An appropriate regulatory estimate of gamma

Report for Aurizon Ltd

16 January 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 Aurizon Ltd (**Aurizon**) to provide our views on the estimation of the gamma parameter in the context of regulatory weighted-average cost of capital (**WACC**) estimation.

2. In particular, we have been asked to respond to the following reports and submissions:

   a) Lally (2012), *The estimated utilisation rate for imputation credits*, report commissioned by the QCA;

   b) Lally (2013), *Estimating Gamma*, report commissioned by the QCA;

   c) McKenzie and Partington (2013), *Review of Aurizon Network's draft access undertaking*, report commissioned by the Queensland Resources Council; and

   d) Queensland Resources Council (2013), *WACC submission*, submission to QCA.

Summary of conclusions

3. Our primary conclusions are set out below.

Estimation of gamma

4. Gamma should be estimated as the product of the distribution rate (F) and the value of distributed credits (theta). This is standard regulatory practice and is consistent with the submissions of all stakeholders.[1]

Distribution rate

5. The QRC proposes that the distribution rate (F) should be set to 0.7. This is the same value as was submitted by Aurizon Network. It is also the same value that was submitted by stakeholders to the AER's Cost of Capital Guideline process and is the value that the AER has proposed in its Draft Guideline.[2] The value of 0.7 is based on the best available empirical evidence.[3]

6. In our view, the current QCA estimate of 0.8 has no support and is therefore untenable and should be replaced by the estimate of 0.7 that has been proposed by all parties.

7. In his report for the QCA, Lally (2013) suggests an alternative approach for estimating the distribution rate, producing an estimate of 0.85. This is the only information before the QCA that is not perfectly consistent with the estimate of 0.7 that has been submitted by all stakeholders. However, in a report to the AER dated two days earlier, Lally (2013)[4] proposed a range for the distribution rate that included the generally-accepted estimate of 0.7, and which the AER interpreted as an endorsement of its estimate of 0.7.[5] Moreover, the QCA has previously rejected the approach that produced the estimate of 0.85. In our view, the alternative approach should again be rejected because no case has been made for rejecting the accepted approach and the alternative approach is

[1] See Section 3 of this report.
[2] AER (2013), Draft Cost of Capital Guideline, p. 24.
[3] AER (2013) Draft Rate of Return Guideline – Explanatory Statement, Section 8.3.4, p. 125.
[4] Lally (2013), *The estimation of gamma*, report for the AER, 23 November.
[5] AER (2013), Rate of Return Guideline – Explanatory Statement, p. 165.

inferior to the accepted approach in its reliance on a very small sample of firms that are not indicative of either the average firm or the benchmark regulated firm.

Empirical evidence or theoretical assumption?

8. The key recommendation from the Lally (2012) report is that the value of distributed imputation credits should not be estimated using empirical evidence from market data, but should instead be determined on the basis of Associate Professor Lally's own theoretical reasoning (which produces an estimate that is inconsistent with all of the empirical evidence).

9. Associate Professor Lally provided exactly the same recommendation to the QCA in his 2004 report. Neither the QCA nor any other Australian regulator has followed that recommendation. The standard practice of all Australian regulators, including the QCA, is to use empirical evidence as the basis for all WACC parameter values.

10. The QCA should not assume that:

    a) All distributed credits are redeemed; and

    b) The full face value of every imputation credit that is redeemed is reflected in the stock price

    when there is clear empirical evidence to the contrary.

The Lally "test"

11. Lally (2012) sets up a "test" to support the conclusion that the value of distributed imputation credits should not be estimated using empirical evidence from market data, but should instead be determined on the basis of Associate Professor Lally's own theoretical reasoning (which produces an estimate that is inconsistent with all of the empirical evidence).

12. That is, the test is designed to show that the value of imputation credits according to market data estimates produces estimates of the cost of equity that fall outside a theoretical range developed by Associate Professor Lally.

13. That test requires estimates of point estimates of what CAPM parameters would be in theoretical perfect segmentation and perfect integration worlds, it ignores estimation error, and it rests on the assumption that Australian government bonds would have the same yield whether or not foreign investors were allowed to invest in them – which defies logic. Relaxing this last assumption alone would result in the empirical estimate of the value of imputation credits *passing* the Lally test.

14. No other Australian regulator has set the value of any WACC parameter based on the assumption that Australian government bonds would have the same yield whether or not foreign investors were allowed to invest in them.

The use of redemption rates

15. The redemption rate (the ratio of redeemed credits to distributed credits) cannot be used to estimate theta for the following reasons:[6]

    a) Redemption only signifies that the credit had *some* positive value to the redeemer – it provides no indication of what that value might have been;

[6] See Section 7 of this report.

b) The Australian Competition Tribunal has ruled that redemption rates cannot be used to estimate theta; and

c) Problems with the tax data mean that the redemption rate cannot be reliably estimated in any event.

16. Moreover, in his advice to the QCA, Lally (2013) explains that:

a) He disagrees with the basic rationale for the use of redemption rates set out by Handley (2008);

b) The use of redemption rates involves an internal inconsistency; and

c) The use of redemption rates "has the perverse consequence"[7] of implying that the cost of equity capital rises as markets become more integrated.

17. Other support for the use of a market value estimate of theta rather than a redemption estimate is:

a) McKenzie and Partington (2013) themselves note that "the standard practice has been to measure the market *value* of theta;"[8] and

b) The National Electricity Rules and National Gas Rules specifically define gamma to be "the *value* of imputation credits."[9]

The SFG (2011) study

18. The SFG (2011) dividend drop-off analysis was performed under the direction of the Australian Competition Tribunal (**Tribunal**). The Terms of Reference for that study (including all technical specifications) were agreed with the Australian Energy Regulator (**AER**) and/or ruled upon by the Tribunal. 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.[10]

19. Lally (2012) raises a number of technical issues in relation to the SFG (2011) study. All of these issues have either already been considered and resolved with the AER and/or Tribunal throughout the process of conducting the SFG (2011) study, or have no effect on the results and conclusions (or both).

20. By way of example, Lally (2012) notes that if model specification 4 was changed to include an additional constant term, the final estimate may be different. He notes that there is no particular reason to change the specification in this way, but that such a change *could* result in a different estimate. This point was raised at the Tribunal hearing, the Applicants advanced a number of reasons why the inclusion of such an additional constant term would be wrong, and the Tribunal ruled that no additional constant term should be used.

[7] Lally (2013), p. 14.
[8] McKenzie and Partington (2013), p. 32.
[9] McKenzie and Partington (2013), p. 32.
[10] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 29.

21. As another example, Lally (2012) takes issue with the use of a filter to exclude very small companies from the sample. He describes the use of this filter as "doubly remarkable"[11] even though it was previously established in the academic literature, proposed by the AER, endorsed by the Tribunal, and subsequently used by other regulators.

22. None of the issues raised by Lally (2012) would lead us to change our conclusions from SFG (2011) or the updated analysis in SFG (2013).

Other contemporaneous evidence

23. The Lally (2012) report is now almost a year old. The cost of capital reviews that are being conducted by a number of Australian regulators have generated considerable material, evidence and discussion in relation to gamma. The now-dated Lally (2012) report does not address the recent evidence that has been submitted into these reviews.

24. Lally (2012) states that:

> Given that there was a tax change in July 2000 that permitted Australian investors to fully utilise the tax credits, which is likely to have raised the utilisation rate, studies that estimate the utilisation rate from that point are preferred and studies with the longest data set since then are doubly preferred. On this basis, the SFG study is the best.[12]

25. The practice of relying on post-2000 data to estimate the value of distributed imputation credits has become an Australian regulatory standard. However, Lally (2012) includes a survey of the same set of papers that were included in his 2004 report for the QCA. All of these papers use pre-2000 data, and consequently it is not clear that this review is of any relevance whatsoever. In addition to using out-dated data, a number of the papers that Associate Professor Lally has included in his 2004 and 2012 reviews for the QCA are well known to suffer from econometric problems and extremely small sample sizes and have not been relied upon by other regulators for some years.

26. Moreover, Lally (2013) recognises that "results using data prior to July 2000 are of much less interest"[13] and the AER has recently stated that "studies that use data from the current tax regime (after 2000) are more relevant."[14]

27. In recent years, a number of new studies have been undertaken. In our view, this contemporaneous evidence produces estimates of the value of distributed imputation credits in the range of 0 to 0.35. The AER has recently concluded that a reasonable range from this evidence is 0 to 0.5.[15]

Market practice

28. The dominant market practice is to make no adjustment in relation to imputation credits to cash flows or discount rates. Australian regulators have set aside this evidence on the basis that market professionals may be using a "conventional" or "classical" approach to directly estimate the ex-imputation required return on equity without having to estimate gamma.

[11] Lally (2012), p. 19.
[12] Lally (2012), p. 24.
[13] Laly (2013), p. 19.
[14] AER (2013), Rate of Return Guideline – Explanatory Statement, p. 176.
[15] AER (2013), Rate of Return Guideline – Explanatory Statement, p. 170.

29. If the QCA considers that there is a "conventional" or "classical" approach that can be used to estimate the ex-imputation required return on equity without requiring an estimate of gamma, the estimate from that approach should at least be compared with the corresponding estimate from the QCA's regulatory approach. Good regulatory practice would then involve the QCA explaining why its estimate of the ex-imputation required return on equity (which forms the basis of the allowed revenue) differed from the "conventional" estimate of the ex-imputation required return on equity.

Basis of current QCA estimate of gamma

30. The QCA currently uses a gamma value of 0.5 based on:

    a) A distribution rate of 0.8; and

    b) A value of distributed credits of 0.625.[16]

31. In the Australian regulatory context, the widely-accepted value for the distribution rate is now 0.7.[17] McKenzie and Partington (2013) state that the distribution rate "can be measured reasonably well from taxation statistics and a value of 70% is widely accepted."[18] The value of 0.7 was also proposed by the QRC.[19] In our view, there is no basis for the QCA maintaining its current estimate of 0.8.

32. The basis for the QCA's estimate of 0.625 for the value of distributed credits (which the QCA has adopted in every one of its decisions) is explained in the QCA's 2001 Electricity Distribution Final Decision. In particular, the 0.625 value is based on the unpublished working paper of Hathaway and Officer (1999). The QCA states that:

> As noted by Hathaway and Officer (1999), 60 per cent of the distributed franking credits are redeemed by taxable investors.[20]

and:

> Consistent with the Hathaway and Officer (1995) (sic) study, when estimating the value of imputation credits from the perspective of the marginal shareholder, the following factors will need to be taken into consideration…the range of utilisation of imputation credits in the market is likely to be around 60 per cent.[21]

and:

> …the Hathaway and Officer study remains the most current in terms of the distribution and utilisation of imputation credits.[22]

33. Hathaway and Officer (1999) examine ATO tax statistic redemption rates and conduct a dividend drop-off analysis. The tax statistic redemption rates can no longer be considered to be valid evidence for two reasons:

[16] See, for example, DBCT Draft Decision 2004, Footnote 22, p. 176 and p. 178.
[17] AER (2013), Draft Cost of Capital Guideline, p. 24.
[18] McKenzie and Partington (2013), p. 31.
[19] QRC WACC Submission, p. 20.
[20] QCA 2001 Electricity Distribution Final Decision, p. 100.
[21] QCA 2001 Electricity Distribution Final Decision, p. 102.
[22] QCA 2001 Electricity Distribution Final Decision, p. 103.

a) Hathaway himself has retracted that evidence. He has identified errors and inaccuracies in the data and has recommended that his analysis of redemption rates should not be relied upon;[23] and

b) The Australian Competition Tribunal has recently ruled that tax statistic redemption rates cannot be used to estimate theta.[24]

34. Consequently, the only remaining basis for the QCA's original adoption of the 0.6 figure is the Hathaway and Officer (1999) dividend drop-off analysis.

35. After its 2004 WACC Review, the QCA published its findings in relation to gamma in one page of the DBCT 2004 Final Decision.[25] It did not refer to any updated or new empirical evidence, and concluded that it would maintain its current estimate.

36. By the time of the QCA's 2005 Electricity Distribution Final Decision, Hathaway and Officer (2004) had updated their earlier study, recommending values of 0.7 for the distribution rate and 0.5 for theta – implying a value of 0.35 for gamma. This apparently led the QCA to abandon any reliance on empirical evidence. In particular, the QCA stated that:

> The Authority notes the evidence provided by Energex suggesting that gamma for Australia wide firms in recent times has been 0.35[26]

but indicated that its estimate of gamma is no longer based on the best available empirical evidence, but rather:

> The Authority set gamma at 0.50 largely on the basis of achieving a compromise over what is a controversial issue.[27]

37. The QCA has subsequently maintained its 0.5 value for gamma, based not on any updated empirical evidence, but on regulatory precedent. For example in the 2009 QR Network Draft Decision, the QCA simply stated that:

> the Authority has chosen 0.50 as the value of gamma, which is consistent with its practice to date.[28]

38. In summary, there appears to be no evidentiary basis for the QCA's estimates of the distribution rate (0.8), theta (0.625) or gamma (0.5).

[23] Hathaway (2013), Paragraph 12.
[24] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010), Paragraph 91.
[25] DBCT 2004 Final Decision, pp. 178-179.
[26] QCA 2005 Electricity Distribution Final Decision, p. 122.
[27] QCA 2005 Electricity Distribution Final Decision, p. 122.
[28] QCA 2009 QR Network Draft Decision, p. 24.

2. Questions to be considered by Authority members

Questions

39. In this section, we set out the key questions, in relation to gamma, that must be answered by the Authority members – together with what we believe to be appropriate evidence-based responses.

40. **Question 1: Should gamma be estimated as the product of F and θ?**

Yes. This is standard regulatory practice and is consistent with the submissions of all stakeholders.[29]

41. **Question 2: What value should be adopted for the distribution rate, F?**

The distribution rate should be set to 0.7. This estimate is based on the best available empirical evidence, it is standard regulatory practice, and is consistent with the submissions of all stakeholders.[30]

42. **Question 3: Should theta be estimated on the basis of empirical evidence or theoretical assumption?** [31]

Theta should be estimated on the basis of empirical evidence for a number of reasons:

a) The QCA has previously rejected the Lally proposal to assume an extreme value for theta based on theoretical reasoning. The QCA has noted that such an approach would be inconsistent with the regulatory model used by the QCA;

b) No other Australian regulator adopts a value for theta based on the theoretical Lally approach;

c) It is the standard regulatory practice to estimate all WACC parameters on the basis of empirical evidence;

d) If theta is to be estimated not as it is, but as it would be in the absence of any foreign investment, then all WACC parameters should be estimated on the same basis;

e) The convoluted "test" that Lally (2012, 2013) proposes to demonstrate the superiority of his theoretical value requires estimates of point estimates of what CAPM parameters would be in theoretical perfect segmentation and perfect integration worlds, it ignores estimation error, and it rests on the assumption that Australian government bonds would have the same yield whether or not foreign investors were allowed to invest in them – which defies logic. Relaxing this last assumption alone would result in the empirical estimate of the value of imputation credits *passing* the Lally test. In any event, no other Australian regulator has set the value of any WACC parameter based on the assumption that Australian government bonds would have the same yield whether or not foreign investors were allowed to invest in them.

43. **Question 4: Can redemption (or "utilisation") rates be used to estimate theta?** [32]

[29] See Section 3 of this report.
[30] See Section 4 of this report.
[31] See Section 5 of this report.
[32] See Section 7 of this report.

No, for the following reasons:

a) Redemption only signifies that the credit had *some* positive value to the redeemer – it provides no indication of what that value might have been;

b) The Australian Competition Tribunal has ruled that redemption rates cannot be used to estimate theta;

c) Problems with the tax data mean that the redemption rate cannot be reliably estimated in any event;

d) The National Electricity Rules and National Gas Rules have recently been amended to clarify that gamma is a measure of *value* and not utilisation; and

e) McKenzie and Partington (2013) note that "the standard practice has been to measure the market *value* of theta."[33]

44. Moreover, in his advice to the QCA, Lally (2013) explains that:

a) He disagrees with the basic rationale for the use of redemption rates set out by Handley (2008);

b) The use of redemption rates involves an internal inconsistency; and

c) The use of redemption rates "has the perverse consequence"[34] of implying that the cost of equity capital rises as markets become more integrated.

45. **Question 5: What data period should be used to estimate the value of theta?** [35]

Lally (2012, 2013) advises the QCA that post-2000 data from the current tax regime should be used. This is consistent with the standard regulatory approach.

46. **Question 6: What are the current empirical estimates of theta?** [36]

47. The best available dividend drop-off estimate of theta is the SFG (2013) estimate of 0.35. Contemporaneous estimates using other techniques are below 0.35. The AER considers that empirical estimates support a range for theta of 0 to 0.5. Consequently, 0.35 should be interpreted as a conservative estimate of theta.

Implications

48. If the six key questions are answered as set out above, the final estimate of gamma is:

$$\gamma = F \times \theta$$
$$= 0.7 \times 0.35 = 0.25.$$

49. The Authority members should also consider:

[33] McKenzie and Partington (2013), p. 32.
[34] Lally (2013), p. 14.
[35] See Section 9 of this report.
[36] See Section 9 of this report.

a) The adequacy of the evidentiary basis for the QCA's current estimate of gamma; and

b) Whether, as a matter of good regulatory practice, the regulatory estimate of the ex-imputation required return on equity should be compared against the "conventional" estimate of the same thing – as a basic reasonableness check.

3. Background: The SFG (2011) study

Australian Competition Tribunal review – background

50. Prior to the last process for setting the AER's Statement of Regulatory Intent (**SoRI**), the long-standing regulatory precedent was to set gamma equal to 0.5. In its SoRI in May 2009, the AER followed the established regulatory practice of setting gamma to be the product of two components:

$$\gamma = F \times \theta$$

where F is the distribution ratio (the proportion of created imputation credits that are distributed to shareholders) and θ (**theta**) is the value of a distributed credit that is reflected in share prices.

51. The AER proposed to set gamma to 0.65, based on:

    a) Setting F to 100%. The AER's consultant on this issue proposed that F should be set on the basis of theoretical assumption rather than market evidence; and

    b) Setting θ to 0.65 as the mid-point of two estimates:

        i) A dividend drop-off estimate of 0.57 whereby one compares the prices of shares immediately before the ex-dividend date with the prices of the same shares immediately after, as a means of inferring the implied value of dividends and the tax credits that are attached to them[37]; and

        ii) An estimate based on ATO tax statistics about the proportion of imputation credits that are redeemed.[38]

52. During the course of the AER's review, a number of stakeholders (including SFG) proposed that other studies and other evidence should be considered when estimating theta. However, the AER determined that theta should be estimated on the basis of only the two studies set out above.

53. The first three businesses to be regulated under the AER's SoRI estimate of 0.65 were ENERGEX, Ergon Energy and ETSA Utilities, all of whom sought a review by the Australian Competition Tribunal (the **Tribunal**). This review took place under the National Electricity (Distribution) Rules and has become known as the *Gamma Case*.[39]

Issues and Tribunal findings

Estimating the distribution rate

54. The distribution rate (F) is the ratio of (a) the total amount of franking credits distributed to shareholders in a given year, to (b) the total amount of franking credits created in a given year. In the *Gamma Case*,[40] the AER abandoned its contention that F should be set to 100% prior to the Tribunal hearing. In its submissions to the Tribunal prior to the hearing, the AER acknowledged that an estimate above 0.7 was unsupportable, as there was no empirical evidence to support it, and therefore

[37] Beggs, D.J., and C.L. Skeels, 2006. "Market arbitrage of cash dividends and franking credits," *The Economic Record,* 82 (258), 239 – 252.
[38] 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.
[39] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010).
[40] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010).

that the distribution rate should be set to 0.7. In summarising the AER's position on this issue, the Tribunal stated that:

> The AER accepts that on the material presently before the Tribunal, there is no empirical data that is capable of supporting an estimated distribution ratio higher than 0.7. The AER therefore accepts that it is open to the Tribunal to adopt a substitute distribution ratio of 0.7.[41]

55. The Tribunal then concluded and ordered that:

> In light of these submissions and the material before the Tribunal, the Tribunal concludes that the distribution ratio is 0.7 for the calculation of gamma.[42]

Estimating Theta

56. The theta parameter estimates the value, to the relevant shareholder, of a dollar of franking credits that has been distributed to them. Different shareholders will place a different value on the franking credits that are distributed to them. Resident shareholders can use franking credits to reduce their personal tax obligations, whereas non-resident shareholders obtain no benefit from franking credits. Theta represents the extent to which trading among all market participants results in some value in relation to franking credits being impounded into the stock price.

57. Two techniques for empirically estimating theta were considered by the Tribunal:

    a) Tax statistics about the proportion of distributed imputation tax credits that had been redeemed by shareholders, obtained from the Australian Taxation Office (**ATO**); and

    b) Dividend drop-off analysis, whereby the implied value of imputation tax credits is inferred from the price change that occurs over ex-dividend days.

58. The Tribunal held that the ATO tax statistic approach did not produce an estimate of market value and that the AER was wrong to have interpreted tax statistic estimates in that way. In particular, the Tribunal held that the ATO tax statistic approach provides no more than an upper bound check on estimates of theta 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.[43]

59. The Tribunal also held that the AER was wrong to take upper bound estimates from two different sub-periods and then interpret their average as a point estimate:

[41] Application by Energex Limited (Distribution Ratio (Gamma)) (No 3) [2010] ACompT 9 (24 December 2010), Paragraph 2.
[42] Application by Energex Limited (Distribution Ratio (Gamma)) (No 3) [2010] ACompT 9 (24 December 2010), Paragraph 4.
[43] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010), Paragraph 91.

> But this simple averaging adjustment has no logic to it and fails to accord each Handley and Maheswaran (2008) estimate its correct interpretation as an upper bound applying to a period…[44]

and that:

> …any downward adjustment to a properly derived upper bound would be inappropriate as a means of deriving an estimate of theta.[45]

60. This left the Tribunal with dividend drop-off analysis. On this point, the AER had sought to rely entirely on a single study by Beggs and Skeels (2006)[46]. The Tribunal held[47] that the AER was wrong to rely on an out-dated and methodologically unsound dividend drop-off study. The Tribunal then directed that a "state-of-the-art" dividend drop-off study should be conducted to assist the Tribunal.[48] The Tribunal also directed that the dividend drop-off study to be performed by SFG "should employ the approach that is agreed upon by SFG and the AER as best in the circumstances."[49]

61. In summary, the Tribunal ruled that:

    a) The AER had erred in using tax statistics estimates for any purpose other than as an upper bound;

    b) The AER had erred in its reliance on the Beggs and Skeels (2006) dividend drop-off estimate of theta; and

    c) SFG should be retained to prepare a "state-of-the-art" dividend drop-off analysis with terms of reference to be agreed with the AER.

The SFG "state-of-the-art" dividend drop-off study

62. After agreement could not be reached between the parties, the Tribunal ruled that:

    a) The four variations of the econometric specification of dividend drop-off analysis drawn by SFG from the literature should be used; and

    b) The results for the full updated period should be used rather than a number of sub-periods.

63. SFG then conducted the dividend drop-off study and circulated a draft report to all parties. The AER and the regulated businesses that were parties to the *Gamma Case*[50] provided detailed comments on the draft report and these were taken into account in a revised report that was provided to all parties and to the Tribunal.

64. Although the AER submitted[51] that the SFG study had departed from the Terms of Reference, the Tribunal disagreed and accepted the estimates from the SFG dividend drop-off study:

---

[44] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010), Paragraph 95.
[45] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010), Paragraph 95.
[46] Beggs, D. J. and Skeels, C.L., (2006), "Market arbitrage of cash dividends and franking credits," *Economic Record*, 82 (258), 239 – 252.
[47] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010), Paragraphs 66, 145.
[48] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010), Paragraph 146.
[49] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010), Paragraph 147.
[50] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010).
[51] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 16.

> 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.[52]
>
> 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.[53]

65. 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.[54]

and

> The Tribunal finds itself in a position where it has one estimate of theta before it (the SFG's March 2011 report value of 0.35) in which it has confidence, given the dividend drop-off methodology. No other dividend drop-off study estimate has any claims to be given weight vis-à-vis the SFG report value.[55]

Final estimate of Gamma

66. Having determined that the appropriate distribution rate is 70% and that the best dividend drop-off estimate of theta is 0.35, the Tribunal multiplied these two estimates together to obtain a gamma estimate of 0.25:

> Taking the values of the distribution ratio and of theta that the Tribunal has concluded should be used, viz 0.7 and 0.35, respectively, the Tribunal determines that the value of gamma is 0.25.[56]

[52] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraphs 18-19.
[53] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 22.
[54] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 29.
[55] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 38.
[56] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 42.

4. Estimating the distribution rate

Definition

67. The distribution rate (F) is the ratio of (a) the total amount of franking credits distributed to shareholders in a given year, to (b) the total amount of franking credits created in a given year. The average distribution rate over a period can be estimated as the ratio of the total credits distributed during the period to the total credits created during that period. The Australian Tax Office (**ATO**) maintains statistics on both components of this ratio.

Current estimates

68. But for Lally (2013) and the practice of the QCA, there is universal endorsement of 0.7 as an appropriate estimate of the distribution rate.

Australian Competition Tribunal estimate is 0.7

69. As set out above, the Australian Competition Tribunal has recently adopted a distribution rate of 0.7:

> In light of these submissions and the material before the Tribunal, the Tribunal concludes that the distribution ratio is 0.7 for the calculation of gamma.[57]

AER estimate is 0.7

70. In its recent Draft Guideline, the AER reaffirmed its use of a distribution rate of 0.7. The AER uses the term "payout ratio" and states that:

> The payout ratio would be estimated using the cumulative payout ratio approach. The cumulative payout ratio is an estimate of the average payout rate from 1987, when the imputation system began, to the latest year for which tax data is available. Based on current evidence, this leads to an estimate of 0.7.[58]

71. The AER also states that some of the advantages of this accepted approach for estimating the distribution rate are:

> it is simple and intuitive
> it is based on long-term data from a reliable source
> this approach has wide support from experts and stakeholders.[59]

McKenzie and Partington estimate is 0.7

72. In their recent report for the QRC, McKenzie and Partington (2013) use the term "access fraction" and state that:

> There is less debate about the magnitude of the access fraction as this can be measured reasonably well from taxation statistics and a value of 70% is widely accepted as the proportion of credits created that are distributed.[60]

[57] Application by Energex Limited (Distribution Ratio (Gamma)) (No 3) [2010] ACompT 9 (24 December 2010), Paragraph 4.
[58] AER Draft Rate of Return Guideline, p. 24.
[59] AER Draft Rate of Return Guideline, Explanatory Statement, p. 125.
[60] McKenzie and Partington, p. 31.

QRC submission is 0.7

73. In its recent WACC Submission, the QRC proposes a distribution rate of 0.7, stating that:

> the available evidence on the distribution ratio indicates that a reasonable estimate of this parameter is 0.7. This is consistent with the most recent tax data, and analysis of this data conducted by NERA in a recent report for the Energy Networks Association.[61]

Aurizon submission is 0.7

74. In its recent submission, Aurizon proposed a distribution rate of 0.7.

QCA estimate

75. The practice of the QCA has always been to adopt a distribution rate of 0.8. This was the practice prior to the QCA's last WACC Review in 2004 and the 0.8 estimate has been maintained in every decision since. It has not been updated to reflect any new data or new evidence or Tribunal decisions or changes to regulatory practice. It is also inconsistent with the submissions of all stakeholders to the current proceedings – all of whom recommend a value of 0.7.

76. In our view, the current QCA estimate of 0.8 has no support and is therefore untenable and should be replaced by the estimate of 0.7 that has been proposed by all parties.

Lally (2013) estimate

No basis for rejecting the accepted estimate

77. In relation to the distribution rate, Lally (2013) begins with a discussion of why the 100% value that the AER adopted in its 2009 WACC review, based on advice from Handley (2008), is flawed and unsupportable. This simply confirms the view of the Tribunal and indeed the AER's own submissions to the Tribunal in the *Gamma* Case.

78. Lally (2013) then turns to the empirical estimation of the distribution rate. As set out above, the widely accepted empirical estimate is 0.7. This is based on what NERA (2013) refer to as the "cumulative payout ratio." In fact, the AER's Draft Rate of Return Guideline Explanatory Statement explicitly sets out that approach and notes that its estimate of the distribution rate will be based on that approach. In relation to the implementation of that approach, and the data required for it, the AER concludes 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.[62]

79. Lally (2013) reaches a different conclusion. He questions the reliability of the data and the resulting estimates. For example, he states that:

> Such data is available from the ATO but there are concerns about it[63]

[61] See QRC WACC Submission, p. 20 and NERA, *The Payout Ratio: A Report for the Energy Networks Association*, June 2013.
[62] AER Draft Rate of Return Guideline – Explanatory Statement, p. 236.
[63] Lally (2013), p. 4.

and that:

> The ATO data suggests a figure of 70% but NERA (2013a) identifies some difficulties in the underlying data.

80. This leads Lally (2013) to seek to produce his own estimate of the distribution rate by extrapolating payout ratios from a sample of ten companies. Nowhere does he explain what "concerns" or "difficulties" he might have with the ATO data that forms the basis of the estimate that is used by everyone else. And nowhere does he explain why his sample-of-ten approach is not subject to the same concerns or difficulties.

81. Moreover, the only data issue raised by NERA (2013) is that an obvious error for one figure in 2000-2001 was corrected after contacting the ATO for confirmation.

Lally approach produces unstable estimates and has been previously rejected by the QCA

82. Associate Professor Lally has previously advised the QCA to reject the accepted approach in favour of an estimate based on his own analysis of a handful of firms. In his report for the QCA's 2004 WACC review, Lally (2004) refers to his estimate of the distribution rate for eight companies and recommends that the distribution rate should be set to 100% on the basis of that analysis.[64] The QCA rejected that recommendation in 2004. Lally (2013) extends the sample of firms from 8 to 10 and the estimate falls from 100% to 85%.

83. Lally (2013) notes that estimates from the accepted approach have been 0.69, 0.71, 0.69, and 0.70 and that "these estimates are broadly consistent."[65] Clearly, they are much more consistent than the small sample estimates produced by his own small sample approach. In our view, the stable estimates from the accepted approach should not be rejected on the basis of unstated "concerns" or "difficulties."

84. Another relevant consideration is the role of foreign sourced profits. Suppose the average company distributes 70% of its profits as dividends. In general, a company with 30% or more of its profits from overseas operations will be able to distribute all of the imputation credits that it creates. Very large companies (such as the ten that Lally (2013) examines) are more likely to have more overseas profits than the average firm – and certainly more overseas profits than the benchmark regulated firm. Consequently, it is not clear that the Lally approach is capable of producing an appropriate estimate of the distribution rate in any event.

Lally's recommendation to the AER

85. In a recent report for the AER, Lally (2013) concludes that:

> Invoking the historical market-wide data, from both the ATO and from annual reports, this points to an estimate for the distribution rate of at least 70%.[66]

86. The AER interprets this conclusion as an endorsement of its 70% distribution rate in that the 70% estimate:

[64] Lally (2004), p. 40.
[65] Lally (2013), p. 41.
[66] Lally (2013), *The estimation of gamma*, report for the AER, pp. 5, 54.

> is supported by Lally's report on our estimation of gamma in the explanatory statement accompanying the draft guideline.[67]

87. We note that the Lally (2013) reports to the AER and QCA are dated two days apart and are based on exactly the same set of evidence. The advice to the QCA is an estimate of 85% due to the unspecified unreliability of the ATO data that produced the 70% estimate. The same data, however, produced advice to the AER two days earlier of an estimate of "at least 70%," suggesting that the 70% estimate at least falls within a reasonable range.

Conclusions and recommendations

88. Our main conclusions in relation to the distribution rate are:

    a) The accepted empirical approach consistently produces an estimate of 0.7;

    b) Standard Australian regulatory practice is to adopt a distribution rate of 0.7;

    c) The only information before the QCA that is not perfectly consistent with an estimate of 0.7 is the advice from Lally (2013). However, in a report to the AER dated two days earlier, Lally (2013) proposed a range for the distribution rate that included the generally-accepted estimate of 0.7, and which the AER interpreted as an endorsement of its estimate of 0.7;

    d) All stakeholders to the current proceedings have proposed a distribution rate of 0.7;

    e) The long-standing QCA value of 0.8 is no longer tenable and should be updated to 0.7; and

    f) The Lally approach (which the QCA has previously rejected) should again be rejected. No case has been made for rejecting the accepted approach. In any event, the Lally approach is inferior to the accepted approach in its reliance on a very small sample of firms that are not indicative of either the average firm or the benchmark regulated firm.

[67] AER (2013), Rate of Return Guideline – Explanatory Statement, p. 165.

5. Empirical estimate or theoretical assumption?

Definition of gamma

89. The practice of all Australian regulators is to estimate gamma as the product of two sub-parameters:

$$\gamma = F \times \theta$$

where F is the distribution ratio (the proportion of created imputation credits that are distributed to shareholders) and θ (theta) is the value of a distributed credit that is reflected in share prices.

90. Expressing gamma as the product of the distribution rate and the value of distributed credits is standard regulatory practice,[68] it is proposed in the McKenzie and Partington (2013) report for the QRC,[69] and it is proposed in the QRC WACC submission, which states:

> Under the Officer framework, the value for gamma is typically calculated as the product of the distribution rate (or payout ratio) and the value of distributed imputation credits (referred to as the utilisation rate, or theta). The distribution rate represents the proportion of generated imputation credits that companies distribute to investors, while theta represents the value to investors of each credit received (as a proportion of the credit's face value). The Officer framework was set out in Bob Officer's seminal paper: R. R. Officer, 'The cost of capital under an imputation tax system', *Accounting and Finance*, Vol. 34, Issue 1, May 1994.[70]

91. In summary, gamma should be estimated as the product of the distribution ratio and "the value of distributed imputation credits, theta."

92. Lally (2012) correctly notes that the value of distributed imputation credits that is reflected in share prices may be less than the face value of those credits for a number of reasons. One reason is that not all investors are able to redeem imputation credits, and Lally (2012) refers to this as the "utilisation" factor. There are also a number of other reasons including taxation, timing, portfolio and convenience factors (which are explained in more detail below).[71] Lally correctly notes that theta will represent the combined effect of *all* the reasons why the market value of an imputation credit (i.e., the proportion of the face value of the credit that is incorporated into the stock price) might be less than its face value.[72]

93. Lally (2012) recommends that:

    a) The utilisation factor should be set to 1 by "ignoring foreigners"[73] and assuming that all imputation credits are distributed to Australian residents who can redeem them; and

    b) All of the other reasons why the market value of distributed credits might be less than their face value should be set aside, in which case theta is simply replaced by the assumed 100% "utilisation rate" *U*.

94. Lally (2013) makes the same recommendation.[74]

[68] AER Draft Rate of Return Guideline, p. 24.
[69] McKenzie and Partington (2013), Equation (1), p. 31.
[70] QRC WACC Submission, Footnote 51, p. 20.
[71] See Paragraphs 167 to 176 below.
[72] Lally (2012), p. 12.
[73] Lally (2012), p. 6.
[74] Lally (2013), pp. 3, 13, 39.

95. In the remainder of this section, we consider whether the standard practice of adopting a value of theta based on empirical evidence should be replaced by adopting a value of *U* based on theoretical reasoning.

Market data vs. theoretical assumption

The QCA's 2004 WACC Review

96. The standard and accepted regulatory approach is to estimate WACC parameters with reference to the observed prices of traded securities. For example, the risk-free rate and required return on debt are estimated with reference to traded bond prices and beta and MRP are estimated with reference to observed stock prices. It is also the standard and accepted regulatory approach to estimate the value of distributed imputation credits (theta) using market data.

97. At the time of its last WACC review in 2004, the QCA practice was to adopt a theta value of 0.625. This value was based on the QCA's analysis of the market data that was available at the time. In its conclusions to the 2004 WACC review, the QCA noted that:

> Lally reviews several different approaches to estimating the value of the utilisation rate. The first approach uses empirical estimates from examining either ex-dividend day returns or the proportion of imputation credits attached to dividends that are redeemed against investor tax liabilities. Lally notes that the typical estimate drawn from these studies is about 0.60.[75]

98. That is, prior to its 2004 WACC review, the QCA adopted a gamma value of 0.5 based on:

    a) A distribution rate (*F*) of 0.8; and

    b) A value of distributed credits (theta) of 0.625 ("about 0.60") – that estimate being based on the QCA's assessment of the empirical evidence available at the time.

99. In his 2004 Draft Report to the QCA, Associate Professor Lally recommended that the value of theta should be set on the basis of an assumption that equity returns are set in a completely segmented Australian capital market in which there was no foreign investment. He advised the QCA that within such an assumed framework, theta should be set equal to a utilisation rate that:

> should be estimated on the basis that all investors in Australian equities are Australians.[76]

and that within such an assumed framework:

> it is not appropriate to recognise foreigners. Consequently an estimate for the utilisation rate of close to 1 is recommended.[77]

[75] DBCT Draft Decision (2004), p. 229. Note that the empirical estimates of theta will reflect *all* reasons why investors do not value imputation credits at their face value, so the QCA's use of the term "utilisation rate" in this context is somewhat misleading. In actual fact, the QCA concluded that the empirical evidence that was available at that time supported a theta estimate in the order of 0.6.
[76] Lally (2004) Draft Report, February, p. 33.
[77] Lally (2004) Draft Report, February, p. 38.

100. As part of the 2004 review, a number of stakeholders submitted that the estimation of gamma (and its components) is "ultimately an empirical issue."[78] Stakeholders submitted that theta should be estimated with reference to market data, as is the practice with all other WACC parameters, rather than being set on the basis of a theoretical assumption.

101. In his Final Report to the QCA, Associate Professor Lally rejected these submissions and again recommended that:

> Since national capital markets are assumed to be segregated, it would be inconsistent to recognise foreigners. Accordingly they are omitted from consideration.[79]

102. Lally (2004) went on to advise that if all foreign investors are omitted from consideration, the only remaining investors are residents. Since all resident investors can utilise franking credits, Associate Professor Lally suggested that an appropriate estimate of the utilisation rate (and consequently theta) is 1.

103. The QCA concluded that the empirical evidence available in 2004 supported a value of theta in the order of 0.6, broadly consistent with the 0.625 value that the QCA has traditionally adopted. The QCA rejected Associate Professor Lally's advice that the empirical estimate should be replaced with a value of 1 based on theoretical assumption, concluding in 2004 that:

> the Authority considers that no change in the value of the utilisation rate is warranted at this time.[80]

104. The QCA also concluded that setting theta to the extreme value of 1 would be inconsistent with its use of the Sharpe-Lintner CAPM and that since it was maintaining its use of that model it would be inappropriate to set theta to 1.[81]

The same recommendation again

105. In all of its determinations since 2004, the QCA has maintained the same estimate of gamma that is based on its assessment of the relevant empirical evidence. In no determination has the QCA, or any other Australian regulator, sought to estimate theta on the basis of theoretical reasoning – they have all adopted empirical estimates based on observed data.

106. In his most recent advice to the QCA, Lally (2012, p. 6; 2013, p.3) again recommends that the empirical evidence based on observed market prices should be set aside in favour of a value of 1 that is obtained via the application of his own theoretical reasoning. Associate Professor Lally has advanced no new arguments or provided any new analysis since previously making the same recommendation to the QCA.

107. Moreover, Lally (2013) reaches the opposite conclusion in relation to the distribution rate – the other component of gamma – where he rejects "theory based estimates" in favour of "empirical estimates" based on the NPV=0 principle which:

[78] DBCT Draft Decision (2004), p. 230.
[79] Lally (2004) Final Report, November, pp. 44-45.
[80] DBCT Draft Decision (2004), p. 38.
[81] DBCT Draft Decision (2004), p. 178.

> implies use of an empirically determined distribution rate rather than one arising from standard valuation assumptions.[82]

The mainstream approach

108. The alternative to simply *assuming* that theta is equal to one, is to empirically *estimate* it using market data. When estimating all other WACC parameters, consideration is given to the available market data and empirical estimates. The weight that is applied to a particular estimate then depends upon the precision with which it is estimated, the statistical reliability of that estimate, and whether the estimate is economically reasonable. The same should apply to the estimation of theta, and consequently gamma.

109. Another way of looking at this issue is that the theoretical assumption approach involves estimating theta not as it *is*, but as it *would be* if there were no foreign investors. But if we estimate theta on this basis, consistency demands that we should do the same for *all* WACC parameters. For example, the risk-free rate would presumably be higher if no foreign investment were allowed, as there would be less demand for Australian government bonds.

110. In summary, when estimating theta the first choice one must make is whether to:

    a) Assume a value for theta by omitting from consideration the impact of foreign investors, in which case *all* WACC parameters should also be estimated not as they are, but as they would be if there were no foreign investors; or

    b) Estimate theta with reference to market data (weighting that evidence in line with the statistical precision and reliability and economic reasonableness of the estimates) in the same way that all other WACC parameters are estimated.

111. In our view, it is appropriate to estimate theta, and consequently gamma, from market data in the same way that all other WACC parameters are estimated.

112. Lally (2013) provides a useful analogy that crystalizes the issue:

> one might develop a model for the operation of gravity in a vacuum and then apply it to situations that are not vacuums; the empirical fact of friction will then conflict with the model but friction does not thereby become part of the model. In both cases, the ideal course of action is to build a model that reflects all empirical features. If this cannot be done, some error is inevitable. The question then is how best to deal with the problem.[83]

113. In this setting, the first-best solution would be to augment the model, relaxing the vacuum assumption by incorporating air resistance within a more complex model. In the asset pricing context, regulatory rules or practice may prevent the use of a more complex expanded model.

114. A second-best solution would be to preserve the simpler model, but to adjust the gravity parameter to take account of empirical observations – recognising that the empirical data does not conform with the pure theoretical assumption because the atmosphere is not in fact a vacuum. That is, we tune the parameters of the model so that it best conforms with the empirical observations. This is analogous to the standard approach of using empirical data to estimate the effect that imputation credits have on stock prices.

[82] Lally (2013), p. 41.
[83] Lally (2013), p. 14.

115. A third possibility is to continue using the theoretical model – to perform calculations under the assumption that the atmosphere is a vacuum and that air resistance will have no effect, even though we have clear evidence to the contrary. This is analogous to the approach of assuming away the existence of foreign investors – assuming that foreign investors will have no effect on the value of imputation credits.

Conclusions and recommendations

116. In our view, the standard and accepted regulatory approach of estimating WACC parameters with reference to the observed prices of traded securities should also be applied when estimating gamma. A regulator should not assume that:

    a) All distributed credits are redeemed; and

    b) The full face value of every imputation credit that is redeemed is reflected in the stock price

    when there is clear empirical evidence to the contrary.

6. The Lally "test"

The utilisation rate and theta

Analysis of the issue

117. Lally (2012, 2013) notes that estimates of theta that are based on market data will reflect the impact of foreign investors to the extent that they have chosen to invest in Australian shares. This is consistent with the definition of the market that is generally adopted by Australian regulators. For example, the AER has recently stated that:

> Consistent with the 2009 WACC review, we propose to define the market as an Australian domestic market that recognises the presence of foreign investors to the extent they invest in the Australian market. This definition reflects the realities of capital markets, and sits in between the purely theoretical definitions of a 'full segregated' market and a 'fully integrated' market. This definition has critical implications for the value of imputation credits.[84]

118. Lally (2012, 2013) goes on to set up a test of whether a particular value of theta (or *U*) produces an allowed return on equity that is between the allowed return in a theoretical full segregation scenario and a theoretical full integration scenario. This requires estimates of what each WACC parameter would be in each of those theoretical scenarios.[85]

119. Associate Professor Lally undertakes the estimation task by starting with estimates of WACC parameters from the real world and making adjustments to determine what those parameter values 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 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 an impossibility.

120. 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.

121. However, Lally (2012, 2013) 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 (or *U*) 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.[86]

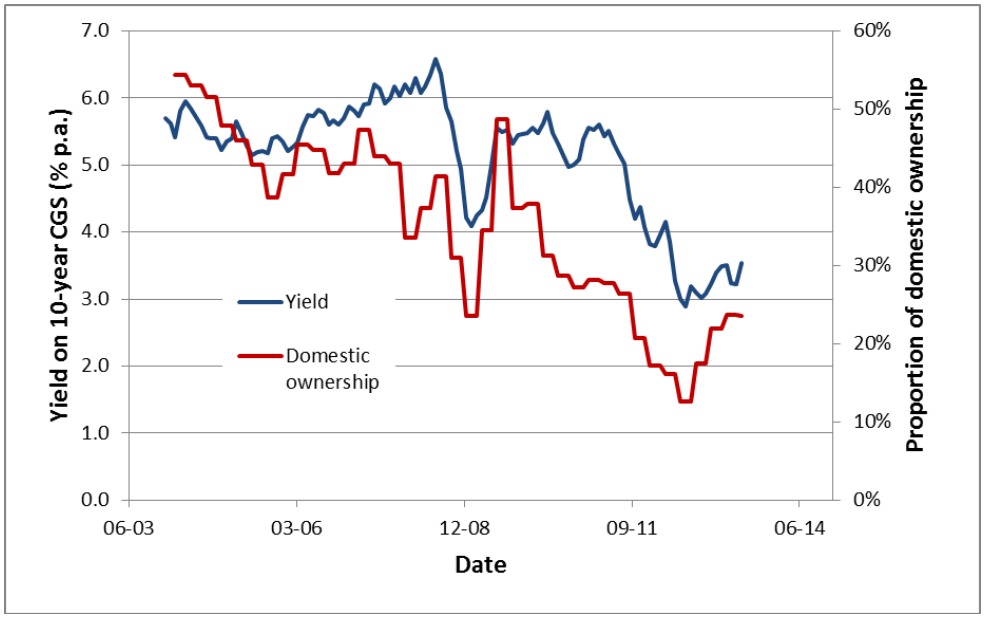
122. The most important aspect of the Lally "test" is his assumption that the risk-free rate would not change in a segmented market. In our view, this assumption is untenable. The Reserve Bank reports that more than 80% of all Australian government bonds are owned by foreign investors. If that

[84] AER (2013), Draft Rate of Return Guideline: Explanatory Statement, p. 120.
[85] See Lally (2012), pp. 26-35 and Lally (2013), pp. 29-38. The two papers use slightly different values for one of the parameters, but that does not materially affect any of the results or any of the conclusions.
[86] 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.

demand were removed from the market, the price would surely be lower and the yield would surely be higher. Yet the Lally test is based on the risk-free rate being the same in a perfect segmentation world as in a perfect integration world. Lally (2012, 2013) uses this assumption to rule out all of the empirical evidence on theta in favour of his theoretically reasoned value of 1.

123. 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 1 and Figure 2 below.

Figure 1
Australian government bond yields and the proportion of domestic ownership



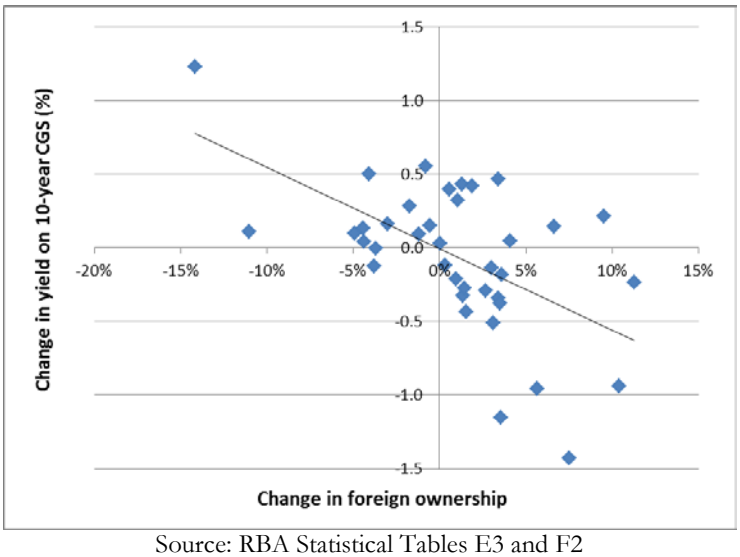
Source: RBA Statistical Tables E3 and F2.

124. Figure 1 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.

125. Figure 2 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.[87]

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

Figure 2
RBA estimates of the ownership of Australian equity



Source: RBA Statistical Tables E3 and F2

126. 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.

127. Lally (2012, 2013) 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.[88]

128. This simply means that the CAPM is silent on how the risk-free rate is determined. 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.

129. 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.[89] But this does not imply that we should assume the same weather conditions for the

[88] Lally (2012) Footnote 18 and Lally (2013) Footnote 23.
[89] 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.

Boston and Brisbane marathons. That is, "exogenous" means "determined by factors outside the model" – it does not mean "equal in all circumstances."

130. Moreover, if the perfect segmentation risk-free rate is increased by just 1% above the perfect integration risk-free rate, all of the empirical estimates based on market data pass the Lally test. That is, even setting aside all of the problems with such a test, none of the market-based empirical estimates are ruled out unless one assumes that government bond yields would be identical whether or not foreign investors are admitted.

Summary and recommendation

131. In our view, the QCA should not use the Lally "test" to set aside all of the empirical evidence based on market data in favour of a theoretically assumed value of theta. That test requires estimates of point estimates of what CAPM parameters would be in theoretical perfect segmentation and perfect integration worlds, it ignores estimation error, and it invokes the assumption that government bond yields would be the same in these two worlds. Such a test is not fit for any purpose, let alone the purpose of excluding all available empirical evidence in favour of a theoretically assumed value.

7. The use of redemption rates

Redemption rates cannot be used to estimate theta

Reliable estimates are unavailable

132. The redemption rate is the ratio of redeemed credits to distributed credits and can be estimated in two ways:

    a) Using aggregate tax statistics published by the ATO relating to the distribution and redemption of imputation credits; and

    b) By estimating the proportion of Australian shares that are held by resident investors, and assuming that those resident investors will redeem any imputation credit they receive.

133. Both approaches are fraught with difficulty. The aggregate tax statistic method requires two separate ATO databases that are inconsistent in the amount of $87.5 billion. This method also requires a series of assumptions about the flow of imputation credits through corporate structures, trusts and other entities. The problems are well summarised by Hathaway (2013) who has used the tax statistic method in previous papers but now concludes that:

> I would caution anyone…against relying on those parts of my earlier reports which focused on ATO statistics.[90]

134. The domestic ownership approach is also fraught with difficulty. This is best demonstrated by the fact that Lally (2012) concludes that "the proportion of Australian equities held by Australians" is 54%[91] whereas the QRC concludes that "approximately 70% of equity in Australian enterprise groups (including companies and unit trusts) is held by domestic investors" [92] and Lally (2013) puts the figure at either 60% or 70%, without reference to his earlier estimate of 54%.[93]

Tribunal ruling against redemption rates

135. The fact that a reliable estimate of the redemption rate is unavailable turns out to be unimportant. This is because the Australian Competition Tribunal has already ruled that redemption rates cannot be used to estimate the value of distributed imputation credits (theta). The Tribunal held that redemption rates provide no information about the value of imputation credits. An investor would rationally redeem a credit whether they valued it a 5% or 100% of face value. That is, redemption only signifies that the credit had some positive value to the redeemer – nothing more than that.

136. Specifically, the Tribunal held that the ATO tax statistic approach did not produce an estimate of value and that the AER was wrong to have interpreted tax statistic estimates in that way. In particular, the Tribunal held that the ATO tax statistic approach provides no more than an upper bound check on estimates of theta 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

[90] Hathaway (2013), Paragraph 12.
[91] Lally (2012), p. 6.
[92] QRC WACC Submission, p. 20.
[93] Lally (2013), p. 13.

> 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.[94]

Further problems with the use of redemption rates

137. In a report for the AER, McKenzie and Partington (2011)[95] question whether redemption rates are even fit to be used as an upper bound for theta (even assuming they could be reliably estimated). Consequently, redemption rates (whether estimated directly from ATO aggregate tax statistics or indirectly by estimating the aggregate proportion of domestic ownership and assuming that domestic shareholders will redeem) can, at most, be used as an upper bound for the value of theta.

138. Similarly, Lally (2013) notes the concerns that Hathaway (2010, 2013) expresses in relation to the reliability of the tax statistics data and concludes that:

> the best that can be said of all this is that the redemption rate is uncertain[96]

139. Lally (2013) also suggests that, even if the redemption rate could be reliably estimated, it is likely to "overestimate the utilisation rate" due to the possibility of foreign investors being able to effectively transfer some credits to domestic investors.[97]

140. Lally (2013) 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.[98]

Conclusion and recommendation

141. In our view, redemption rates cannot be used to provide a point estimate of theta in the way the QRC proposes.

The interpretation of theta

142. In their report for the QRC, McKenzie and Partington (2013) note that there are two very different and mutually exclusive conceptual interpretations of theta. One interpretation is that theta should measure "utilisation" which is another name for the redemption rate discussed above. The other possible interpretation is that theta represents the market value of distributed credits.

143. McKenzie and Partington (2013) go on to note that:

[94] Application by Energex Limited (No 2) [2010] ACompT 7 (13 October 2010), Paragraph 91.
[95] McKenzie and Partington, (2011), p. 6.
[96] Lally (2013), p. 15.
[97] Lally (2013), p. 15.
[98] Lally (2013), p. 14.

> The standard practice has been to measure the market value of theta.[99]

144. The recent revisions to the National Electricity Rules and National Gas Rules put this issue beyond doubt when they define:

> γ is the value of imputation credits. [100]

145. Moreover, as set out above, the Australian Competition Tribunal has recently ruled that redemption or "utilisation" rates cannot be used to estimate theta because they do not provide an estimate of *value*, whereas the empirical studies do.

146. Also, as explained in Section 5 of this report, theta represents the extent to which the *value* of distributed imputation credits is reflected in the *value* of the stock price.

147. In their report for the QRC, McKenzie and Partington (2013) are very careful not to take any stance on whether they consider that theta should be interpreted as a redemption rate or as the value of distributed imputation credits. However, in our view it is abundantly clear that theta represents the *value* of distributed imputation credits for all of the reasons set out above. In this case, theta must be set using empirical evidence based on market prices.

148. Other support for the use of a market value estimate of theta rather than a redemption estimate is:

a) McKenzie and Partington (2013) themselves note that "the standard practice has been to measure the market *value* of theta;"[101] and

b) The National Electricity Rules and National Gas Rules specifically define gamma to be "the *value* of imputation credits."[102]

149. The difference between the utilisation/redemption rate and the value of imputation credits is made clear in Equation (3) from Lally (2013):[103]

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

which can be re-written as:

$$S_0 = \frac{Reinvestment_1 + Dividend_1 + IC_1U + S_1}{1 + r_e}.$$

150. This equation shows that the current *value* of equity is the present value of:

a) The amount of post-tax profit that is reinvested back into the business at the end of the period (which is expected to produce future cash flows that have a present value equal to the amount that is invested);

[99] McKenzie and Partington (2013), p. 32.
[100] McKenzie and Partington (2013), p. 32.
[101] McKenzie and Partington (2013), p. 32.
[102] McKenzie and Partington (2013), p. 32.
[103] Lally (2013), p. 10.

b) The cash dividend to be paid at the end of the period;

c) The value of imputation credits to be paid at the end of the period; and

d) The ex-dividend, ex-reinvestment value of equity at the end of the period.

151. In using a redemption rate estimate, Lally (2013) invokes the assumption that every dollar of imputation credit that is redeemed increases the value of equity by one dollar: IC_1 is the amount of imputation credits distributed and U is the proportion of them that are redeemed. That is, when using redemption rates Lally (2013) assumes that the full face value of every imputation credit that is redeemed is reflected in the stock price.

152. It is clear from the equation above that:

a) What is required is an estimate of the *value* of imputation credits – the extent to which distributed imputation credits *are* reflected in the stock price; and

b) Lally (2013) *assumes* that the full face value of every imputation credit that is redeemed is reflected in the stock price.

153. When using his preferred theoretical estimate based on the elimination of all foreign investors, Lally (2013) then additionally *assumes* that all imputation credits that are distributed will be redeemed (i.e., $U = 1$).

154. The alternative approach to making these assumptions is to use empirical estimates from observed market prices. Indeed the empirical evidence contradicts the assumptions set out above:

a) There is clear empirical evidence contradicting the assumption that all distributed credits are redeemed; and

b) There is clear empirical evidence contradicting the assumption that the full face value of every imputation credit that is redeemed is reflected in the stock price.

155. The choice for a regulator is to:

a) Adopt a value based on empirical evidence (consistent with regulatory practice, the Tribunal decision, and with the way all other WACC parameters are estimated); or

b) Adopt a value based on assumptions that are contradicted by the empirical evidence.

Updated estimates of equity ownership

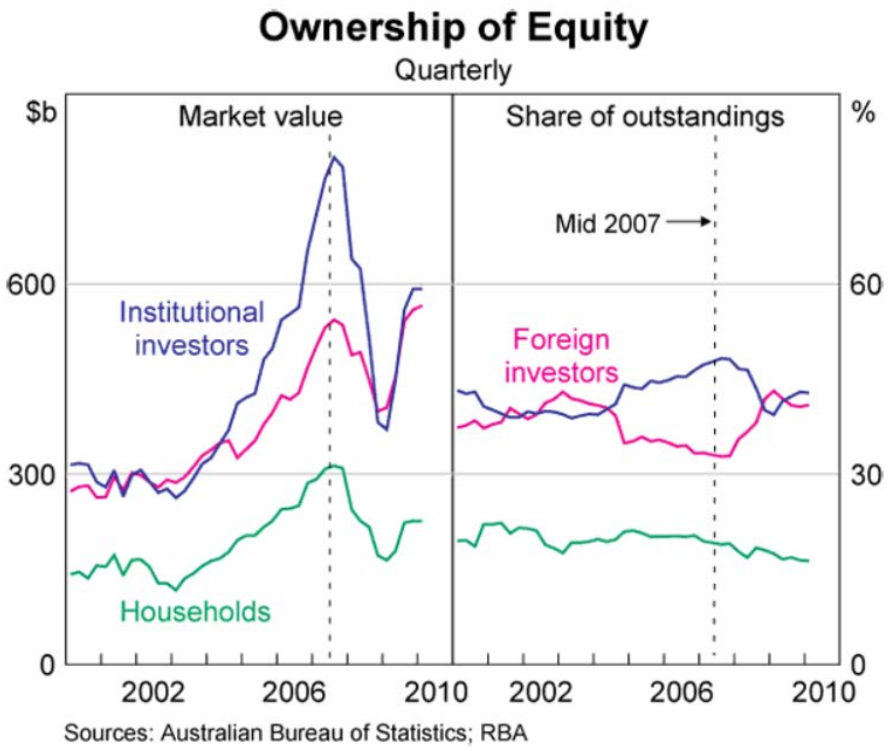
156. We also note that the QRC concludes that "approximately 70% of equity in Australian enterprise groups (including companies and unit trusts) is held by domestic investors." [104] The QRC indicates that the source of this figure is:

> Data from the Australian Bureau of Statistics indicates that approximately 70% of equity in Australian enterprise groups (including companies and unit trusts) is held by domestic investors.[105]

[104] QRC WACC Submission, p. 20.

157. The original source of this figure is the AER Draft Guideline Explanatory Statement, which in turn refers to a 2007 estimate from the Australian Bureau of Statistics (**ABS**).[106] A 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 3 below.

Figure 3
RBA estimates of the ownership of Australian equity



Source: Black and Kirkwood (2010), RBA.

158. If the ABS aggregate equity ownership estimate is to be used, the 2007 estimate should not be preferred to the updated estimates – which are materially higher.

159. Moreover, there are a number of reasons why the aggregate ABS equity ownership estimate is inappropriate and should not be used. First, in additional to privately-owned equity the ABS aggregate estimate includes equity in government-owned trading enterprises, general government and the Reserve Bank. If the purpose is to determine what proportion of imputation credits (which are distributed with the dividends paid by listed 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. The ASX has recognised that issue and has presented foreign ownership estimates for privately-owned equity only. Lally (2012) refers to the ASX (2011) estimate of 46% foreign ownership and concludes that "the proportion of Australian equities held by

[105] QRC WACC Submission, p. 20.
[106] 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.

Australians" is 54%.[107] 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%.[108]

160. The ASX estimate is based on data for privately-owned equity. However, this estimate apparently includes listed and unlisted equity.[109] 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.[110]

Conclusions and recommendations

161. In summary:

a) Redemption rates should not be used as an estimate of theta for the reasons set out above (including the fact that the Tribunal has already determined that redemption rates cannot be used as an estimate of theta); and in any event

b) The 30% estimate adopted in the AER Explanatory Statement, and referred to in the QRC Submission and Lally (2013), 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;

   iii) Includes equity in unlisted entities; and

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

[107] Lally (2012), p. 6.
[108] ASX (2013), p. 2. The ASX figures are based on ABS series 5232.0, Table 32 for the September quarter 2012.
[109] See the data description for ABS series 5232.0 at http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/5232.0 Explanatory%20Notes1Jun%202013?OpenDocument.
[110] 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=.

Lally (2012, 2013) estimates of redemption rates

162. In his reports to the QCA, Associate Professor Lally provides a number of estimates of "the proportion of Australian equities owned by Australians. In his first report, Lally (2012) states that:

> the proportion of Australian equities held by Australians is 54%.[111]

163. The source of this estimate is ASX (2012), which is based on data through to the end of 2011.

164. In his second report, Lally (2013) cites two estimates. Both of these pre-date the estimate he used in his first report and both of them are higher than the estimate he used in his first report. He provides no indication of why these superseded estimates should now be preferred to the more recent estimate used in his 2012 report. He simply refers to the task of estimating the proportion of Australian equities owned by Australians and states that:

> In respect of listed equity, this is currently about 60% (Black and Kirkwood, 2010, page 2). If unlisted equity were included, with valuations based upon accounting values, the result is (unsurprisingly) higher at about 70% (Australian Bureau of Statistics, 2007).[112]

165. Throughout the remainder of the report, Lally (2013) states that the proportion of Australian equities held by Australians is "about 0.70"[113] without providing any indication of why that estimate should be preferred among the two (superseded) estimates that are cited.

166. In summary, between his 2012 and 2013 reports, Associate Professor Lally has increased his equity ownership estimate materially by relying on data that is four years older and which includes approximations in relation to unlisted equity that is the subject of data quality warnings from the ABS – without any explanation or even any reference to his earlier estimate that was based on more current data.

[111] Lally (2012), p. 6.
[112] Lally (2013), p. 13.
[113] Lally (2013), pp. 3, 38, 53.

8. Lally's criticisms of the SFG (2011) study

The utilisation rate and theta

Analysis of the issue

167. Theta represents the extent to which a distributed imputation credit is reflected in the market price of the firm's shares. For example, if theta is 0.35, the share price would be higher than it would otherwise be by 35% of the face value of the imputation credits that are expected to be distributed.

168. Lally (2012) correctly notes that there are a number of reasons why, in reality, theta would be less than 1. One reason is that not all investors are eligible to redeem imputation credits. In particular, imputation credits are worthless to non-resident investors. Consequently, to the extent that non-resident investors have some effect, the share price will not reflect the full face value of imputation credits and theta will be less than 1. Lally (2012) defines this effect as the "utilisation rate" where $U \leq 1$.

169. Lally (2012) also notes that there are other reasons why the full face value of imputation credits would not be incorporated into share prices. For example, resident investors must pay tax on imputation credits at their top marginal rate[114] and investors may find the receipt of dividends and imputation credits to be inconvenient from a portfolio re-balancing perspective.[115] Both of these effects are common between dividends and imputation credits. That is, these effects will similarly reduce the market values of cash dividends and imputation credits. Lally (2012) uses the symbol δ to represent this effect, where $\delta \leq 1$.

170. Lally (2012) does not consider any other reasons why share prices would reflect less than the full face value of imputation credits and defines:

$$\theta = U \times \delta .$$

171. However, there are other reasons why share prices would reflect less than the full face value of imputation credits. For example, there is a time delay in obtaining a benefit from imputation credits. Whereas dividends are available to the investor as soon as they are paid, imputation credits only have value after the investor's end-of-year tax return is filed and processed. Another important consideration is the portfolio holdings of resident investors. If dividend imputation leads resident investors to hold more domestic shares than they otherwise would (in order to receive imputation credits) their portfolios will become more concentrated and the 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.[116] This is another reason why share prices might not reflect the full face value of imputation credits.

172. Lally (2013) and other regulators have specifically recognised this point:

> 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

[114] Lally (2012), p. 11.
[115] Lally (2012), p. 11, in particular, the reference to Frank and Jagannathan (1998).
[116] 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.

> transaction costs, and sacrifice international diversification opportunities by purchasing Australian stocks with imputation credits.[117]

173. There are likely to be many more reasons why share prices do not reflect the full face value of imputation credits. If those that are not accounted for in U or δ are summarised by the symbol φ, we have $\theta = U \times \delta \times \varphi$.

174. Lally (2012) submits that:

> SFG mistakenly equate the utilisation rate with the coefficient on franking credits in their regression model.[118]

175. That is, Lally (2012, 2013) submits that SFG (2011) equate θ with U. He goes on to propose that the SFG estimate of θ should be converted into an estimate of U by dividing by an estimate of δ. However, there are at least four problems with Associate Professor Lally's analysis on this point:

a) SFG do *not* equate θ with U. SFG do not seek to estimate U and never even refer to U anywhere in their report. Rather, SFG set out to estimate theta, they do estimate theta, and they report their estimate of theta – as required under the Australian regulatory framework and as directed by the Australian Competition Tribunal. SFG do not "mistakenly equate" anything;

b) The adjustment that Associate Professor Lally proposes is not the standard practice of the relevant literature and it is not made by Australian regulators;

c) The adjustment that Associate Professor Lally proposes ignores a number of reasons why share prices might not reflect the full face value of imputation credits (those summarised by φ above); and

d) Lally (2012) notes that the adjustment that he proposes would have a very small effect anyway (converting an estimate of θ of 0.35 into an estimate of U of 0.40).

Summary and recommendation

176. SFG (2011) do not inadvertently equate θ with U as Lally (2012) suggests. Rather, SFG (2011) set out to estimate theta, as directed by the Tribunal. The adjustment that Associate Professor Lally proposes is non-standard and incomplete and would not make a material difference in any event.

Trading volumes around ex-dividend dates

Summary of the issue

177. Lally (2012) correctly notes that trading volumes tend to increase around ex-dividend dates, potentially affecting estimates of theta from dividend drop-off studies. He states that:

[117] Lally (2013), p. 16. The reference to ERA (2013) appears to be a reference to Vo, Gellard and mero (2013).
[118] Lally (2012), p. 3 and Lally (2013), p. 17.

> the results from dividend drop-off studies may tend to reflect the composition of only shareholders around ex-dividend day and this may be significantly different to that at other times due to "tax arbitrage".[119]

178. This possibility is well-known and has recently been addressed in some detail as part of the AER's Guideline process, a summary of which is set out below.

SFG analysis

179. In previous regulatory reports and academic articles, SFG has explicitly noted that trading volumes tend to increase around ex-dividend dates and (for that very reason) has consistently recommended that the estimate of theta should be informed by a range of relevant empirical methodologies.[120] Indeed SFG provided exactly that advice during the AER's WACC Review in 2008/09.[121]

180. The AER did not accept SFG's advice and instead restricted its analysis of theta to only two pieces of evidence: tax statistic redemption rates and dividend drop-off analysis. The Australian Competition Tribunal held that tax statistic redemption rates cannot be used to estimate theta and that the AER had erred in using them for that purpose. This left the Tribunal with dividend drop-off analysis. Having determined that the AER had erred in relying on the Beggs and Skeels (2006) dividend drop-off analysis, the Tribunal directed SFG to perform a "state of the art" drop-off analysis, which SFG duly performed. SFG would have performed other empirical analyses (such as the analysis of futures prices that it recommended to the AER) had the Tribunal directed it to, however, the Tribunal did not make any such direction.

181. In our view, the fact that SFG performed the state-of-the-art dividend drop-off analysis as directed by the Tribunal is neither "remarkable" [122] nor "even more remarkable."[123]

Effect on estimates of theta

182. An increase in trading volume around ex-dividend dates (caused by dividend capture or tax arbitrage trading) could have an effect on estimates of theta from dividend drop-off analysis. This issue has recently been dealt with in some detail as part of the AER's current WACC Review. The analysis of this issue indicates that, if anything, the increased trading has the effect of increasing the estimate of theta. This is broadly because the increased trading is driven by that subset of investors who value dividends and imputation credits most. To the extent that this "high valuation" subset of investors has a disproportionate effect on prices around ex-dividend events, the estimated value of dividends and imputation credits is likely to be greater than it would otherwise be. This analysis is consistent with the fact that dividend drop-off analysis tends to produce higher estimates of theta than are obtained from other empirical techniques.

183. A detailed summary of the analysis from the AER's current WACC Review is attached as Appendix 1 to this report.

[119] Lally (2012), p. 13.
[120] See Lally (2012), pp. 15-16.
[121] See, for example, SFG (2008), "The impact of franking credits on the cost of capital of Australian firms," Report submitted to AER WACC Review.
[122] Lally (2012), p. 15.
[123] Lally (2012), p. 16.

Summary and recommendation

184. An increase in trading volume around ex-dividend dates could have an effect on estimates of theta from dividend drop-off analysis. The analysis of this issue indicates that, if anything, the increased trading has the effect of increasing the estimate of theta. This analysis is consistent with the fact that dividend drop-off analysis tends to produce higher estimates of theta than are obtained from other empirical techniques.

Use of a constant term

Analysis of the issue

185. Under the Terms of Reference for the SFG (2011) study, four different econometric specifications or "models" were examined, as set out in Table 1 below. The base specification (Model 1) *does* include a constant term, where that constant term represents the value of a $1 cash dividend. All other specifications can be interpreted as generalised least squares (GLS) estimation of the base model. Under GLS estimation, all variables (including the constant term) are scaled by a common factor to improve the statistical reliability of the estimates. No additional terms (such as an extra constant term) are inserted into a model when GLS estimation is being used – to do so would break the integrity of the base model.

Table 1
Econometric models estimated in SFG (2011) and SFG (2013) and ERA (2013)

Model	Specification	Interpretation
Model 1	$\frac{P_{i,t-1}-P_{i,t}^{*}}{D_i}=\delta+\theta\frac{FC_i}{D_i}+\varepsilon_i$	Basic model.
Model 2	$\frac{P_{i,t-1}-P_{i,t}^{*}}{P_{i,t-1}}=\delta'\frac{D_i}{P_{i,t-1}}+\theta'\frac{FC_i}{P_{i,t-1}}+\varepsilon_i'$	GLS estimation of (1) with weighting variable dividend yield, $\frac{D_i}{P_{i,t-1}}$.
Model 3	$\frac{P_{i,t-1}-P_{i,t}^{*}}{D_i\sigma_i}=\delta''\frac{1}{\sigma_i}+\theta''\frac{FC_i}{D_i\sigma_i}+\varepsilon_i''$	GLS estimation of (1) with weighting variable inverse stock return volatility, $\frac{1}{\sigma_i}$.
Model 4	$\frac{P_{i,t-1}-P_{i,t}^{*}}{P_{i,t-1}\sigma_i}=\delta'''\frac{D_i}{P_{i,t-1}\sigma_i}+\theta'''\frac{FC_i}{P_{i,t-1}\sigma_i}+\varepsilon_i'''$	GLS estimation of (1) with weighting variables dividend yield, and inverse stock return volatility.

186. Model 2 is obtained by simply scaling every term in Model 1 by the dividend yield. Thus, Model 2 does not contain a constant term because the constant term in Model 1 has been scaled by the dividend yield, as have all other terms, thereby ensuring consistency between the models. Similarly, Models 3 and 4 are obtained by simply multiplying all terms in Model 1 by a common scaling factor.

187. Thus, we begin with the base Model 1, which posits that we expect the ex-dividend price change to reflect the market value of the cash dividend and the associated imputation credit. But for the dividend and imputation credit, the expectation is that the stock price would (on average) simply follow the broad market. The other three models are simply scaled versions of the base model, where all terms are scaled by the same factor, potentially improving the reliability and precision of the estimates.

188. Adding an additional constant term to the scaled specifications would have two implications:

a) It would make those specifications inconsistent with the base model; and

b) It would violate the basic notion that, in the absence of a dividend, stocks would (on average) follow the broad market. Indeed Associate Professor Lally himself states that:

> The lack of any compelling reason for the expected price change, or the expected rate of return, to be non-zero as the (cash) dividend goes to zero supports exclusion of the constant.[124]

189. Lally (2012) notes that the reason for not adding an additional constant term into the specification for Model 4 is not explained in detail in SFG (2011). The primary reason for this is that the four model specifications were approved by the Tribunal and incorporated into the Terms of Reference for the study. Finalising the Terms of Reference required a separate Tribunal hearing, where one of the matters discussed was the inclusion of an additional constant term in some of the model specifications. The Tribunal held that no additional constant term should be included – for the reasons set out above.

Summary and recommendation

190. The econometric specifications that were used in the SFG (2011) study were specifically approved by the Australian Competition Tribunal. Moreover, the Tribunal specifically considered arguments about the insertion of an additional constant term and rejected them. The specifications used in the SFG (2011) report have formed the basis of the gamma value used by the AER for the last two years and have recently been endorsed by the ERA.[125]

Cash dividends less than fully valued

Analysis of the issue

191. Lally (2012) correctly notes that dividend drop-off analysis produces a pair of estimates – an estimate of the value of cash dividends and an estimate of the value of imputation credits. SFG (2011) specifically recognised this point in the conclusion of their study:

> For the reasons set out in detail in this report, we conclude that the appropriate estimate of theta from the dividend drop-off analysis that we have performed is 0.35 and that this estimate is paired with an estimate of the value of cash dividends in the range of 0.85 to 0.90.[126]

192. Australian regulatory practice has been to essentially ignore the evidence that cash dividends are less than fully valued when using the Sharpe-Lintner CAPM. There is an inconsistency in this practice in that the regulator assumes cash dividends are fully valued when using the CAPM to estimate the required return on equity, but adopts a materially lower value when estimating gamma. Consistency would require that the regulator should adopt the same value for this parameter throughout the WACC estimation process. If the regulator adopts a particular estimate of the value of cash

[124] Lally (2012), p. 16.
[125] Vo, Gellard and Mero (2013).
[126] SFG (2011), Paragraph 3.

dividends when estimating the required return on equity, the regulator should adopt the same value when estimating gamma. In our view this is not "remarkable."[127]

Summary and recommendation

193. Where a parameter is used in more than one place in a single WACC estimation exercise, consistency would require that the regulator should adopt the same value throughout.

Elimination of micro-cap companies

Analysis of the issue

194. The "principal data issue"[128] identified by Lally (2012) is the elimination of micro-cap companies from the sample. SFG (2011) exclude any company that represented less than 0.03% of the market capitalisation of the All Ordinaries index. The origin of this filter was Beggs and Skeels (2006) who state that:

> Although market capitalisation alone is not critical to the analysis, companies with very small market capitalisations tend to be rarely traded on the stock exchange. Therefore the market pricing mechanisms for firms with small market capitalisations are not efficient, and the price changes on the ex-dividend date will be an unreliable measure of true scarcity. The cut-off figure of 0.03 was suggested by Andrew Poppenbeck, the manager of Comm-Sec Share Portfolio Database.[129]

195. In relation to the SFG (2011) study, the 0.03% filter was proposed by the AER and accepted by the Tribunal. It was a matter about which there was no dispute, so there was need for an extensive sensitivity analysis in relation to it.

196. The same 0.03% filter has recently gained further regulatory acceptance – the ERA (2013) study adopts the same filter describing it as an "important filter."[130]

197. In light of the evidence set out above, it would seem that SFG's use of the 0.03% filter would be better described as "standard" rather than "doubly remarkable."[131]

198. Associate Professor Lally's primary reason for preferring the inclusion of the micro-cap firms is that they are likely to be too illiquid to be of interest to dividend capture or tax arbitrage traders.[132] However, this is precisely the reason for excluding them. As Beggs and Skeels (2006) note, "the market pricing mechanisms for firms with small market capitalisations are not efficient, and the price changes on the ex-dividend date will be an unreliable measure of true scarcity."[133]

Summary and recommendation

199. The 0.03% size filter is a standard practice that has been implemented for the good reason that including illiquid micro-cap firms is likely to add noise to the estimation task.

---

[127] Lally (2012), p. 17.
[128] Lally (2012), p. 17.
[129] Beggs and Skeels (2006), Footnote 16, p. 252.
[130] Vo, Gellard and Mero (2013), p. 13.
[131] Lally (2012), p. 19.
[132] Lally (2012), p. 19.
[133] Beggs and Skeels (2006), Footnote 16, p. 252.

Consistency with terms of reference

200. Lally (2012) appears to suggest that SFG (2011) have not followed the prescribed terms of reference:

> By contrast, the Terms of Reference mandate a different model, [134]

but then concludes that the approach adopted by SFG:

> is not in conflict with the prescribed methodology[135]

and that

> On other matters, SFG appears to have abided by the Terms of Reference and to have applied the prescribed methodology correctly and consistently.[136]

201. Associate Professor Lally's final position appears to be acceptance that SFG have properly followed the terms of reference – the same conclusion that was reached by the Tribunal.

Interpretation of results

Analysis of the issue

202. Lally (2012) appears to take issue with the conclusion of SFG (2011) that the results of their analyses support a theta estimate of 0.35. SFG perform a range of analyses using different econometric specifications, estimation techniques, and data samples and they perform a range of sensitivity analyses. Every combination and permutation of these choices produces a confidence interval that includes 0.35 and for most 0.35 is close to the centre of the confidence interval. The analysis of the results from SFG (2011) is set out as Appendix 2 to this report. In our view no serious analysis of that evidence could conclude that 0.35 is not a reasonable estimate of theta.

203. Indeed, Lally (2012) does not suggest that 0.35 is an unreasonable conclusion to be drawn from the results of SFG (2011). Rather, he notes that the upper bound of the confidence interval from some of the analyses is only slightly below the value of 0.625 that the QCA presently uses.[137] He does not suggest what the QCA should do with this information, but there appear to be two possibilities:

a) If the QCA is of the view that they should use the best available estimate, they would adopt the 0.35 value that has been endorsed by the Tribunal; or

b) If the QCA is of the view that they should maintain their current value (of 0.625) unless that estimate falls outside some confidence interval or upper bound, then:

   i) The current QCA estimate *does* fall outside even Associate Professor Lally's upper bound of 0.59; and

[134] Lally (2012), p. 20.
[135] Lally (2012), p. 20.
[136] Lally (2012), p. 20.
[137] Lally (2012), p. 23.

ii) Having determined that the current value should change, the QCA would have to determine whether to change to the best available estimate or some other inferior estimate.

9. Contemporaneous empirical evidence

The use of pre-2000 data

204. Lally (2012, 2013) recommends that theta should be set according to theoretical reasoning rather than empirical evidence. Nevertheless, both reports include surveys of some of the empirical evidence that is based on traded market prices. However, those reviews consist essentially of the same set of papers that were included in Associate Professor Lally's 2004 report for the QCA. In particular, all of the papers in the 2012 review use pre-2000 data, and consequently provide estimates of theta under a different tax regime – one pre-dating the Rebate Provision that took effect in July 2000. For a number of years, Australian regulators have consistently rejected empirical estimates of theta that are based on pre-2000 data. Consequently, it is not clear that this review is of any relevance whatsoever.

205. For example, in its 2008-09 WACC Review, the AER considered the reliability of estimates that use any pre-2000 data. In its 2009 Final Decision the AER noted that:

> In its explanatory statement the AER considered there to be persuasive evidence to reject pre-2000 data from consideration in estimating theta. In this respect there is a clear conceptual case to focus on data from the post-2000 period only, given the tax changes in July 2000 which allowed a full cash rebate to resident investors for unused imputation credits.[138]

206. The AER's 2009 Final Decision considered this issue further and went on to conclude that:

> the AER maintains its view from the explanatory statement that there are strong conceptual grounds for a structural break in theta estimates after the July 2000 tax changes. The AER reiterates that the case for a structural break as a result of the July 2000 tax changes has a sound conceptual basis, and is supported by the most reliable and verifiable empirical evidence.[139]

207. The AER's final conclusion on this point at its 2009 WACC Review was:

> The AER maintains its view that there is compelling evidence to reject pre-2000 data from consideration in estimating a forward-looking theta. Accordingly, for the purposes of this final decision the AER has estimated theta based on post-2000 data only.[140]

208. Even Lally (2012) states that:

> Given that there was a tax change in July 2000 that permitted Australian investors to fully utilise the tax credits, which is likely to have raised the utilisation rate, studies that estimate the utilisation rate from that point are preferred and studies with the longest data set since then are doubly preferred. On this basis, the SFG study is the best.[141]

and Lally (2013) confirms that:

[138] AER 2009 WACC Review Final Decision, p. 426.
[139] AER 2009 WACC Review Final Decision, p. 428.
[140] AER 2009 WACC Review Final Decision, p. xix and p. 430.
[141] Lally (2012), p. 24.

> results using data prior to July 2000 are of much less interest as estimates of the current value.[142]

209. In addition to using out-dated data, a number of the papers that Associate Professor Lally has included in his 2004 and 2012/2013 reviews for the QCA are well known to suffer from econometric problems and extremely small sample sizes and have not been relied upon by other regulators for some years.

210. Since Australian regulatory practice has already rejected the use of these papers based on their out-dated sample periods, it would seem to be unnecessary to provide a detailed analysis of each of these papers. However, if the QCA determines that pre-2000 data has once again become relevant for the purposes of estimating theta, such a detailed analysis could be provided.

211. Moreover, Lally (2012, 2013) does not consider a number of recent empirical studies that use post-2000 data and that are currently being considered by other regulators. The remainder of this section summarises the results from the contemporaneous empirical evidence.

Contemporaneous dividend drop-off evidence

212. The dividend drop-off studies that use post-2000 data are:

a) Beggs and Skeels (2006) – but only the results for the post-2000 sub-period;

b) SFG (2011);

c) SFG (2013); and

d) ERA (2013).

The Beggs and Skeels and SFG studies

213. In its 2009 WACC review, the AER sought to rely on the Beggs and Skeels estimate to the exclusion of all other dividend drop-off estimates. The Australian Competition Tribunal recently had cause to consider the reliability of the Beggs and Skeels estimate and concluded that the AER was wrong to have relied on that study. The Tribunal then directed that SFG should conduct a "state-of-the-art" dividend drop-off study to assist the Tribunal.[143] The Tribunal also directed that the dividend drop-off study to be performed by SFG "should employ the approach that is agreed upon by SFG and the AER as best in the circumstances."[144]

214. After a number of meetings and telephone conferences and circulation of several draft versions of proposed Terms of Reference, agreement on several matters could not be reached. This required a further hearing before the Tribunal on those matters that were in dispute. At the completion of this hearing, the Tribunal made an immediate ruling, finding against the AER on all issues.

215. SFG then conducted the state-of-the-art dividend drop-off study and circulated a draft report to all parties. The AER and the regulated businesses provided comments on the draft report and these were taken into account in a revised report that was provided to all parties and to the Tribunal.

[142] Lally (2013), p. 19.
[143] Australian Competition Tribunal [2010] ACompT 7, Paragraph 146.
[144] Australian Competition Tribunal [2010] ACompT 7, Paragraph 147.

216. At the final hearing, the AER submitted that the SFG study had departed from the Terms of Reference, could be criticised on numerous other grounds, and should therefore be afforded little weight. The Tribunal rejected these submissions entirely concluding that:

> It is not necessary to set out the details of the eight issues, since they raise no important or significant questions of principle…Calling them "major compliance issues" is unnecessarily pejorative.
>
> Whether or not the terms of reference have been departed from, what is important is whether the concerns raised by the AER with the construction of the database cast doubt on the value of SFG's analysis, requiring the Tribunal to give it less weight than it otherwise would. In the Tribunal's view, they do not.
>
> 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.[145]

217. The Tribunal then accepted the estimates of the SFG (2011) study in full.

> 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. 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.[146]

218. 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.[147]

and

> The Tribunal finds itself in a position where it has one estimate of theta before it (the SFG's March 2011 report value of 0.35) in which it has confidence, given the dividend drop-off methodology. No other dividend drop-off study estimate has any claims to be given weight vis-à-vis the SFG report value.[148]

219. The SFG (2011) study concluded that:

> For the reasons set out in detail in this report, we conclude that the appropriate estimate of theta from the dividend drop-off analysis that we have performed is 0.35 and that this estimate is paired with an estimate of the value of cash dividends in the range of 0.85 to 0.90.[149]

220. The SFG (2013) study employs the same methodology as the SFG (2011) study, but extends the data set through to the end of 2012. The conclusion from that study is that:

[145] Australian Competition Tribunal [2011] ACompT 9, Paragraphs 18-19.
[146] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 22.
[147] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 29.
[148] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 38.
[149] SFG (2011), Paragraph 3.

> the conclusions from that earlier study remain valid when tested against the updated data set.[150]

The ERA study

221. Vo, Gellard and Mero (2013) from the Economic Regulation Authority of Western Australia (**ERA**) have recently produced a drop-off study that essentially follows the methodology of the SFG studies. One important deviation from the SFG methodology is that the ERA study also presents results that are based on analysis that omits the standard market adjustment. 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%.

222. The market adjustment is performed in every study set out in Table K.12 of the Explanatory Statement, including the ERA study. However, the ERA study also reports results in the absence of this standard market adjustment on the basis that, but for the dividend, a particular stock price might have moved (over the ex-dividend day) by somewhat more or less than the market. For example, it is possible that when the broad market increases by 2%, a particular stock might have moved (but for the dividend) by 1.8% or by 2.2%.

223. Omitting the market adjustment entirely is certain to be an inferior estimate on average. Whereas individual stocks might have moved by somewhat more or less than the broad market, on average stocks will move exactly in accordance with the market index, by definition.[151] That is, the standard market adjustment produces estimates of "but for the dividend" stock price movements that are unbiased on average – in the sense that it is equally likely that (but for the dividend) the stock might have moved somewhat more or somewhat less than the broad market index. Omitting the market adjustment entirely is to assume that (but for the dividend) the stock price would not have moved at all. Such an omission creates a bias. If the broad market increased by 2% over the ex-dividend day, the assumption that the stock price would have been 0% is clearly likely to be a material under-estimate, on average.

224. The reason the ERA authors provide for reporting results that omit the standard market correction is that "applying the market correction is an unnecessary complication to an already complex econometric task." [152] However, the correction is necessary to produce unbiased estimates and it is not difficult to implement. For these reasons, the ENA submits that the subset of the results in the ERA paper that are based on analysis that omits the standard market adjustment should receive no weight.

225. When the standard market adjustment is performed, the ERA study confirms 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.[153] When no market correction is applied, the ERA reports an average theta estimate of 0.40 and a robust regression estimate from Model Specification 4 of 0.32.

[150] SFG (2013), Paragraph 6.
[151] This is because the market portfolio is an average taken over all stocks.
[152] Vo, Gellard and Mero (2013), p. 32.
[153] Vo, Gellard and Mero (2013), Table 5.

Contemporaneous dividend drop-off evidence

226. In our view, the best available dividend drop-off estimate of theta is 0.35. This is the estimate reported by SFG (2011) and SFG (2013). It is also closely consistent with the results of the ERA study when the standard market adjustment is applied.

Contemporaneous evidence from futures contracts

227. Cannavan, Finn and Gray (2004) examine ordinary shares (which entitle the holder to dividends and imputation credits) and futures contracts on those ordinary shares (which do not entitle the holder to dividends or imputation credits). The implied value of dividends and imputation credits can be estimated by comparing the simultaneous prices of the two securities. In particular, for futures contracts there is a well-known "cost of carry" or "fair value" relationship that stems from the fact that the futures payoff can be exactly replicated by a dynamic strategy of borrowing money to buy the physical shares.

228. An investor who purchases a futures contract effectively receives a payoff of $S_T - F$ at maturity of the contract where S_T is the stock price at maturity and F is the futures price. An investor who borrows money to buy the stock today and then repays the borrowed funds at maturity receives a payoff of $S_T - S_0(1+r)^T$ where S_0 is the current stock price, r is the interest rate, and T is the time to maturity. Since both of these strategies require no initial investment and because all terms other than S_T are known constants, it must be the case that $F = S_0(1+r)^T$. This relationship does not require any assumptions other than the absence of easy arbitrage opportunities – the most fundamental assumption that is required before market prices can be used for *any* purpose. Cannavan, Finn and Gray (2004) show that this pricing relation holds to within a fraction of a per cent for the data in their sample.[154]

229. Cannavan, Finn and Gray (2004) then use this no arbitrage condition to estimate the implied value of dividends and imputation credits using a sample of firms that paid a dividend prior to the maturity of the futures contract.

230. Since this study uses pre-2000 data, the specific results are assumed to be irrelevant for current purposes. However, it is relevant that the methodology and approach was approved by the peer review process of the *Journal of Financial Economics* (JFE), which is one of the top three finance journals world-wide.

231. SFG (2013)[155] update the Cannavan, Finn and Gray (2004) study using data from July 2000 to December 2012. They employ the same methodology as was used for the earlier JFE study – they simply apply it to an updated post-2000 data set. They conclude that:[156]

> This report has been prepared by two of the authors of the Cannavan, Finn and Gray (2004) study. We have used the same data source and applied the same methodology to data from July 2000 to February 2013. The data set consists of 52,041 observations. The simultaneous prices of ordinary shares and matching futures contracts imply that:

[154] Cannavan, Finn and Gray (2004), Figure 2.
[155] SFG (2013), "Using market data to estimate the equilibrium value of distributed imputation tax credits."
[156] SFG (2013), "Using market data to estimate the equilibrium value of distributed imputation tax credits," p. 3.

> a) The combined value of a $1 cash dividend and the associated imputation credit is $0.99;
>
> b) Cash dividends are valued at 94% of face value; and
>
> c) Imputation credits are valued at 12% of face value.

Hybrid securities

232. Feuerherdt, Gray and Hall (2010)[157] apply dividend drop-off analysis to hybrid securities. These are securities that have relatively high fully-franked dividends and low price variation over time. For this reason they tend to have a higher signal-to-noise ratio than ordinary shares in the sense that the dividend tends to be large relative to the usual daily price change.

233. Feuerherdt, Gray and Hall report that the combined value of a $1 dividend and the associated imputation credit is $1.[158] Because these securities are designed to pay a high fully-franked dividend, there are no examples of unfranked dividends in the sample, in which case attribution of the $1 total value between the dividend and imputation credit requires the value of one of the components to be set using extraneous evidence. The authors note that if the cash dividend is assumed to be fully valued, the implication is that imputation credits do not affect the equilibrium value of these securities – theta is zero.

Rate of return studies

234. Two recent studies test whether (other things being equal) firms with higher imputation credit yields are valued more highly by investors. Both find that they are not. This implies that equilibrium stock prices are independent of the amount of imputation credits that they generate, which leads the authors to conclude that theta is not materially different from zero, in equilibrium.

235. Lajbcygier and Wheatley (2012)[159] summarise their results as follows:

> The provision of imputation tax credits can in principle lower the returns that investors require on equity. Whether in practice imputation credits lower the returns that investors require depends in large part on the impact of foreign investors on equity prices. This is because foreign investors in general cannot use the credits that domestic equities provide. We use a range of pricing models and monthly data from July 1987 to December 2009 to test whether, holding risk constant, equity returns are related to credit yields. We find no evidence that the provision of imputation tax credits lowers the returns investors require on equity.[160]

236. They conclude that:

[157] Clinton Feuerherdt, Stephen Gray and Jason Hall, (2010), The value of imputation tax credits on Australian hybrid securities, *International Review of Finance*, 10:3, 365-401.
[158] Feuerherdt, Gray and Hall (2010), Figure 4 and Table 1.
[159] Paul Lajbcygier and Simon Wheatley (2012), Imputation credits and equity returns, *The Economic Record*, 88, 283, 476-494.
[160] Lajbcygier and Wheatley (2012), p. 476.

> If a representative long-term investor assigns no value to the credits that firms distribute, and our results cannot reject that hypothesis, then in assigning a value to credits regulators are likely to underestimate the cost of equity for these firms. [161]

237. NERA (2013) have recently updated the results of Labcygier and Wheatley (2012). They note that a positive value of theta implies that:

> there will be a negative relation, holding a firm's equity beta constant, between the firm's cost of equity, exclusive of a value assigned to imputation credits distributed, and the firm's credit yield.[162]

238. However the results suggest that:

> there is a positive, rather than a negative relation, holding a firm's equity beta or betas constant, between the firm's without-credit cost of equity and its credit yield,[163]

in which case they conclude that:

> there is no evidence to suggest that the market places a value on imputation credits distributed.[164]

239. The results of Lajbcygier and Wheatley (2012) have recently been corroborated by Siau, Sault and Warren (2013)[165] who summarise their results as follows:

> We investigate the value placed on imputation credits in the Australian stock market by examining whether they are capitalised into prices using two main methods. First, we relate stock prices to the present value of dividends and imputation credits under a discounted cash flow valuation model. Second, we regress earnings yields on imputation credit yields plus a range of control variables. We find no substantial evidence that the presence of imputations credits has any significant marginal influence on the overall level of share prices. Our results align with Lajbcygier and Wheatley (2012), who uncover no evidence of any negative relation between imputation credits and realised returns. Together these findings suggest that imputation credits are not priced from the perspective of longer-term buy-and-hold investors. The implications are that such investors might expect to fully benefit from their imputation credits, and that it may be inappropriate to incorporate imputation effects when estimating cost of capital.[166]

240. In a recent report for the Energy Networks Association, NERA (2013)[167] updates the Lajbcygier and Wheatley (2012) study and summarises the results from this strand of the literature. This literature recognizes that the total required return on equity depends on systematic risk factors. Under the Sharpe-Lintner CAPM, for example, the total required return on equity depends on beta. Imputation

[161] Lajbcygier and Wheatley (2012), p. 491.
[162] NERA (2013), p. ii.
[163] NERA (2013), p. iii.
[164] NERA (2013), p. iv.
[165] Shaun Siau, Stephen Sault and Geoffrey Warren, (2013), "Are imputation credits capitalised into stock prices?" Working Paper, Australian National University.
[166] Siau, Sault and Warren (2013), p. 1.
[167] NERA (2013), "Imputation credits and equity prices and returns."

credits are relevant only to the extent that the total required return is partitioned between imputation credits on the one hand and dividends and capital gains on the other. If imputation credits are highly valued by the representative investor, firms with high franking credit yields would require lower returns from dividends and capital gains, other things (including systematic risk) equal. However, NERA (2013) show there is *not* an inverse relationship between franking credit yield on the one hand and dividends and capital gains on the other. NERA (2013) conclude that this literature suggests that there is no evidence that a material value for imputation credits is factored into stock returns or capitalized into stock prices.

241. These studies are broadly based on the same methodology of the studies that the AER has previously used to support its use of the SL CAPM, rather than a version of the CAPM that allows for dividends and capital gains to be differentially valued.[168] In the 2009 WACC Review, the AER stated that:

> the evidence from US dividend yield studies indicates that cash dividends are fully valued in total equity returns. In turn, this implies that there is no clear evidence to replace the Sharpe CAPM with an alternative tax-adjusted CAPM (e.g. Brennan CAPM), even if this option were available to AER under the NER.[169]

242. The "US dividend yield studies" on which the AER relies to support its assumption that cash dividends are fully valued (as per the assumption of the Sharpe-Lintner CAPM) compare the returns of companies with high dividend yields with the returns of companies with low dividend yields. Because there is no difference between the returns of each group, the authors conclude that returns are independent of dividend yields. If dividends were valued less than capital gains, high-dividend yield companies would require higher total returns.

243. The franking credit yield studies show that returns are independent of the imputation credit yield. If imputation credits were materially valued, firms with high imputation credit yields would require lower returns (from dividends and capital gains) – but this is not the case.

Summary of contemporaneous evidence

244. The contemporaneous evidence produces estimates of the value of distributed imputation credits in the range of 0 to 0.35.

[168] For example, the model of Lally and van Zijl (2003).
[169] 2009 WACC Review Final Decision, pp. 461, 465.

10. Market practice

Evidence of market practice

Survey evidence and independent expert reports

245. When determining an appropriate value for gamma, one of the relevant pieces of evidence is the practice of market professionals. The evidence of market practice has been considered in more detail by the AER. This section reviews the most recent regulatory analysis of market practice in relation to gamma.

246. As part of its consideration of the gamma parameter during its 2009 WACC Review, the AER considered a range of evidence about the practice of market professionals. That evidence showed that:

a) The great majority of independent expert valuation reports make no adjustment at all to either cash flows or discount rates to reflect any assumed value of franking credits (Lonergan, 2001[170]; KPMG, 2005[171]);

b) The great majority of CFOs of major Australian companies (who between them account for more than 85% of the equity capital of listed Australian firms) make no adjustment at all to either cash flows or discount rates to reflect any assumed value of franking credits (Truong, Partington and Peat, 2008[172]);

c) Published Queensland Government Treasury valuation principles require government entities to make no adjustment at all to either cash flows or discount rates to reflect any assumed value of franking credits (OGOC, 2006[173]); and

d) Credit rating agencies make no adjustments in relation to franking credits to any quantitative metric that they compute when developing credit ratings for Australian firms.

247. In a recent report for the ENA, SFG (2013)[174] reviewed independent expert reports from 2008 to 2013 and concluded that:

> None of the reports in our sample make any adjustment in relation to dividend imputation. No adjustments of any kind were made to any cash flows and no adjustments of any kind were made to any discount rates.[175]

248. This confirms that the long-established practice of independent expert valuation professionals making no adjustment in relation to imputation credits remains the current practice.

---

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

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

[172] 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.

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

[174] http://www.aer.gov.au/sites/default/files/Report%204%20-%20Use%20of%20Independent%20Expert%20Reports%20%28Final%29%20-%2026%20June.pdf.

[175] SFG (2013), p. 2.

249. By contrast, Lally (2013) concludes that "there has been a trend in the last decade towards explicit adjustments for imputation credits.176 This appears to be based on a small survey conducted by KPMG (2013), which includes responses from six banks, six professional services firms, and six infrastructure funds.[177] No information is provided about which organisations responded to the survey, what the response rate was, which individuals within each organisation completed the survey or their qualifications or roles within the organisation. It is difficult to imagine that any survey could fare worse when compared against the criteria set out by the Tribunal for the use of survey information.[178]

250. Moreover, the largest group in the survey was infrastructure funds, who reported that they account for imputation credits in cash flows. Of course, the cash flows of any regulated infrastructure asset are adjusted for imputation credits – according to the regulator's estimate of gamma. To ignore this adjustment would be to misestimate the allowed cash flows. Consequently, it is far from clear that these responses should be treated as independent evidence.

Equity imputation funds

251. Lally (2013) notes that the AER has recently highlighted the existence of managed funds that focus on firms with high imputation credit payout rates. He concludes that "this suggests that *U* is positive but nothing more." [179]

252. The AER's Explanatory Statement refers to an "informal survey"[180] that identifies the existence of a number of managed funds with a focus on investing in firms with a high imputation credit payout ratio. The Explanatory Statement does not indicate how many of these funds the AER has identified, the dollar volume of assets under management, the proportion of all funds that have an imputation yield focus, or any quantitative information whatsoever. The questions were not disclosed before the survey was conducted to enable comments from interested parties to be considered. Moreover, the Explanatory Statement does not indicate whether this evidence about the existence of imputation funds would cause its estimate of theta (or gamma) to be higher or lower than it would otherwise be, and by how much.

253. The existence of such funds suggests nothing more than that there exists a group of investors who value imputation credits higher than the equilibrium value that is incorporated into market prices. An equilibrium theta of 1 would imply that the full face value of imputation credits is impounded into share prices, in which case shareholders would have to pay for the full face value of imputation credits when buying the shares. In this scenario, there would be no demand for an imputation-focused fund. By contrast, an equilibrium theta of 0 would imply that imputation credits are not reflected in stock prices at all, in which case it is investors (rather than firms) who benefit from imputation. In this scenario, an individual investor who valued imputation credits may benefit from investing in a fund that focused on firms with high imputation yields. That is, the demand for imputation-focused funds will be inversely related to the equilibrium value of theta.

254. The mere fact that we observe that a number of imputation funds exist tells us nothing more than that there exists a group of investors who value imputation credits higher than the equilibrium value that is incorporated into market prices. It is not clear that anything can be concluded from this evidence, other than that theta must not be equal to 1.

---

176 Lally (2013), p. 24.
177 http://www.kpmg.com/AU/en/IssuesAndInsights/ArticlesPublications/valuation-practices-survey/Documents/valuation-practices-survey-2013-v3.pdf.
178 Application by Envestra Ltd (No 2), ACompT 3, Paragraphs 162-163.
179 Lally (2013), p. 29.
180 Explanatory Statement, p. 136.

Dividend washing

255. Lally (2013) also refers to the AER's recent comments about dividend washing, again concluding that "this suggests that *U* is positive but nothing more."[181]

256. The AER's Explanatory Statement refers to the change in tax policy to prevent certain investors from being able to effectively double the amount of imputation credits they receive via a process known as "dividend washing." The AER notes that some investors did engage in the practice of dividend washing, which "suggests that imputation credits are significantly valuable to these particular investors." [182] Of course, this tells us nothing at all about the equilibrium value of imputation credits, just that a very small subset of investors[183] have some positive valuation.

Summary

257. In relation to market practice, our view is that the clear evidence is that the majority of market practitioners do not make any adjustment for the value of imputation credits.

Regulatory consideration of market practice

258. In its 2009 WACC Review Final Decision, the AER concluded that:

> The AER agrees that the clear evidence is that the majority of market practitioners do not make any adjustment for the value of imputation credits.[184]

259. However, the AER concluded that there are at least two reasons why market professionals might not make any adjustment in relation to imputation credits:

a) No adjustment would be observed if market professionals considered that imputation credits had no material effect on the equilibrium stock price or on the equilibrium cost of equity; or

b) No adjustment would be observed if market professionals were using an approach that enabled them to bypass the need to estimate gamma.

260. The second alternative was raised in Handley (2008), a report commissioned by the AER.[185] Handley notes that the ultimate task of the regulator is to estimate the ex-imputation required return on equity, defined as:

$$r_e^* = r_e\left[\frac{1-T}{1-T(1-\gamma)}\right]$$

261. For example, if the total required return on equity is estimated to be $r_e = 10\%$ and if $T = 30\%$ and $\gamma = 0.5$, the ex-imputation required return is $r_e^* = 8.2\%$. In this case, shareholders require a total return of 10%, but the regulator sets prices or revenues so that the firm can provide a return of 8.2%, with the remaining 1.8% assumed to come from the value of imputation credits.

---

[181] Lally (2013), p. 29.
[182] Explanatory Statement, p. 136.
[183] The Explanatory Statement (p. 136) notes that the total effect is anticipated to be only $20 million per year.
[184] AER 2009 WACC Review, Final Decision, p. 407.
[185] Handley, J., 2008." A note on the value of imputation credits," December, www.aer.gov.au/content/index.phtml/itemId/722190.

262. The regulatory approach for estimating r_e^*, the ex-imputation required return on equity (which determines the regulated firm's revenue allowance), involves two steps. First, the regulator estimates r_e, the total return on equity, including imputation credits. The practice of the QCA is to estimate r_e using the Sharpe-Lintner CAPM with an estimate of MRP that is grossed-up to incorporate the assumed value of imputation credits. Then, the regulator removes the assumed effect of imputation credits via the adjustment formula set out above.[186]

263. Handley (2008) advised the AER that market professionals may be using what he called the "conventional" or "classical" approach to estimate r_e^* directly, without the need for an estimate of gamma at all. Under the SL CAPM, for example, r_e^* could be estimated directly in a single step by simply using an estimate of MRP that had not been grossed-up to reflect the assumed value of imputation credits.

264. In summary, the regulated firm's revenue requirement must be set so that the firm is able to pay a return of r_e^* to its shareholders. According to Handley (2008), there are two ways to estimate r_e^*:

    a) Use the two-step regulatory approach to estimate r_e^*; or

    b) Use the direct conventional (or classical) approach to estimate r_e^* that is used by market professionals.

265. In its 2009 WACC Review, the AER accepted the advice of Handley (2008), concluding that:

> On this basis the AER considers it is clear that there is a valid valuation framework (i.e. the classical approach) that would avoid the need to directly estimate gamma. It is quite possible and plausible that market practitioners are consciously choosing to adopt this simpler approach to estimating the cost of equity. To reiterate, as the NER require the AER to estimate gamma in calculating the tax building block (i.e. the 'assumed utilisation of imputation credits'), the classical valuation approach is not available.[187]

266. The QCA approach has been to estimate r_e^* using only the two-step approach set out above. Information about the conventional or classical approach for estimating r_e^* has been used only for the purpose of explaining away the evidence about the dominant market practice being to make no adjustment for imputation credits.

267. In our view, the QCA should at least compare its estimate of r_e^* with the estimate of r_e^* that would be obtained using the conventional or classical approach. It would not be appropriate for a regulator to raise the existence of the conventional or classical approach for the purpose of explaining away evidence of market practice, but then to not compare its own estimate of r_e^* with the corresponding estimate obtained under the conventional or classical approach.

[186] It is well known that the effect of the Australian regulatory framework is to reduce the allowed return to equity according to the formula above. This reduction in return is implemented by adjusting the taxation component of the revenue requirement.
[187] AER 2009 WACC Review, Final Decision, p. 409.

268. Lally (2013) also addresses this point. He confirms that the conventional approach is to use an ex-imputation required return on equity (defined as r_e^* above) that market professionals may estimate directly and that the regulatory approach is to first gross-up this required return to include the assumed value of imputation credits and to then remove their assumed value when calculating the regulated revenue requirement.[188]

269. Again, the conclusion is that the QCA should at least compare its estimate of r_e^* with the estimate of r_e^* that would be obtained using the conventional or classical approach.

Conclusions in relation to market practice

270. If the QCA considers that there is a "conventional" or "classical" approach that can be used to estimate the ex-imputation required return on equity without requiring an estimate of gamma, the estimate from that approach should at least be compared with the corresponding estimate from the regulatory approach.

[188] Lally (2013), p. 27.

11. QRC submissions

Queensland Resources Council

Distribution rate of 0.7

271. The Queensland Resources Council (**QRC**) submits that:

> A balanced (sic) of the empirical evidence supports a value for gamma of 0.5, as previously adopted by the QCA.[189]

272. The QRC proposes that the distribution rate (*F*) should be set to 0.7. This is the same value as was submitted by Aurizon Network. It is also the same value that was submitted by stakeholders to the AER's Cost of Capital Guideline process and is the value that the AER has proposed in its Draft Guideline.[190] The value of 0.7 is based on the best available empirical evidence.[191]

273. In our view, the current QCA estimate of 0.8 has no support and is therefore untenable and should be replaced by the estimate of 0.7 that has been proposed by all parties.

Estimating theta

274. The QRC proposes that:

> The available evidence on the value of distributed imputation credits [theta] indicates that a reasonable estimate of this parameter is also 0.7.[192]

275. The QRC sets out[193] two pieces of evidence to support its estimate of 0.7 for theta:

a) Redemption rates; and

b) Empirical estimates.

276. In our view, redemption rates cannot be used to estimate theta for the reasons set out in Section 7 of this report.

277. The QRC submission claims that "estimates of the implied value of imputation credits from econometric studies indicate a range of values, from 0.35 to 0.8."[194] This is simply untrue. A number of the empirical studies that are summarised in Section 9 of this report produce estimates materially below 0.35. All of the empirical estimates that are above 0.35 use pre-2000 data from a different tax regime that has previously been rejected by Australian regulators or have been superseded by more recent evidence. In particular, the upper bound of the QRC's range is from a paper that examines only the first three years of the imputation system and is now 20 years out of date. Other than the Beggs and Skeels (2004) estimate that was rejected by the Tribunal, we are unaware of any empirical estimate based on post-2000 data that is above 0.35. In our view, a more accurate characterisation of the range of empirical estimates is 0 to 0.35.

[189] QRC WACC Submission, p. 2.
[190] AER Draft Rate of Return Guideline, p. 24.
[191] AER Draft Rate of Return Guideline – Explanatory Statement, Section 8.3.4, p. 125.
[192] QRC WACC Submission, p. 20.
[193] QRC WACC Submission, p. 20.
[194] QRC Submission, p. 20.

McKenzie and Partington

Redemption rate or market value?

278. In their report for the QRC, McKenzie and Partington (2013) note that there are two very different and mutually exclusive conceptual interpretations of theta. One interpretation is that theta should measure "utilisation" which is another name for the redemption rate discussed above. The other possible interpretation is that theta represents the market value of distributed credits.

279. McKenzie and Partington (2013) go on to note that:

> The standard practice has been to measure the market value of theta.[195]

280. The recent revisions to the National Electricity Rules and National Gas Rules put this issue beyond doubt when they define:

> γ is the value of imputation credits. [196]

281. Moreover, as set out in Section 7 of this report, the Australian Competition Tribunal has recently ruled that redemption or "utilisation" rates cannot be used to estimate theta because they do not provide an estimate of *value*, whereas the empirical studies do.

282. Also, as explained in Section 5 of this report, theta represents the extent to which the *value* of distributed imputation credits is reflected in the *value* of the stock price.

283. In their report for the QRC, McKenzie and Partington (2013) are very careful not to take any stance on whether they consider that theta should be interpreted as a redemption rate or as the value of distributed imputation credits. However, in our view it is abundantly clear that theta represents the value of distributed imputation credits for all of the reasons set out above. In this case, theta must be set using empirical evidence based on market prices.

Empirical estimates of theta

284. In relation to the empirical evidence, McKenzie and Partington (2013) refer to "a reasonably comprehensive sample of studies estimating theta" that has recently been compiled by the AER.[197] Almost all of those studies use data that pre-dates the July-2000 change in imputation tax laws – which makes them irrelevant according to the AER's own determinations.

285. Nevertheless, McKenzie and Partington (2013) take a simple average across the estimates from all of these studies to obtain a value of 0.53, which, when combined with a 70% distribution rate produces an estimate of gamma of 0.37.

286. They go on to note that Associate Professor Partington's studies "give a higher theta."[198] Indeed the average estimate from Professor Partington's studies is nearly double the average of all other studies.[199] Placing more weight on these higher estimates produces a higher value of gamma. But McKenzie and Partington provide no reason to place more weight on Associate Professor

[195] McKenzie and Partington (2013), p. 32.
[196] McKenzie and Partington (2013), p. 32.
[197] McKenzie and Partington (2013), p. 34.
[198] McKenzie and Partington (2013), p. 34.
[199] 0.83 vs. 0.42.

Partington's studies other than "naturally we would tend to give our own studies greater weight."[200] It is only by placing more weight on Associate Professor Partington's studies that McKenzie and Partington get to a 0.5 value for gamma. Since there is no rationale for placing more weight on these studies, there is no rationale for the 0.5 value for gamma.

287. Moreover, to the extent that post-2000 data is considered to be more relevant, relatively less weight would be placed on Associate Professor Partington's empirical estimates. This approach would be more consistent with the AER's recent conclusion that the best current empirical estimates of theta lie within the range of 0 to 0.5.[201]

[200] McKenzie and Partington (2013), p. 34.
[201] AER (2013), Rate of return Guideline: Explanatory Statement, p. 170.

References

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

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, 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 Competition Tribunal, 2012, Application by Envestra Ltd (No 2) [2012] ACompT 3.

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

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

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

Australian Energy Regulator, 2009, *Review of Weighted Average Cost of Capital: Final Decision*, December.

Australian Securities Exchange, 2013, "Annual Australian cash equity market," www.asx.com.au/documents/professionals/australian_cash_equity_market_2013.pdf.

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

Beggs, D.J., and C.L. Skeels, 2006, "Ownership of Australian equities and corporate bonds," *The Economic Record,* 82 (258), 239 – 252.

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.

Cannavan, D., Finn, F., and S. Gray, 2004, "The value of dividend imputation tax credits in Australia," *Journal of Financial Economics*, 73, 167-197.

Feuerherdt, S. Gray and Hall, '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.

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.

Lajbcygier, P. and S. Wheatley, 2012, Imputation credits and equity returns, *The Economic Record*, 88, 283, 476-494.

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

Lally, M., 2013, *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, February.

Lally, M., 2004, *The Cost of Capital for Regulated Entities*, Report Prepared for the Queensland Competition Authority, November.

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

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

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.

NERA distribution rate

Queensland Competition Authority, 2001, *Regulation of electricity distribution: Final determination*, May.

Queensland Competition Authority, 2004, *Dalrymple Bay Coal Terminal draft access undertaking: Draft Decision*, October.

Queensland Competition Authority, 2005, *Regulation of electricity distribution: Final determination*, April.

Queensland Competition Authority, 2009, *QR Network draft access undertaking: Draft Decision*, December.

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

Queensland Resources Council, 2013, *QRC's WACC submission*, Submission to the QCA, November.

Rantapuska, E., 2008, "Ex-dividend day trading: who, how and why? Evidence from the Finnish market," *Journal of Financial Economics,* Vol. 88, Iss. 2, pp. 355–374.

Shaun Siau, Stephen Sault and Geoffrey Warren, 2013, "Are imputation credits capitalised into stock prices?" Working Paper, Australian National University.

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

SFG Consulting, 2013, *Using market data to estimate the equilibrium value of distributed imputation tax credits*, Report prepared for the Energy Networks Association, 3 October.

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

SFG Consulting, 2008, *The impact of franking credits on the cost of capital of Australian firms*, Report submitted to AER WACC Review.

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 effect of additional trading around the ex-dividend event – Summary of analysis from the AER cost of capital guideline process

Overview

288. 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.[202] 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.[203]

289. 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

290. 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.

291. In this regard, the AER cites evidence of abnormal trading being associated with an increase (or "run-up") in the cum-dividend price.[204] 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[205]

and that

> Short term traders appear to be arbitraging higher yield franked dividends and low spread stocks.[206]

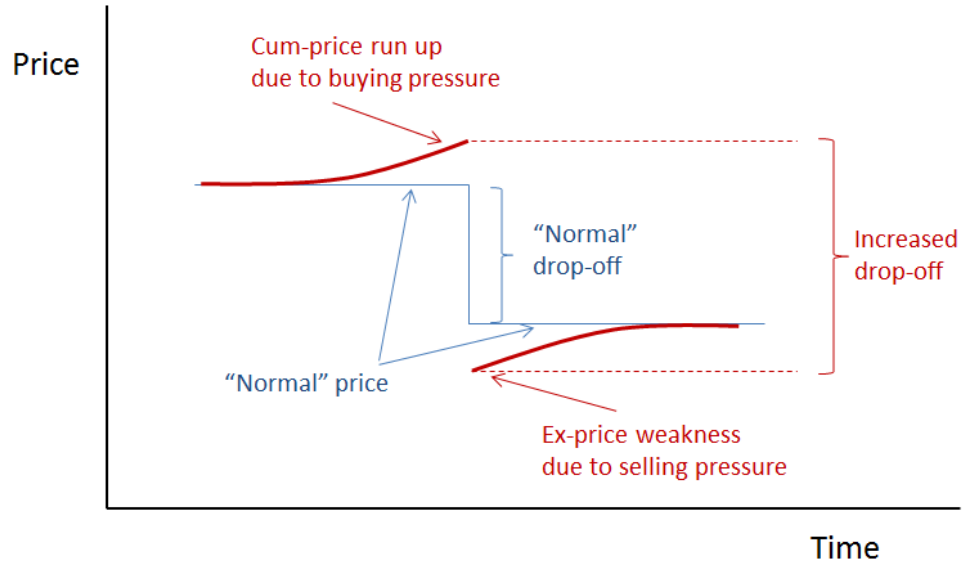
292. They conclude that the result is

> 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.[207]

[202] Explanatory Statement, pp. 242-243.
[203] Explanatory Statement, p. 242.
[204] Explanatory Statement, p. 242.
[205] McKenzie and Partington (2011), p. 9.
[206] McKenzie and Partington (2011), p. 10.

293. 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 4 below.[208]

Figure 4
Effect of excess trading on dividend drop-off estimates



294. 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

295. 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.[209]

296. 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

[207] McKenzie and Partington, p. 10.
[208] 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.
[209] Explanatory Statement, p. 242.

trading around the ex-dividend event, it is their (lower) valuation that will be reflected in the dividend drop-off estimates.

297. 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.[210] 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.

298. 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.

299. 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.

300. 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)[211] 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)".

301. 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.

Consistency with other evidence

[210] 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.
[211] See McKenzie and Partington (2011), p. 10.

302. The Explanatory Statement also cites evidence from offshore markets.[212] 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.

303. 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.

304. 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.[213] 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."

305. 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).

306. 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.

307. 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.

[212] 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.

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

Appendix 2: Conclusions and recommendations from SFG (2011)

Overview

308. Our conclusion is that the appropriate estimate of theta from the dividend drop-off analysis that we have performed is 0.35 and that this estimate is paired with an estimate of the value of cash dividends in the range of 0.85 to 0.90. The reasons for this conclusion are set out in the remainder of this section of the report.

Elimination of factors that have an immaterial effect on estimates

309. The first step in forming a conclusion is to eliminate factors that have an immaterial effect on the final estimates. In this report we prepare a range of estimates that vary across a number of dimensions. The sensitivity and robustness analyses that we have conducted lead us to conclude that the results are insensitive to a number of factors:

    a) The results are insensitive to whether the sample period ends on 31 December 2009 or 30 September 2010. Restricting the sample period to 31 December 2009 generally results in slightly lower estimates of theta, but none of the differences are statistically significant;

    b) The results are insensitive to the treatment of price sensitive announcements. Whether these observations are included, excluded, mostly included or mostly excluded, the estimates of theta are immaterially different;

    c) The results are insensitive to which of the four robust regression techniques are used;

    d) The results are insensitive to whether the CNA outlier is included or excluded. To the extent that adding back the CNA outlier does result in different estimates, it generally results in a decrease in the estimate of theta; and

    e) The results are insensitive to whether the five observations that involve cash distributions that are deemed to be "return of capital" are included or excluded.

Greater weight assigned to more precise and more stable estimates

310. The estimates from some model specifications and some estimation techniques are more stable than for others. For example, the estimates of theta for Model Specification 1 vary more across estimation techniques and have larger standard errors than is the case for Model Specification 4. The robust regression estimates of theta vary less across model specifications than do the OLS estimates. In this regard, we note that the GLS weighting procedure in Model 4 and the robust regression procedure both tend to down-weight the observations that are most affected by noise – observations for which the dividend yield is low and stock return volatility is high. It is precisely these observations for which the effect of the dividend is most likely to be "lost" among large changes in the stock price caused by exogenous factors. Applying a lower weighting to these observations results in more stable and reliable results in our data set.

311. In determining a final recommended point estimate, we assign more weight to the results of estimates of Model Specification 4 and to the results of robust regression estimation. This is because those results are the most stable and consistent across the range of sensitivity analysis and robustness checks that we have performed. In this regard, we note that:

    a) The average of the robust regression estimates of theta is 0.34; and

b) The average of the estimates of theta from Model Specification 4 across Tables 5 to 8 is 0.35.

Results to be considered in total

312. In our view, the most appropriate estimate must be consistent with (or corroborated by) the different versions of the estimation that have been performed. Even though it is appropriate to afford some model specifications and some estimation techniques greater weight than others, an estimate that is consistent with a whole range of different specifications and different estimation techniques is more robust and reliable.

313. That is, we do not recommend the adoption of a single estimate that is based on a single specific choice of:

a) Model specification;

b) Estimation technique;

c) Sample period;

d) Treatment of corporate announcements; and

e) Treatment of outliers,

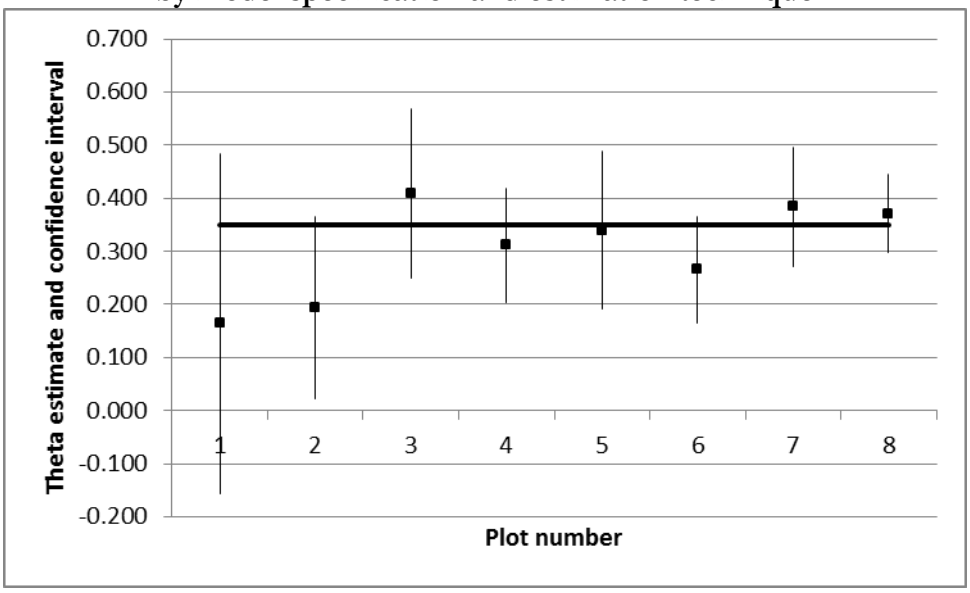
but rather examine whether the proposed estimate is consistent with a whole range of different estimations.

0.35 is consistent with results from different model specifications and estimation techniques

314. We note that 0.35 lies within the standard statistical 95% confidence interval for all the estimations we have performed. We illustrate this in Figure 5 to Figure 8 below. Each of those figures plots the point estimates and 95% confidence intervals for a range of estimations, and demonstrates that the proposed estimate of 0.35 is within the confidence interval for every estimation.

315. Figure 5 plots estimates for Model Specifications 1-4 estimated by OLS/GLS (Plots 1-4 in the figure) and then the corresponding robust regression estimates (Plots 5-8 in the figure). For none of these estimations can the proposed estimate of 0.35 be statistically rejected.

Figure 5
Summary of point estimates and confidence intervals for theta by model specification and estimation technique



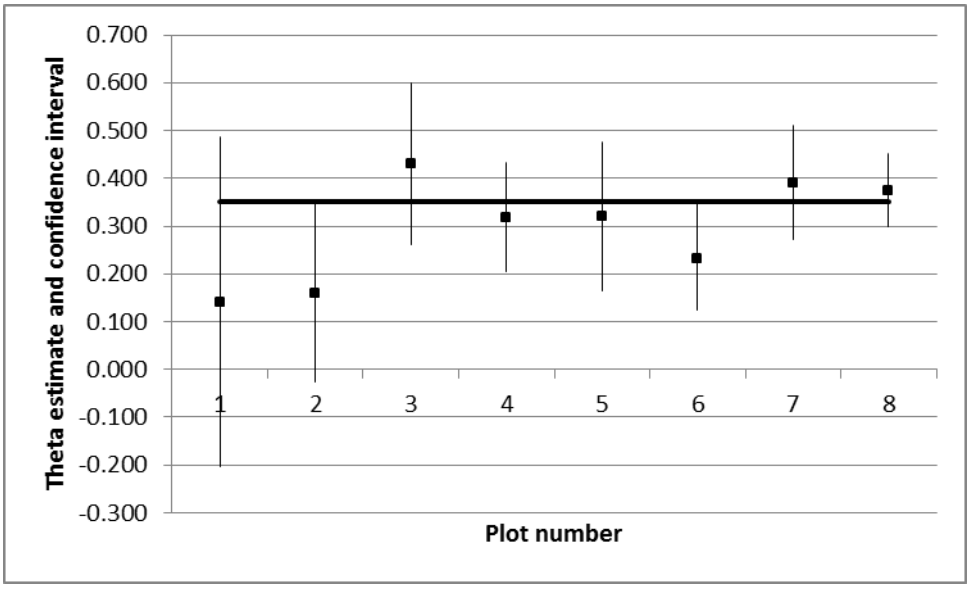
For each estimate, the narrow line represents the 95% confidence interval for theta and the solid black marker represents the point estimate. The solid black horizontal line represents the recommended point estimate of 0.35. For all models, the announcement threshold is set to two standard deviations.

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.

0.35 is consistent with results from different treatment of market sensitive announcements

316. Figure 6 is structured in the same way as Figure 5, but displays estimates for the case where *all* observations involving a market sensitive announcement are removed. Again, for none of these estimations can the proposed estimate of 0.35 be statistically rejected.

Figure 6
Summary of point estimates and confidence intervals for theta with removal of market sensitive announcements

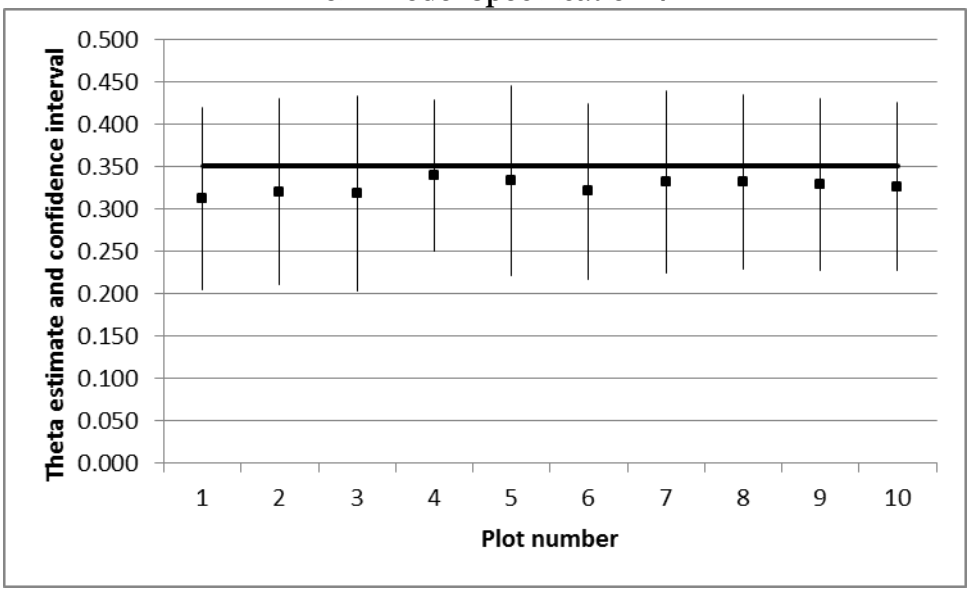


For each estimate, the narrow line represents the 95% confidence interval for theta and the solid black marker represents the point estimate. The solid black horizontal line represents the recommended point estimate of 0.35. For all models, all observations for which the firm made a "market sensitive" announcement are removed.
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.

0.35 is consistent with all of the results from Model Specification 4, which is given relatively higher weight

317. Figure 7 plots a range of estimates for Model Specification 4. Plots 1-5 in the figure vary the treatment of market sensitive announcements, and Plots 6-10 vary the treatment of influential observations. This figure shows that the estimates from Model Specification 4 are highly consistent and have relatively narrow confidence intervals. That is, these estimates are stable and precise. The figure also shows that the estimate of 0.35 is close to the point estimates from all of these estimations (within 0.05).

Figure 7
Summary of point estimates and confidence intervals for theta from Model Specification 4



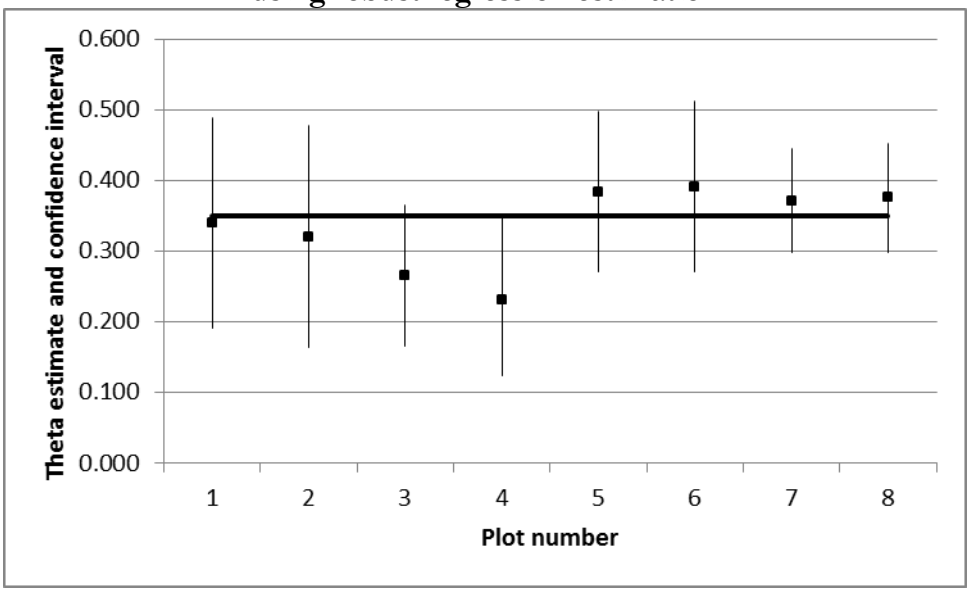
For each estimate, the narrow line represents the 95% confidence interval for theta and the solid black marker represents the point estimate. The solid black horizontal line represents the recommended point estimate of 0.35. All estimates relate to Model Specification 4.

Plot 1: OLS estimation, announcement threshold=2;
Plot 2: OLS estimation, announcement threshold=1;
Plot 3: OLS estimation, all announcements removed;
Plot 4: OLS estimation all returns>2 std dev removed;
Plot 5: OLS estimation, no announcements removed;
Plot 6: Same as Plot 1, with 5 influential pairs removed;
Plot 7: Same as Plot 1, with 10 influential pairs removed;
Plot 8: Same as Plot 1, with 15 influential pairs removed;
Plot 9: Same as Plot 1, with 20 influential pairs removed;
Plot 10: Same as Plot 1, with 25 influential pairs removed.

0.35 is consistent with all of the robust regression results, which are given relatively higher weight

318. Figure 8 plots a range of robust regression estimates. These are all estimates using the MM robust regression technique, but applied to the four model specifications and across different treatments of market sensitive announcements. The odd numbered plots are for Model Specifications 1-4 where market sensitive announcement observations are only removed if the cum- or ex-dividend day excess return was greater than two standard deviations of historical excess returns, and the even numbered plots show the corresponding results when all market sensitive observations are removed. This figure shows that the robust regression estimates are relatively consistent and have relatively narrow confidence intervals. The figure also shows that the estimate of 0.35 is slightly above four of the point estimates and very slightly below the other four point estimates.

Figure 8
Summary of point estimates and confidence intervals for theta using robust regression estimation



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. All estimates are computed using robust regression.

Plot 1: Model 1, announcement threshold=2; Plot 2: Model 1, all announcements removed;
Plot 3: Model 2, announcement threshold=2; Plot 4: Model 2, all announcements removed;
Plot 5: Model 3, announcement threshold=2; Plot 6: Model 3, all announcements removed;
Plot 7: Model 4, announcement threshold=2; Plot 8: Model 4, all announcements removed.

Final conclusion

319. In our view, considering all of the evidence set out above, an appropriate point estimate for theta based on dividend drop-off analysis is 0.35.

320. Finally, it is important to note that dividend drop-off analysis produces estimates of two parameters: theta and the value of cash dividends. That is, the estimates from drop-off analysis come in pairs. The point estimate of 0.35 for theta is not independent of the estimated value of cash dividends. Rather the estimate of 0.35 for theta corresponds with an estimate in the range of 0.85 to 0.90 for the value of cash dividends.