 Draft Access Undertaking – Maximum Allowable Revenue, September.

Queensland Government Treasury, 2006, "Government owned corporations – Cost of capital guidelines," www.ogoc.qld.gov.au.

SFG Consulting, 2014 ERA Gamma, *Estimating gamma*, March.

SFG Consulting, 2014 Gamma QCA, *An appropriate regulatory estimate of gamma*, January.

SFG Consulting, 2013, *Updated dividend drop-off estimate of theta*, Report prepared for the Energy Networks Association, 7 June.

SFG Consulting, 2011, *Dividend drop-off estimate of theta*, Report prepared for the Australian Competition Tribunal.

Truong, G., G. Partington, and M. Peat, 2008, "Cost of Capital Estimation and Capital Budgeting Practice in Australia," *Australian Journal of Management,* 33, 95 – 121.

Vo, D., B. Gellard and S. Mero, 2013, *Estimating the market value of franking credits: Empirical evidence from Australia*, Working paper.

Appendix 1: The role of gamma in the Australian regulatory setting

The Lally/QCA approach for the distribution rate

255. The QCA has rejected the standard 70% distribution rate that has been adopted by every other Australian regulator. Instead, the QCA adopts the Lally (2013 QCA, 2014 QCA) estimates of the mean distribution rate for 10, and subsequently 20, large listed firms. However, Lally has not estimated the distribution rate as defined by the QCA – he has estimated something quite different.

256. To see this, note that the QCA defines the distribution rate (in its Market Parameters Decision at Equation (1); at p. 25; at Equation (34); and at p. 89) to be:

$$\frac{Distributed\ credits}{Corporate\ tax\ paid}.$$

257. By contrast, Lally has estimated:

$$\frac{Distributed\ credits}{Created\ credits}.$$

258. These two different quantities are linked as follows:

$$\frac{Distributed\ credits}{Corporate\ tax\ paid} = \frac{Created\ credits}{Corporate\ tax\ paid} \times \frac{Distributed\ credits}{Created\ credits}$$

259. That this, the two quantities will only be equal if:

$$Created\ credits = Corporate\ tax\ paid.$$

260. This equality does not hold for the firms in the Lally samples. By contrast, Lally has selected a sample of firms that almost guarantees the biggest possible *difference* between created credits and corporate tax paid. This is because his sample consists of the largest multinational companies who pay material amounts of tax to foreign governments – tax payments that do not create imputation credits.

261. By way of analogy, it is as though the QCA needs an estimate of temperature and they have instead inserted a Lally estimate of humidity. This "estimate of the wrong thing" issue is developed more fully in the following sub-sections.

How do some of the Lally firms distribute most of the credits they create?

262. We begin by considering a domestic firm that earns all of its profits and pays all of its tax within Australia. Suppose that our firm (on average) pays out 70% of its profits as dividends and reinvests 30% back into the firm.[149] This firm will mechanically distribute 70% of the imputation credits that it creates each year, as set out in Table 1 below.

263. Table 1 shows that the firm generates an after-tax profit of $70. It distributes 70% of this, which amounts to a $49 dividend. The maximum amount of imputation credits that can be attached to that

[149] This 70% dividend payout rate is close to the average payout rate for Australian listed firms over the last 10 years and it is close to the 71% dividend payout rate for the Lally sample. Source: Morningstar.

dividend is $49 \times \frac{0.3}{1-0.3} = 21$. Consequently, the firm has distributed 70% of the imputation credits that it created.

Table 1. Distribution of imputation credits – Domestic firm

Company profit	100
Corporate tax paid (30%)	30
Imputation credits created	30
After-tax profit	70
Dividend paid (70%)	49
Imputation credits distributed	21
Proportion of credits distributed	70%

264. Now consider a firm that earns some profits that have not been taxed in Australia at the standard 30% corporate tax rate. This could be profits that have been generated (and taxed) offshore and/or Australian profits that are the subject of some sort of corporate tax exemption. Suppose, for example, that the firm above has $70 of domestic profits that are taxed in Australia and $30 of offshore profits that are taxed at 30% in the offshore jurisdiction. If the firm distributes the standard 70% of its $70 after-tax profit, the dividend will be $49. A maximum of $21 of imputation credits can be attached to that dividend since $49 \times \frac{0.3}{1-0.3} = 21$. In this case, fully franking the dividend results in 100% of the imputation credits being distributed. The distribution of all of the created credits required the firm to have material foreign sourced profits. The relevant calculations are set out in Table 2 below.

Table 2. Distribution of imputation credits – Multinational firm

	Domestic	**Foreign**	**Total**
Company profit	70	30	100
Corporate tax paid	21	9	30
Imputation credits created	21	0	21
After-tax profit	49	21	70
Dividend paid			49
Imputation credits distributed			21
Proportion of credits distributed			100%

265. In our examples above, we have adopted a dividend payout rate of 70%. This is because:

a) The average Australian listed firm has a dividend payout rate of approximately 70%;[150] and

b) The average firm in the Lally sample also has a dividend payout rate of approximately 70%.[151]

266. In summary:

a) The average listed firm in Australia distributes 70% of its after-tax profits as dividends;

b) If a firm with exclusively domestic operations has a dividend payout rate of 70%, its maximum imputation credit distribution rate is 70%;[152] and

[150] Source: Morningstar.
[151] Source: Morningstar.

c) The only way that a firm with a dividend payout rate of 70% can distribute more than 70% of its imputation credits is if it has (foreign sourced) income that has not been taxed in Australia. But in this case, created credits will not equal corporate tax paid and the Lally estimate will be inconsistent with the QCA definition of the distribution rate.

Operation of the regulatory model

267. The Australian Energy Regulator (**AER**) has developed an integrated spreadsheet model that uses the building block approach to compute the annual revenue requirement, given the necessary inputs. This is known as the Post-tax Revenue Model (**PTRM**). All references to the PTRM in this appendix relate to the publicly available AER version which implements the building block approach set out in the National Gas Rules (NGR) and National Electricity Rules (NER).

268. The effect of the regulatory rules is to assume that shareholders receive a benefit that has a value to them given by the product of gamma and the firm's total tax payment. A detailed explanation is set below in this appendix. In this section, we summarise the key issues.

269. We begin by considering a regulated firm that has $700 of equity capital and an allowed return on equity of 10%. Obviously, this firm needs to distribute a return of $70 to its shareholders. Assume for this example that gamma is set to 0.25, based on a distribution rate of 70% and theta of 0.35 – the values set by the Tribunal. The regulatory Rules state that the pre-tax profit that the firm must generate is determined by solving:

$$X\left(1-T\left(1-\gamma\right)\right)=X\left(1-0.3\left(1-0.25\right)\right)=70 \quad (1)$$

270. In this case, the required pre-tax profit is $90.32. This produces an after-tax profit for shareholders of $63.23 and imputation credits with a value of $6.77 – a total of $70, as set out in Table 3 below.

Table 3. Regulatory implementation of imputation credits

Profit before tax	90.32
Less corporate tax (30%)	27.10
After-tax profit available for distribution to shareholders	63.23
Value of imputation credits (0.25 times corporate tax paid)	6.77
Total return to shareholders	70.00

271. The subsequent section of this appendix explains all of the calculations from Table 3 in detail, referencing them back to the provisions in the regulatory Rules, and showing precisely where they are implemented in the PTRM.

272. The regulatory model set out in the Rules and implemented in the PTRM assumes that all tax payments generate imputation credits. This is equivalent to assuming that *imputation credits created* equals *corporate tax paid* for regulated firms. The reason these two quantities are considered to be identical is because regulated assets are domestic, with all profits being taxed in Australia. However, these two quantities are *not* equal in the Lally samples of 10 or 20 firms – due to the existence of material foreign profits that are taxed offshore. Indeed, by selecting a small number of the largest firms, Lally has effectively maximised the difference between imputation credits created and corporate tax paid for his sample. That is, across the whole economy the amount of imputation

[152] Such a firm will only be able to achieve an imputation credit distribution rate of 70% if 100% of its profits are taxed at the full 30% rate.

credits created is likely to be close to the amount of corporate tax paid, with the difference between these two quantities being concentrated in the sorts of very large multinational firms that make up most of the Lally samples.

273. In particular, we have compiled data on total tax payments and imputation credits created for the Lally sample from Morningstar. For the Lally sample, $\frac{Created\ credits}{Corporate\ tax\ paid} = 59\%$. That is, for the Lally firms, approximately 41% of total tax payments do not create imputation credits.

274. As set out above, the regulatory definition and the standard regulatory model require an estimate of $\frac{Distributed\ credits}{Corporate\ tax\ paid}$. By contrast, the Lally approach produces an estimate of $\frac{Distributed\ credits}{Created\ credits}$. This causes problems because created credits are materially different from corporate tax paid for the Lally sample of firms.

275. If the Lally sample is to be used to estimate the distribution rate, it should be used to estimate the definition of the distribution rate, as used in the PTRM, $\frac{Distributed\ credits}{Corporate\ tax\ paid}$. For the Lally sample, this quantity is 50%. That is, for the Lally firms, the ratio of imputation credits distributed to corporate tax paid is 50%.[153]

276. In summary:

a) The QCA defines the distribution rate to be $\frac{Distributed\ credits}{Corporate\ tax\ paid}$;[154]

b) The PTRM also requires an estimate of $\frac{Distributed\ credits}{Corporate\ tax\ paid}$;[155]

c) Lally examines 20 firms and produces an estimate of $\frac{Distributed\ credits}{Created\ credits}$;

d) For the Lally sample of firms, $\frac{Distributed\ credits}{Corporate\ tax\ paid} = 50\%$.

277. That is, if the Lally sample is to be used to estimate the distribution rate as the PTRM defines it, the appropriate estimate would be 50%.

The regulatory tax calculation in a non-imputation setting

278. Consider a firm with $700 of equity in its RAB and an allowed return on equity of 10%. In the absence of dividend imputation, such a firm would require an after-tax profit of $70 to distribute to its shareholders. This would require a pre-tax profit of $100, as set out in the table below.

Profit before tax	100
Less corporate tax	30
After-tax profit available for distribution to shareholders	70

279. In general, in the absence of dividend imputation, a pre-tax profit of $X will generate an after-tax profit (available for distribution to shareholders) of $X(1-T) where T is the corporate tax rate. In this case, the required pre-tax profit can be determined by solving:

[153] Source: Morningstar.
[154] QCA Market Parameters Decision, at Equation (1); at p. 25; at Equation (34); and at p. 89.
[155] See Appendix 1 to this report.

$$X(1-0.3)=70,$$

where X is \$100 in this case.

280. That is, the regulator would allow the firm to charge prices so that the expected pre-tax profit is \$100, in order that there would be \$70 of after-tax profits available to shareholders, as required.

281. Note that the \$70 benefit that the shareholders receive from the after-tax profit is independent of the firm's payout policy. For example, suppose the firm distributes a dividend of \$50 and retains \$20 to fund future investment. If the invested funds earn a normal return, the value of those investments will be \$20. That is, whatever is not distributed as a dividend increases the value of the firm by an equivalent amount.

The regulatory tax calculation in an imputation setting

282. Now consider the case *with* imputation. We consider the same firm as above with \$700 of equity capital and an allowed return of 10%. In the regulatory setting, the allowed return on equity includes the value of imputation credits – it represents the total return required by shareholders, a portion of which is assumed to come in the form of imputation credits.

283. By way of example, suppose gamma is set to 0.25. In that case, a \$100 pre-tax profit produces the same \$70 after-tax profit for distribution to shareholders. It also produces imputation credits with a face value of \$30 (equal to the amount of corporate tax paid). For gamma set to 0.25, the value of those imputation credits is $0.25\times 30=7.5$. Thus, the total return to shareholders is the sum of the \$70 after-tax profit and the \$7.5 of value from imputation credits, as set out in the table below.

Profit before tax	100
Less corporate tax	30
After-tax profit available for distribution to shareholders	70
Value of imputation credits	7.5
Total return to shareholders	77.5

284. In general, a pre-tax profit of \$X will generate an after-tax profit for shareholders of \$X(1-T) plus imputation credits valued at γTX. In this case, a pre-tax profit of \$100 produces an after-tax profit for distribution to shareholders of:

$$100(1-0.3)=70.$$

and imputation credits with a value of:

$$\gamma TX = 0.25\times 0.3\times 100 = 7.5.$$

285. In summary, a pre-tax profit of \$X produces a return to shareholders of:

$$X(1-T)+\gamma TX$$

which can also be written as:

$$X(1-T(1-\gamma)).$$

286. In the example above, a pre-tax profit of $100 produces a total return to shareholders of:

$$100(1-0.3(1-0.25))=77.5.$$

287. This is more than the $70 return that is required by shareholders of a firm with $700 of equity capital and an allowed return on equity (including imputation credits) of 10%. In this case, the correct pre-tax profit is determined by solving:

$$X(1-0.3(1-0.25))=70 \quad (2)$$

288. In this case, the required pre-tax profit is $90.32. This produces an after-tax profit for shareholders of $63.23 and imputation credits with a value of $6.77 – a total of $70, as set out in the table below.

Profit before tax	90.32
Less corporate tax (30%)	27.10
After-tax profit available for distribution to shareholders	63.23
Value of imputation credits (0.25 times corporate tax paid)	6.77
Total return to shareholders	70.00

Estimated tax cost under the NGR

289. The Rules define the Estimated Tax Cost (ETC)[156] as:

$$ETC=(ETI\times r_t)(1-\gamma).$$

where ETI is the estimated taxable income (90.32 in the above example) and r_t is used to represent the corporate tax rate (30% in the above example). That is, the expected tax cost in the above example is:

$$ETC=(90.32\times 0.3)(1-0.25)=20.32. \quad (3)$$

290. This calculation recognises that the firm pays corporate tax of 27.10, which is offset by the value that shareholders receive from imputation credits, 6.77 (i.e., 27.10 - 6.77 = 20.32, with rounding).

291. In its PTRM, the AER combines Equations (2) and (3) above. This enables the calculation of the expected tax cost as:

$$ETC=\frac{Required\ return\ on\ equity}{ex-imputation\ credits}\times\frac{T}{1-T(1-\gamma)}. \quad (4)$$

292. In the above example, we have:

$$ETC=70\times\frac{0.3}{1-0.3(1-0.25)}=27.10$$

as set out in Row 44 of the Analysis sheet of the PTRM.

[156] NER Clause 6.5.3; NGR Clause 87A(1).

293. The PTRM then computes the value of imputation credits by multiplying the corporate tax payment gamma at Row 43 of the Analysis sheet of the PTRM. In the example above, this is:

$$27.10 \times 0.25 = 6.77.$$

294. The required pre-tax profit is then determined as:

$$\begin{aligned} \underset{profit}{Pre-tax} &= \underset{profit}{After-tax} + ETC - \gamma \times ETC \\ &= 70 + 27.10 - 6.77 = 90.32, \end{aligned} \tag{5}$$

exactly as set out above. This calculation is performed at Row 27 of the Analysis sheet of the PTRM.

Returns with and without imputation credits

295. In the above example, shareholders require a total return (including imputation credits) of 10%, which amounts to $70 for equity capital of $700. The $70 return is paid in two components:

a) Imputation credits comprise $6.77 of the $70 total. This amounts to 9.68% of the total; and

b) The firm is allowed to charge prices that enable it to achieve an after-tax profit for the shareholders of $63.23, which amounts to 90.32% of the total.

296. Officer (1994) has previously shown that the proportion of the total return that comes from after tax profits (i.e., not including the value of imputation credits) is:

$$\frac{1-T}{1-T(1-\gamma)},$$

which, in the above example is:

$$\frac{1-0.3}{1-0.3(1-0.25)} = 90.32\%.$$

297. Similarly, Officer (1994) has also previously shown that the relationship between the with-imputation return and the ex-imputation return is given by:

$$r_{ex} = r_{with} \frac{1-T}{1-T(1-\gamma)}.$$

298. In the above example, we have:

$$r_{ex} = 10\% \frac{1-0.3}{1-0.3(1-0.25)} = 9.032\%.$$

299. Note that the return from after-tax profits is $63.23, which amounts to a return of 9.032% on the $700 of equity capital.

Calculations in the Australian regulatory framework

300. The Australian regulatory framework, and the AER's PTRM in particular, begin with an estimate of the total (with-imputation) required return on equity (10% in the above example). From this, the PTRM computes the total required return to equity ($70 in the above example).

301. The PTRM then computes the pre-tax profit that would be required to produce the required return to equity by solving:

$$X\left(1-T\left(1-\gamma\right)\right)=\frac{\textit{Total required}}{\textit{return to equity}}.$$

302. In the example above, a pre-tax profit of $90.32 produced an after-tax profit for shareholders of $63.23 and imputation credits with a value of $6.77 – making up the $70 total required return.

303. The regulator then sets prices to produce the required pre-tax profit ($90.32 in the above example).

304. The starting point for these calculations is an estimate of the with-imputation required return on equity. Consequently, any approach that produces an estimate of the ex-imputation required return on equity must first be converted to a with-imputation required return on equity for use in the Australian regulatory framework (and the AER's PTRM in particular). As set out above, converting between ex-imputation and with-imputation required returns is straightforward, as shown by Officer (1994):

$$r_{ex}=r_{with}\frac{1-T}{1-T\left(1-\gamma\right)}. \qquad (6)$$

305. For example, IPART uses a number of versions of the dividend discount model to inform its estimate of the required return on equity. The dividend discount approach takes no account of imputation credits at all, and consequently produces an estimate of the ex-imputation required return on equity. IPART use the Officer formula set out above to convert the ex-imputation estimate into a with-imputation estimate, for use in the regulatory model.

306. In summary, IPART and the PTRM both convert between the with-imputation and ex-imputation required return on equity using the Officer (1994) formula in Equation (6) above.

Appendix 2: Other papers and submissions on value vs. redemption rates

Overview

307. The ERA's ATCO Gas Draft Decision refers to a number of papers and reports that consider the relative merits of the *value* and *redemption rate* interpretations of theta. This issue was addressed in some length in the AER's Guideline. This appendix reviews the work on this issue that was considered in the AER Guideline.

McKenzie and Partington (2011)

308. The AER's Guideline materials refer to advice from McKenzie and Partington (2011) as supporting the redemption rate interpretation of theta. In its Guideline materials, the AER states that the McKenzie and Partington report that it commissioned during the *Gamma* case "raised fundamental questions over the framework."[157]

309. In that report, McKenzie and Partington (2011) state that there are two possible interpretations of theta:

> the market value of franking credits distributed[158]

and:

> the franking credits redeemed as a percentage of franking credits distributed…known as the utilisation ratio.[159]

310. That is, McKenzie and Partington (2011) are clear about the fact that one must choose between a *value* interpretation and a *utilisation* interpretation. In our view, it is this exact distinction that the AEMC sought to clarify in its recent Rule change which specifies that gamma "is the value of imputation credits." The standard regulatory practice has always been to estimate the *value* of imputation credits and this remains the practice of all regulators other than the AER. The Rule change clarifies that the *value* interpretation that has always been used is the correct one.

311. McKenzie and Partington (2011) are also clear about the fact that:

a) Empirical studies such as dividend drop-off analysis provide an estimate of the *value* of imputation credits; whereas

b) Redemption rates provide an estimate of the *utilisation* of credits.[160]

312. Nowhere in their report do McKenzie and Partington (2011) state their view about which of the value or utilisation interpretations is the appropriate one in the regulatory/valuation setting, although they do note that the general consensus is that the value interpretation should be used:

> The literature subsequent to Officer has tended to view both gamma and theta as market values.[161]

[157] AER Rate of Return Guideline, Explanatory Statement, Appendix H, p. 149.
[158] McKenzie and Partington (2011), p. 2.
[159] McKenzie and Partington (2011), p. 2.
[160] McKenzie and Partington (2011), p. 2.
[161] McKenzie and Partington (2011), p. 3.

313. In their more recent submission to the QCA, McKenzie and Partington (2013) clarify their view as follows:

> Theta (θ) is the value to the investor of the imputation credits distributed, expressed as a fraction of face value,[162]

and:

> The standard practice has been to measure the market value of theta.[163]

314. McKenzie and Partington (2013) then state that:

> The question then is how to measure the market value of the imputation credits[164]

and the balance of their report considers various empirical estimates of the value of imputation credits, without any further discussion of utilisation/redemption rates.

315. In summary, the advice from McKenzie and Partington does not recommend that the redemption rate interpretation of theta should be adopted. Rather, McKenzie and Partington simply state that if a regulator decides to define gamma in terms of redemption rates, then gamma should be estimated in terms of redemption rates. Certainly McKenzie and Partington never suggest that redemption rates should be used to the exclusion of market value estimates, or even in preference to market value estimates.

316. In our view, the advice from McKenzie and Partington (2011, 2013) does not support the sole reliance on redemption rates when estimating gamma. By contrast, McKenzie and Partington (2011, 2013) consider empirical estimates of the *value* of imputation credits at some length.

Handley (2008)

317. During its 2009 WACC Review, Handley (2008) provided the same advice in a report commissioned by the AER. One issue that was addressed in the Handley report was the appropriate interpretation of the redemption rate estimates reported by Handley and Maheswaran (2006). Handley (2008) advised the AER that the Handley and Maheswaran study estimated redemption rates, rather than the value of distributed credits. Handley further advised that it would be inappropriate to use a redemption rate interpretation of theta for the purposes of estimating gamma. He advised the AER that a redemption rate estimate of theta will not produce an appropriate estimate of gamma – at best, it will produce an upper bound for gamma.

318. In particular, Handley (2008) advised the AER that an estimate of gamma based on the redemption rate interpretation:

> may be interpreted as a reasonable upper bound on the value of gamma.[165]

[162] McKenzie and Partington (2013), p. 31.
[163] McKenzie and Partington (2013), p. 32.
[164] McKenzie and Partington (2013), p. 33.
[165] Handley (2008), p.8.

319. At the Roundtable convened by the AER in October 2008, Handley further addressed the concept of an estimate of gamma that was based on a redemption rate (rather than on a market value estimate of theta). He again stated clearly that the redemption rate interpretation does not provide an appropriate estimate of gamma:

> Well, that's not our estimate of gamma therefore we haven't said that's our estimate of gamma. In some ways, what you could do is you could certainly say that is perhaps an upper bound for what gamma is.[166]

320. In summary, the author of the main redemption rate study that the AER relied upon at its last WACC Review has advised the AER that the study estimates the redemption rate and not theta, and that redemption rates cannot be used to provide an appropriate estimate of gamma. Handley's point is that his redemption rate study provides a reasonable estimate of the utilisation of imputation credits, but that the utilisation of credits cannot be used to produce an appropriate estimate of gamma.

321. In our view, the advice from Handley (2008) does not support the sole reliance on redemption rates when estimating gamma. A more appropriate interpretation of Handley (2008) suggests that redemption rates can only be used as an upper bound cross check.

Officer (1994)

322. In its Guideline materials, the AER points out that Officer (1994) defines gamma to be both:

a) The value of a dollar of tax credit to the shareholder; and

b) The proportion of company tax that is rebated against personal tax.[167]

323. In their report for the AER, McKenzie and Partington (2011) also note this apparent inconsistency, describing it as "a potential source of confusion" [168] and "ambiguity."[169]

324. Logically, there are two paths through the confusion and ambiguity caused by the drafting of the text in Officer (1994):

a) Conclude that Officer means gamma to have a *value* interpretation and that words suggesting a *utilisation* interpretation were poorly drafted (i.e., the reference to utilisation should be read as simply identifying the source of value); or

b) Conclude that Officer means gamma to have a *utilisation* interpretation and that words suggesting a *value* interpretation were poorly drafted.

325. In our view, the first interpretation is plausible and the second is not. To see this, first consider the following passage from Officer (1994):

> Where there is a market for tax credits one could use the market price to estimate the value of γ for the marginal shareholder, i.e. the shareholder who implicitly sets the price of the shares and the price of γ and the company's cost of capital at the margin, but

[166] AER Roundtable transcript, 10 October 2008, p. 18.
[167] AER Rate of Return Guideline, Explanatory Statement, Appendix H, p. 138. The QCA also notes this apparent inconsistency at p. 93.
[168] McKenzie and Partington (2011), p.2.
[169] McKenzie and Partington (2011), p.3.

> where there is only a covert market, estimates can only be made through dividend drop-off rates.[170]

326. In our view, it is inconceivable that anyone who so clearly refers to the "market price" and "value" and who specifically references dividend drop-off analysis could possibly be of the view that the value interpretation was the one that was incorrect. Such explicit statements are unlikely to have been made by accident. It is far more likely that the references to "the proportion of tax collected from the company which gives rise to the tax credit associated"[171] have simply been poorly drafted.

327. Second, one can bypass the ambiguous language in Officer (1994) altogether and go directly to the mathematical equations and numerical examples to see precisely how gamma *is* interpreted in his paper. For example, consider the calculations in Officer's worked example. In particular, consider the calculations relating to the vanilla definition of WACC labelled "III" on p. 17 of Officer (1994). That example adopts the parameters set out in Table 4 below.

Table 4
Parameters for Officer (1994) worked example

Parameter	Symbol	Estimate
Corporate tax rate	T	39%
Gamma	γ	0.5
Cost of equity	r_e	17.70%
Cost of debt	r_d	14.32%

Source: Officer (1994)

328. The cash flows and imputation credits from that example are summarised in Table 5 below.

Table 5
Cash flows and imputation credits for Officer (1994) worked example

	Symbol	$ (millions)
Pre-tax profit	X_O	39.96
Interest	X_D	5.14
Taxable income	X_O-X_D	34.82
Corporate tax	TAX	13.58
Face value of imputation credits	IC	13.58

Source: Officer (1994)

329. In general, the annual cash flow to equity is:

$$\begin{matrix}\text{Cash Flow}\\ \text{to Equity}\end{matrix} = \begin{matrix}\text{Pre-tax}\\ \text{Profit}\end{matrix} - \text{Interest} - \begin{matrix}\text{Corporate}\\ \text{Tax}\end{matrix} + \begin{matrix}\text{Value of}\\ \text{Imputation Credits}\end{matrix}$$

which can be expressed as:

$$CF(Equity) = X_O - X_D - TAX + \gamma \times IC.$$

[170] Officer (1994), p. 5.
[171] Officer (1994), p. 5.

330. Consequently, the annual cash flow to equity in this case is:[172]

$$\begin{aligned} CF(Equity) &= X_O - X_D - TAX + \gamma \times IC \\ &= 39.96 - 5.14 - 13.58 + 0.5 \times 13.58 \\ &= 28.03. \end{aligned}$$

331. Since, in this example, all cash flows are perpetuities the value of equity is given by: [173]

$$E = \frac{X_O - X_D - TAX + \gamma \times IC}{r_e} = \frac{39.96 - 5.14 - 13.58 + 0.5 \times 13.5}{0.177} = 158.362.$$

332. This expression unambiguously shows that gamma represents the extent to which imputation credits are capitalised into the stock price. Gamma shows the effect that imputation credits have on the *value* of the shares. In the absence of imputation credits, the value of the firm's equity would be:

$$E_{ex-IC} = \frac{X_O - X_D - TAX}{r_e}.$$

333. Gamma then represents the increase in the *value* of equity due to imputation credits, expressed as a proportion of the face value of imputation credits:

$$\gamma = \frac{E_{with-IC} - E_{ex-IC}}{IC}.$$

334. This shows, unambiguously, that gamma has a *value* interpretation.

335. Finally, we note that McKenzie and Partington (2011) have advised the AER that:

> The literature subsequent to Officer has tended to view both gamma and theta as market values.[174]

336. We suggest that the foregoing discussion explains why it is that the standard practice is to view gamma and theta as market values. We also suggest that the literature subsequent to Officer has *uniformly* viewed gamma and theta as market values. Even the authors of redemption rate studies view gamma and theta as market values, such that redemption rates can only provide an upper bound.

337. In our view, Officer (1994), properly and holistically interpreted, does not support the sole reliance on redemption rates when estimating gamma. That is, the QCA's proposed approach is inconsistent with Officer (1994).

[172] Since, in this example, all of the profits after interest and tax are paid as a dividend to the shareholders, we can also write $CF(Equity) = Dividend + \gamma \times IC = 21.24 + 0.5 \times 13.58 = 28.03$.

[173] Similarly the value of debt is given by $D = \frac{5.14}{0.14316} = 35.903$ in which case the value of the firm is $V = E + D = 194.265$ as set out in Officer (1994, p. 17).

[174] McKenzie and Partington (2011), p. 3.

Hathaway and Officer (2004)

338. The AER's Guideline materials present a quote from Hathaway and Officer (2004) that is claimed to be "supporting the cash flow interpretation of the value of imputation credits."[175] However, the Guideline materials have misconstrued the point that Hathaway and Officer are making. The point being made is simply that estimates of the value of distributed credits are not estimates of gamma, but of theta. They need to be multiplied by the distribution rate (F) to obtain an estimate of gamma.

339. Indeed the Guideline materials quote only the first half of the relevant paragraph. In the second half of that same paragraph, Hathaway and Officer (2004) state that:

> Gamma is not the *value* of distributed credits alone. It is the compounding of two factors – the fraction of tax distributed as credits multiplied by the *value* of distributed credits. In this sense it is the *value* of all possible credits, that is, the *value* of all tax payments giving rise to the creation of credits.[176]

340. Moreover, the primary purpose of the Hathaway and Officer (2004) study was to present the results of a dividend drop-off analysis, which is clearly relevant only to the standard *value* interpretation of theta. Hathaway and Officer also present some statistics relating to redemption rates, but that analysis has been retracted by Hathaway who has since stated that it should not be relied upon.[177]

341. In our view, Hathaway and Officer (2004) does not support the sole reliance on redemption rates when estimating gamma. In particular, the fact that Hathaway and Officer (2004) is primarily a dividend drop-off analysis would suggest that they would not support exclusive reliance on redemption rates when estimating gamma and that they do not consider a market value interpretation to be irrelevant.

[175] AER, Rate of Return Guideline, Explanatory Statement, Appendix H, p. 143, emphasis added.
[176] Hathaway and Officer (2004), p. 7.
[177] Hathaway (2013), Paragraph 12.

Appendix 3: The effect of additional trading around the ex-dividend event

Overview

342. The ERA's ATCO Gas Draft Decision refers to a number of potential issues that arise from the trading that occurs around ex-dividend dates. These issues have all been previously considered as part of the AER's Guideline process. This appendix reviews the relevant material from the AER Guideline process.

343. In its Explanatory Statement, the AER sets out its concerns regarding the abnormally high trading volumes that tend to be observed around ex-dividend events.[178] The AER notes that drop-off studies are based on stock price changes between the cum-dividend and ex-dividend prices, and that there is evidence that trading volumes are higher than normal over those two days. The AER further notes that a particular mix of investors might be motivated to trade around the ex-dividend day, and that this mix might differ from the mix of investors who trade at different times of the year. The AER refers to this as a potential "clientele effect," concluding that:

> By largely reflecting the abnormal trading conditions on the two relevant trading days, dividend drop off studies may not identify the market value for the representative investor in other circumstances.[179]

344. In summary, the AER's concern is that the theta estimated using dividend drop-off analysis will reflect the equilibrium value of the mix of investors who trade around the ex-dividend date, which may differ from the mix of investors who provide long-term equity capital to the firm.

The impact of additional trading

345. The first step in addressing the potential clientele effect is to consider whether there is any evidence that the mix of investors who trade around ex-dividend events is unusual, and if so, whether their trading is likely to lead to an under- or over-estimate of theta. This is done by considering whether there is any evidence about the effect that the additional trading around ex-dividend events might have on the cum-dividend price and on the ex-dividend price.

346. In this regard, the AER cites evidence of abnormal trading being associated with an increase (or "run-up") in the cum-dividend price.[180] The Explanatory Statement cites the report prepared for the AER by McKenzie and Partington (2011), who survey the relevant research and report that there is:

> Direct evidence of the presence of short term trading about the ex-dividend date in Australia[181]

and that

> Short term traders appear to be arbitraging higher yield franked dividends and low spread stocks.[182]

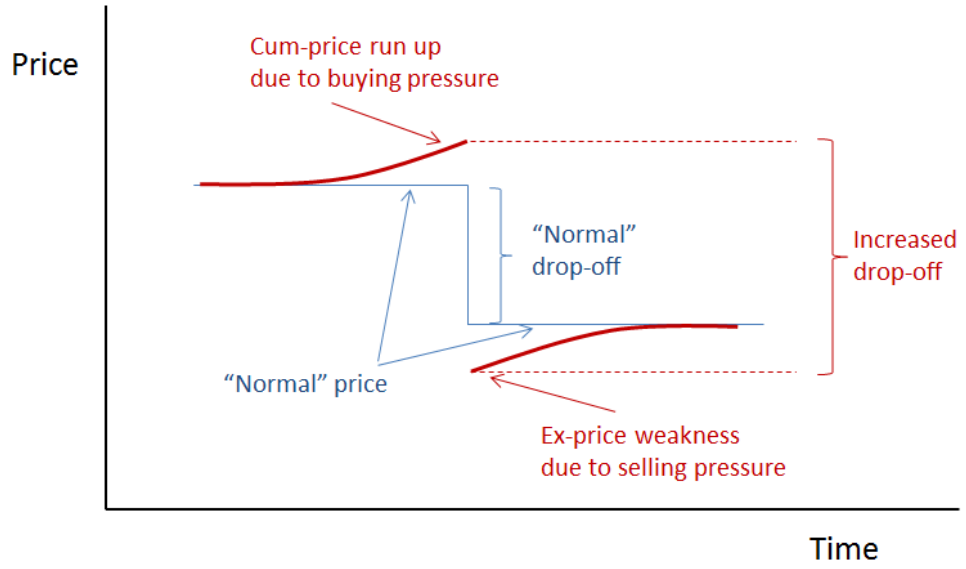
347. They conclude that the result is

[178] Explanatory Statement, pp. 242-243.
[179] Explanatory Statement, p. 242.
[180] Explanatory Statement, p. 242.
[181] McKenzie and Partington (2011), p. 9.
[182] McKenzie and Partington (2011), p. 10.

> Buying pressure cum dividend, selling pressure ex dividend, and an abnormal volume of trades. Note however, that these price effects are not just from short-term trading.[183]

348. In summary, McKenzie and Partington advise that there is buying pressure from a range of investor types that causes the cum-dividend price to be higher than it would otherwise be (the price run-up) and selling pressure from a range of investor types that causes the ex-dividend price to be lower than it would otherwise be. The result is that the abnormal trading volume causes the dividend drop-off to be larger than it would have been if trading among market participants had been at more normal levels. This is illustrated in Figure 9 below.[184]

Figure 9
Effect of excess trading on dividend drop-off estimates



349. According to McKenzie and Partington, abnormal buying pressure causes an increase in the cum-dividend price and abnormal selling pressure causes a decrease in the ex-dividend price. To the extent that these effects are material, the result is a dividend drop-off that is larger than it would otherwise be. This results in the estimate of theta being larger 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 will result in an over-estimate of theta.

Potential effect of short-term traders

350. The Explanatory Statement also considers advice from McKenzie and Partington (2011) about the potential impact of short-term investors around the ex-dividend event:

> McKenzie and Partington identify that if short term traders are highly involved in trading around the cum-dividend/ex-dividend dates, dividend drop off studies would underestimate the value of dividends and franking credits to those traders.[185]

[183] McKenzie and Partington, p. 10.
[184] McKenzie and Partington (2011) suggest that the cum-price run-up due to buying pressure is a stronger and more consistent result than the ex-dividend price weakness dues to selling pressure. Even if there is no ex-price weakness, the strong cum-price run-up causes the measured drop-off to be larger than it would otherwise be.
[185] Explanatory Statement, p. 242.

351. The substance of this advice is that there may be a subset of investors who value the dividend and imputation credit less than the equilibrium market value, and if that subset of investors dominate trading around the ex-dividend event, it is their (lower) valuation that will be reflected in the dividend drop-off estimates.

352. To understand this argument further, suppose that the representative investor values a $1 dividend and the associated imputation credit at a combined value of $1 (which is consistent with a broad range of empirical evidence as set out below). Also suppose that there is a subset of investors who value the same package at only 80 cents.[186] The McKenzie and Partington argument is that *if* this subset of investors dominates trading around the ex-dividend event, it is their valuation that will be reflected in stock prices and the resulting drop-off will be 80 cents on average, which is less than the value to the representative investor.

353. However, there are two problems with this argument by McKenzie and Partington. First, it is illogical. It would be impossible for this subset of investors to dominate trading around ex-dividend events thereby imposing their lower-than-average valuation on market prices. If it were the case that the trading of such investors did result in a drop-off of only 80 cents, where the equilibrium value in the market was $1, other investors would surely enter the market to take advantage of the abnormal returns that were on offer. For example, an investor who valued the dividend and imputation credit at the equilibrium value of $1 would seek to buy shares in the cum-dividend period, obtain the dividend and imputation credit which they valued at $1, and then see the stock price fall by only 80 cents, being 20 cents to the better overall. This activity would continue until the cum-dividend buying pressure offset the trading of the "low valuation" subset of investors. That is, the argument that the subset of "low valuation" investors could drive prices around the ex-dividend day is only plausible if it is accompanied by an argument about why all other investors have been excluded from trading around the ex-dividend day. But McKenzie and Partington provide no such evidence – they merely state that an effect *can* occur *if* a subset of investors that *may* exist dominates trading around the ex-date.

354. The second problem with the hypothesis that "low valuation" investors may cause a lower-than-equilibrium drop-off to occur is that all of the available evidence suggests the exact opposite. For the observed drop-off to be lower than the equilibrium valuation, it would have to be the case that the cum-dividend price was driven down by the additional trading, whereas McKenzie and Partington note that the evidence is consistent with the exact opposite – a cum-dividend price run-up.

355. Moreover, there is also direct evidence that "low valuation" investors do *not* dominate trading around ex-dividend events. Again, the evidence suggests the exact opposite – the investors who dominate trading in the cum-dividend period and cause a price run-up are those that have a *high* valuation of dividends and imputation credits. McKenzie and Partington (2011)[187] state that these "high valuation" investors include "long term investors [who] trade cum-dividend to capture dividends" and short-term arbitrageurs "(eg. Domestic investors with higher franking credit values)".

356. In summary, the notion that a subset of "low valuation" investors dominate trading around the ex-dividend date causing the drop-off to be artificially low is directly contradicted by all of the available evidence and should be given no weight.

[186] This scenario only requires that some group of investors have a valuation that is lower than the representative investor's valuation. The difference may be due to tax positions, transaction costs, or other factors.
[187] See McKenzie and Partington (2011), p. 10.

Consistency with other evidence

357. The Explanatory Statement also cites evidence from offshore markets.[188] For example, Frank and Jagannathan (1998) develop a simple model of investor trading around ex-dividend dates to explain why the observed drop-off in the Hong Kong market tends to be less than the amount of the dividend. They explain that investors in the Hong Kong market pay no tax on dividends or capital gains, in which case there is no tax-related reason for trading around ex-dividend events. Indeed, in the Frank and Jagannathan model there is no increase in trading volume around the ex-dividend event. Rather, there is simply a change in the type of investor who initiates a trade. Specifically, Frank and Jagannathan develop a type of "dividend annoyance" model whereby investors would generally prefer not to receive dividends because they involve the administrative costs of having to reinvest them appropriately.

358. The result of the Frank and Jagannathan model is that trades in the cum-dividend period are more likely to be seller-initiated (as there are relatively more investors seeking to avoid the dividend) and to occur at the bottom of the bid-ask spread. Conversely, trades that occur in the ex-dividend period are more likely to be buyer-initiated (as investors who delayed their purchase to avoid the dividend now seek to buy the stock) and to occur at the top of the bid-ask spread. This has the effect of reducing the measured drop-off.

359. The no-tax conditions in the Hong Kong market lead to a material number of investors seeking to avoid dividends. However, McKenzie and Partington (2011) report that the Australian market conditions lead to a material number of investors being attracted to dividends.[189] The cum-dividend buying pressure not only results in trades being more likely to occur at the top of the bid-ask spread, but it causes both bid and ask prices to increase in the form of a "cum-dividend price run-up."

360. In summary, the Frank and Jagannathan model helps to explain why the drop-off is likely to be over-estimated in a setting where there is cum-dividend buying pressure and ex-dividend selling pressure – as is the case in Australia according to McKenzie and Partington (2011).

361. The Explanatory Statement also refers to a study of the Finnish stock market by Rantapuska (2008). Rantapuska shows that the subset of investors who (because of their tax and other circumstances) value the dividend most trade more heavily in the cum-dividend period to capture the dividend. Cum-dividend buying pressure then results in the sort of cum-dividend price run-up that McKenzie and Partington (2011) document for the Australian market. That is, to the extent that trading patterns around the ex-dividend day are materially different from other days, it is the subset of investors who value the dividend most that cause the cum-dividend price run-up, which in turn results in a higher drop-off than would otherwise be observed.

362. To the extent that this Finnish study has any relevance to the Australian market, it is this: cum-dividend trading is likely to be influenced by that subset of investors who value the dividend and imputation credit the most. That subset of investors cause the cum-dividend price run-up and the drop-off being higher than it would otherwise be. This, in turn, results in the estimated value of the dividend and imputation credit (theta) being higher than it would otherwise be. Consequently, to the extent that these effects are material, they would result in an over-estimation of theta.

[188] The ENA's view is that the regulator should have regard to offshore evidence if that evidence is relevant and useful. If, however, the AER determines that offshore evidence cannot be used because the benchmark firm is defined to be one operating in Australia, this offshore evidence must be ignored. For example, if the AER determines that offshore comparables cannot be used to assist in the estimation of equity beta, internal consistency would require that offshore evidence cannot be used to assist in the estimation of gamma.

[189] McKenzie and Partington (2011), pp. 9-10.

Appendix 4: Instructions

In its recent ATCO draft decision, the ERA has changed its position on gamma substantially from that in the ERA's rate of return guidelines, basing its new viewpoint on two reports by Lally for the AER and QCA, and the AER's response to Lally's reports, as well as its own previous work on gamma. The changes may be summarised as follows:

a) The ERA now believes, based on the work of Lally, that empirical estimation of theta is highly unreliable, and should not be relied upon solely to estimate theta, as in the past.

b) The ERA now believes, again due to the work of Lally, that all previous work on theta in dividend drop-off studies, including that published in refereed literature, has misinterpreted the coefficient in the relevant regressions that gives rise to theta, and that correcting this error causes theta to be increased substantially.[190]

c) The ERA continues to believe that its own empirical work on dividend drop-off studies is correct, specifically in reference to its treatment of returns on non-dividend days.

d) The ERA now believes that, due to the use of the Officer framework, the estimation of theta is a complex weighted average which cannot be captured adequately by market valuation studies relying upon two-days of data per valuation.

e) The ERA now believes that the equity ownership approach and taxation statistics approach now deserve primary consideration in the estimation of theta.[191] It also believes that Lally's "conceptual goalposts" should form a basis for the bounds of theta.

We would like to understand whether there is merit in these beliefs, and whether they have sufficient merit to alter the value of gamma which the Competition Tribunal has implemented of 0.25.

[190] The ERA notes that SFG has also said that the relevant coefficient on franking credits may be capturing other factors and we would like to understand, if this statement is true, what those other factors might be, and whether they relate to Lally's criticism.

[191] We note that its equity share estimate is based upon the share of Australian ownership of listed and unlisted equity, and would like to understand whether dividend imputation credits are available for holders of unlisted equity.