Estimating gamma

REPORT PREPARED FOR DBCT MANAGEMENT PTY LTD

September 2015

Estimating gamma

Estimating gamma

Figures

1 Background and conclusions

1.1 Overview and instructions

1 Frontier Economics (**Frontier**) has been retained by DBCT Management Pty Ltd (**DBCT**) to provide our views on issues relating to the conceptual definition and estimation of the gamma parameter within the regulatory setting. In particular, we have been asked to respond to the Market Parameters Decision and the Aurizon UT4 Draft Decision of the Queensland Competition Authority (**QCA**) insofar as they relate to the value of dividend imputation tax credits, gamma.

1.2 Summary of conclusions

2 Our primary conclusions are as follows:

a. Gamma should be estimated as the product of:

   i. The distribution rate, F; and

   ii. The value of distributed credits, theta.

b. As set out in Section 3 of this report, we adopt a distribution rate of 70% because:

   i. That estimate is consistent with data for all companies;

   ii. That estimate is consistent with data for all listed companies excluding the top 20; and

   iii. The top 20 firms are very large multinationals that are able to distribute imputation credits via profits earned offshore and the benchmark entity operates only within Australia.

c. Theta should be interpreted as the value of distributed credits – as in the price that an investor would be prepared to pay for a credit in the market for equity funds, or (equivalently) the extent to which credits are capitalised into stock prices.[1] We explain our reasons for this conclusion in Section 4 of this report.

d. In our view, the best available estimate of theta is 0.35. The source of this estimate is dividend drop-off analysis applied to data from 2000-2013. Other market value estimates of theta tend to be lower, in which case the 0.35 estimate would be conservative. We explain this in Section 7 of this report.

---

[1] That is, the extent to which stock prices have been bid up to reflect the market's assessment of the value of imputation credits.

e. The redemption rate (whether estimated using tax statistics or equity ownership proportions) does not provide an estimate of the relevant value of distributed credits, theta. It can only be used as an upper bound for theta. The majority of the redemption rate estimates that are available are between 0.43 and 0.45. Our preferred estimate of theta of 0.35 lies below these upper bound estimates, satisfying that test. We explain this in Section 8 of this report.

f. Our preferred estimate of gamma is 0.25, which is the product of the distribution rate (0.7) and theta (0.35). In our view, this is the best estimate of gamma that is currently available.

2 The components of gamma

3 The standard regulatory approach has been to define gamma to be the product of two components:

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

where F is the distribution rate (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.

4 The QCA defines gamma to be the product of the following two components:[2]

$$\gamma = \frac{IC}{Tax} \times U.$$

5 The QCA defines the distribution rate (first parameter) to be the ratio of imputation credits distributed to total corporate tax paid. We consider issues relating to the definition and estimation of the distribution rate in Section 3 below.

6 The QCA defines the second parameter to be the utilisation rate, which is specified to be:

> …the rate at which shareholders actually use the credits (the utilisation rate) when they file their taxes. [3]

7 We consider issues relating to the definition and estimation of the utilisation rate, or theta, in Section 4 below.

8 In summary, the QCA also follows the approach of defining gamma to be the product of two components. The key issue is not the names or symbols used to represent each component, but the conceptual definition and estimation approaches that are used for each component. In the following sections, we consider each of the two components in turn.

---

[2] QCA Market Parameters Decision, p. 25.

[3] QCA Market Parameters Decision, p. 24.

3 The distribution rate

3.1 The QCA estimate is inconsistent with stakeholder submissions

9 In its recent Market Parameters Decision and Aurizon Network UT4 Draft Decisions, the QCA adopts a distribution rate of 0.84.[4] This is inconsistent with the submissions of service providers and access seekers – all of whom submitted that the standard empirical estimate of 0.7 should be used.

10 For example, in their report for the Queensland Resources Council (**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.[5]

11 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.[6]

12 In its submission, Aurizon Network also proposed a distribution rate of 0.7.

3.2 The standard 0.7 estimate is reliable

13 The QCA questions the reliability of the Australian Tax Office data that forms the basis of the standard 0.7 estimate of the distribution rate. Specifically, the QCA cites two places in the NERA (2013) report, which the AER currently uses as the basis for its 0.7 estimate of the distribution rate for all equity. There are three issues identified in those sections:

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

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

[4] We explain the basis of this estimate below.

[5] McKenzie and Partington, p. 31.

[6] See QRC WACC Submission, p. 20 and NERA, *The Payout Ratio: A Report for the Energy Networks Association*, June 2013.

ii. Credits that flow from one company to another via a trust are effectively double counted;[7]

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

c. There is a material change in the distribution rate for the last year of the NERA sample because that estimate is a preliminary one that has not yet been finalised by the ATO.[8]

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

a. The first issue is immaterial and results in a conservative *upward* bias in the distribution rate in any event;

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

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

15 We note that the AER has recently relied upon the NERA (2013) study in affirming its use of the standard 0.7 estimate for all equity. In relation to the quality of the data and the estimation techniques applied to it, the AER has concluded that:

> We consider this is a reasonable approach to estimate the payout ratio. In particular, we consider it is simple, fit for purpose, transparent, replicable and based on reliable and publicly accessible data sets.[9]

16 Thus, the QCA's decision to entirely reject this evidence due to reliability concerns is at odds with the evidence and with regulatory practice.

3.3 The Lally/QCA approach estimates the wrong thing

17 The QCA adopts the Lally (2013 QCA, 2014 QCA) estimates of the mean distribution rate for 10, and subsequently 20, large listed firms. However, Lally

---

[7] NERA (2013), pp. 5-6.

[8] NERA (2013), pp. 8-9.

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

has not estimated the distribution rate as defined by the QCA – he has estimated something quite different.

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

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

19 By contrast, Lally has estimated:

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

20 These two different quantities are linked as follows:

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

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

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

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

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

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

24 We begin by considering a domestic firm that earns all of its profits and pays all of its tax within Australia. Suppose that our firm (on average) pays out 70% of its profits as dividends and reinvests 30% back into the firm.[10] This firm will mechanically distribute 70% of the imputation credits that it creates each year, as set out in Table 1 below.

25 Table 1 shows that the firm generates an after-tax profit of $70. It distributes 70% of this, which amounts to a $49 dividend. The maximum amount of imputation credits that can be attached to that dividend is $49 \times \frac{0.3}{1-0.3} = 21$. Consequently, the firm has distributed 70% of the imputation credits that it created.

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

Table 1. Distribution of imputation credits – Domestic firm

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

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

Table 2. Distribution of imputation credits – Multinational firm

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

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

a. The average Australian listed firm has a dividend payout rate of approximately 70%;[11] and

b. The average firm in the Lally sample also has a dividend payout rate of approximately 70%.[12]

28 In summary:

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

b. If a firm with exclusively domestic operations has a dividend payout rate of 70%, its maximum imputation credit distribution rate is 70%;[13] and

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

3.5 The QCA estimate is inconsistent with the regulatory model

29 The AER has developed an integrated spreadsheet model that uses the building block approach to compute the annual revenue requirement, given the necessary inputs. This is known as the Post-tax Revenue Model (**PTRM**). Aurizon Network has proposed to use the AER's PTRM (with some minor modifications, none of which are related to the valuation of imputation credits) to derive its annual revenue requirement and the QCA has accepted the use of that model:

> Our Draft Decision reflects our acceptance of Aurizon Network's proposed adoption of a PTRM as a structural framework for its 2014 DAU inputs and revenue models.[14]

30 The AER has made its version of the PTRM publicly available whereas the QCA-Aurizon version is not publicly available. Consequently, all references to the PTRM in this report relate to the publicly available AER version which implements the building block approach set out in the National Gas Rules (**NGR**) and National Electricity Rules (**NER**). We understand that, in all

[11] Source: Morningstar.

[12] Source: Morningstar.

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

[14] QCA UT4 Draft Decision, p. 283.

respects that are relevant to this report, the QCA-Aurizon PTRM is the same as the AER version.

31 The effect of the regulatory rules is to assume that shareholders receive a benefit that has a value to them given by the product of gamma and the firm's total tax payment. A detailed explanation is set out in Appendix 1 to this report. In this section, we summarise the key issues.

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

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

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

Table 3. Regulatory implementation of imputation credits

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

34 Appendix 1 explains all of the calculations from Table 3 in detail, referencing them back to the provisions in the regulatory Rules, and showing precisely where they are implemented in the PTRM.

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

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

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

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

38 If the Lally sample is to be used to estimate the distribution rate, it should be used to estimate the QCA's definition of the distribution rate, as used in the PTRM, $\frac{Distributed\ credits}{Corporate\ tax\ paid}$. For the Lally sample, this quantity is 50%. That is, for the Lally firms, the ratio of imputation credits distributed to corporate tax paid is 50%.[15]

39 In summary:

a. The QCA defines the distribution rate to be $\frac{Distributed\ credits}{Corporate\ tax\ paid}$;[16]

b. The PTRM also requires an estimate of $\frac{Distributed\ credits}{Corporate\ tax\ paid}$;[17]

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

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

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

[15] Source: Morningstar.

[16] QCA Market Parameters Decision, at Equation (1); at p. 25; at Equation (34); and at p. 89.

[17] See Appendix 1 to this report.

3.6 Recent regulatory developments on the distribution rate

3.6.1 Overview

41 The AER continues to give some weight to the 0.7 estimate that is based on ATO data (discussed above) and now applies some weight to an estimate based on the credits distributed by exchange-listed companies only. The AER refers to these as its "all equity" and "listed equity" estimates, respectively. In this sub-section, we consider a range of issues pertaining to the AER's listed equity estimate, which is most similar to the QCA's estimate.

3.6.2 A firm-specific parameter

42 In its recent final decisions, the AER notes that:

> …the distribution rate is a firm specific parameter.[18]

43 The AER also notes that there is broad agreement that when estimating the distribution rate, we are seeking an estimate of the proportion of credits that would be distributed by the benchmark efficient entity:

> There appears to be agreement between the service providers, SFG and us that the distribution rate is the proportion of imputation credits generated by the benchmark efficient entity that is distributed to investors.[19]

44 There is also agreement on this point from Lally (2013 AER):

> …within the Officer (1994) model, the distribution rate is a firm specific parameter rather than a market average parameter.[20]

3.6.3 The relevant characteristics of the benchmark efficient entity

45 In its 2009 WACC Review the AER stated that the benchmark efficient entity should not be interpreted as a large listed firm:

> …the AER does not agree that a benchmark efficient NSP be defined as a large, stock market listed NSP and is a settled concept.[21]

46 Consistent with this view, the AER's 2013 Rate of Return Guideline defines the benchmark efficient entity without reference to size or listing status:

> The AER's proposed conceptual definition of the benchmark efficient entity is a pure play, regulated energy network business operating within Australia. [22]

---

18 TransGrid Final Decision, Attachment 4, p. 20.

19 TransGrid Final Decision, Attachment 4, p. 65.

20 Lally (2013 AER), p. 41.

21 AER 2009 WACC Review, pp. 80, 105.

22 AER Rate of Return Guideline, p. 7.

47 Thus, the AER's view is that the benchmark efficient entity should not be defined as a large listed company, but generically as a "network business."

3.6.4 The AER's estimation approach

48 The AER has decided that the distribution rate should not be estimated with reference to comparator firms (as it does for other firm-specific parameters such as beta and gearing) because that may provide an incentive for regulated firms to manipulate their dividend payout policies to obtain a higher regulatory estimate of gamma.[23] As unlikely as this seems, the current question is *which* broader data set should be used to estimate the distribution rate. The AER considers two possibilities: all tax-paying companies, and all public companies.

49 SFG (2015 AER) demonstrate that the two data sets that the AER considers produce effectively identical estimates, but for the 20 largest listed companies, which have materially higher payout ratios.[24] Specifically, the AER accepts that:

a. Listed firms in aggregate distribute 80% of the credits that they create;[25] and

b. The 20 largest listed firms, which account for 62% of all listed equity, distribute 84% of the credits that they create.[26]

50 SFG (2015 AER) show that implies that the public firms that are not among the top 20 have an average distribution rate of 73% since:

$$73\% \times 0.38 + 84\% \times 0.62 = 80\%.$$

51 NERA (2015) use Australian Tax Office data to estimate distribution rates for various types of companies from 2000-2012. Their results are summarised in Table 4 below.

---

23 AER Rate of Return Guideline, Explanatory Statement, p. 164.

24 We note that these are precisely the 20 companies in the Lally sample, on which the QCA places 100% reliance.

25 TransGrid Final Decision, Attachment 4, p. 67.

26 TransGrid Final Decision, Attachment 4, p. 67.

Table 4: Distribution rate 2000-2012 by company type

Firm type	Distribution rate
Top 20 ASX listed	0.840
Public, but not top 20 ASX listed	0.693
All public	0.755
Private	0.505
All companies	0.676

Source: NERA (2015), Table 3.4, p. 23.

52 Thus, the distribution rate for listed firms is approximately 70%, for all but the 20 largest listed firms and it is lower for unlisted firms. Consequently, the question is whether "the proportion of imputation credits generated by the benchmark efficient entity that is distributed to investors"[27] is best estimated with reference to the 20 largest listed firms, or with reference to other firms.

53 Handley (2015 JGN) confirms that the distribution rate is a firm specific parameter and confirms the NERA estimates set out above.

3.6.5 The role of the top 20 listed firms

54 In our view, when estimating the distribution rate there are two reasons to be concerned about the weight that is afforded to the top 20 listed firms:

a. The AER has specifically stated that the benchmark efficient entity should not be assumed to be a large listed company, as set out above; and

b. The top 20 listed firms differ from the benchmark entity in that their foreign sourced profits enable a higher distribution rate.

55 As set out above, the 20 largest listed firms are generally very large multinationals. For example, BHP has equity that is valued at more than 30 times the equity in the regulated asset base of even a large service provider.[28] Even the 20th listed company is orders of magnitude larger than the service providers that are regulated by the AER.[29]

56 As noted above, the 20 largest listed firms have a material amount of foreign sourced profits which enable them to distribute a higher proportion of imputation credits. Specifically, multinational firms are able to attach imputation credits to dividends that they distribute out of foreign sourced profits (since *any*

---

27 TransGrid Final Decision, Attachment 4, p. 65.

28 A service provider with a $10 billion RAB would be considered to be large. Such a service provider would have $4 billion of equity. BHP has a market capitalisation of over $122 billion.

29 For example, Amcor has a market capitalisation of approximately $16 billion.

dividend can have credits attached to it). Foreign profits enable any firm to distribute more imputation credits than it would otherwise have been able to.

57 This differentiates the top 20 listed firms from the benchmark entity, which is purely domestic by definition.[30]

58 In its recent final decisions, the AER acknowledges the SFG (2015 AER) submission on this point and then devotes the following single sentence to its dismissal:

> Handley considered SFG's analysis to be 'incomplete and oversimplified to support such a strong conclusion'.[31]

59 The sum total of Handley's consideration of this important issue is reproduced below:

> SFG argues that the estimate of the distribution rate based on data for public companies only is overstated to the extent that foreign sourced income enables large public companies to distribute a higher proportion of imputation credits. The analysis used by SFG is however incomplete and oversimplified to support such a strong conclusion. There are many factors which determine the financing and dividend policies of multinational firms relative to domestic firms. One cannot simply assume (as SFG has done) that both types of firms would seek to pay the same dollar amount of dividends out of the same dollar amount of profits irrespective of its source.[32]

60 This analysis seems to miss the point entirely. The point is that *any* firm with foreign profits will be able to distribute more imputation credits than they would otherwise have been able to. The 20 largest multinational companies obviously have material foreign income and they would obviously be able to distribute fewer imputation credits without that foreign income.[33]

61 The fact that firms consider many things before they settle on a dividend policy is self-evidently true, but irrelevant to the point at hand. The point is that the 20 large multinationals have foreign profits that inflate their ability to distribute imputation credits, and that the benchmark firm has no such ability. If these multinationals differ from the benchmark domestic entity in other ways as well (e.g., because of their size or other considerations they make in setting their dividend policy) then there would be even more reason to exclude them.

3.6.6 Summary and conclusions

62 In summary, we note that:

a. The distribution rate for all companies is approximately 70%;

---

30 The AER defines the benchmark efficient entity to be "operating within Australia." AER Rate of Return Guideline, p. 7.

31 TransGrid Final Decision, Attachment 4, p. 66.

32 Handley (2015), p. 21.

33 That is, for *any* given level of dividends, the more offshore profits a firm has, the greater the proportion of its franking credits that it will be able to distribute.

b. The distribution rate for all listed companies, other than the top 20, is also approximately 70%; and

c. The top 20 listed companies differ from the benchmark efficient entity in their ability to distribute imputation credits via profits that have been sourced offshore.

Consequently, our view is that the best estimate of "the proportion of imputation credits generated by the benchmark efficient entity that is distributed to investors"[34] is 70%.

[34] TransGrid Final Decision, Attachment 4, p. 65.

4 Value or redemption?

4.1 Context

63 Prior to the AER's 2013 Rate of Return Guideline, all Australian regulators interpreted theta (the second component of gamma) as the market value of a distributed imputation credits – the extent to which a distributed credit would be capitalised into the stock price. Consequently, theta was estimated using market data, for example, by comparing the prices of shares before and after the distribution of an imputation credit.

64 In its December 2013 Guideline, the AER set out the results of its "conceptual re-evaluation" of theta. This involved the AER redefining theta to be the proportion of distributed credits that are likely to be redeemed by shareholders – the redemption rate. This has led the AER to now estimate theta by considering the proportion of distributed credits that might be redeemed.

65 In its recent Market Parameters Decision, the QCA has followed the AER in this re-interpretation of theta. Since the QCA's Market Parameters Decision, there have been a number of developments in relation to the estimation of theta. For example, the AER's recent final decisions for Jemena Gas Networks and the NSW electricity networks contain updated estimates and the latest regulatory justification for the new approach to theta. Consequently, in the remainder of this section we consider the AER's recent determinations and the ramifications for the approach proposed by the QCA.

4.2 The key point to be determined

66 The key point to be resolved is the question of whether theta should be interpreted as:

a. The value of distributed credits (as in the worth of those credits to investors or the price that they would be prepared to pay for those credits in the market for equity funds or the extent to which credits are capitalised into stock prices); or

b. The redemption proportion – the proportion of distributed credits that are likely to be redeemed.

67 This dichotomy is relevant throughout the discussion below and for convenience we refer to the two possibilities as the *value* and *redemption* interpretations, respectively.

68 If the *value* interpretation is adopted, we should use estimation methods that measure the value of credits (such as dividend drop-off analysis), and if the *redemption* interpretation is adopted we should use estimation methods that measure the proportion of credits that are redeemed (such as equity ownership and tax statistics).

69 There is broad agreement about the fact that the market value of distributed credits is materially less than the redemption proportion. For example, the market value estimate is 35%, indicating that the market values distributed credits at 65% less than their face amount. There are two explanations for this. First, 40-45% of credits are distributed to non-residents who cannot utilise them. Second, even those credits that *are* distributed to resident investors are not valued at the full face amount because:

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

   i. Credits distributed to resident investors who sell the shares within 45 days of their purchase cannot be redeemed;[35] and

   ii. Some credits distributed to resident investors are not redeemed because some investors fail to keep the required records and simply do not claim them. For example, Handley and Maheswaran (2008) report that, on average 8% of the credits distributed to resident individuals are never redeemed.[36]

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

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

---

[35] The so-called "45 day Rule" took effect in July 1997. It prevents resident investors from redeeming imputation credits unless they own the shares for 45 days around the payment of the relevant dividend.

[36] This figure includes credits that are not redeemed due to the 45-day Rule and, for the pre-2000 period, credits that are not redeemed because the shareholder has taxable income below the tax-free threshold.

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

e. If dividend imputation leads resident investors to hold more domestic dividend-paying shares than they otherwise would (because they are attracted by the possibility of receiving imputation credits) their portfolios will become more concentrated and the resulting loss of diversification comes at a cost. A rational investor would continue to increase the concentration of their portfolio until the marginal benefit of the last imputation credit equalled the marginal cost of losing diversification. That is, the last imputation credit would be of no net benefit.[37]

70 In summary, the market value estimate of theta is materially lower than the redemption rate because investors do not value imputation credits at the full face amount. Thus, the question is whether gamma should be based on the value of credits or on the proportion of them that can be redeemed.

4.3 The role of gamma in the regulatory setting

71 In the regulatory setting, the regulator first estimates the return that shareholders' require and then reduces the allowed return according to the estimate of gamma. For example, suppose the regulator determines that shareholders require a return of $100 and that those shareholders will receive imputation credits that are worth $20 to them. The regulator would then allow the firm to charge prices so that it can pay a return of $80 to the shareholders.[38] That is, the regulator's estimate of gamma determines the quantum of the reduction in the return that the firm is able to provide its shareholders by other means (dividends and capital gains).

72 If, for example, the regulator's assessment of the value of imputation credits is greater than the true value of imputation credits to shareholders, the shareholders will be under-compensated. In this case, the reduction in other forms of return (dividends and capital gains) will exceed the true value of the imputation credits.

73 Thus, when estimating gamma, the appropriate question to consider is this: What is the quantum of dividends and capital gains that shareholders would be prepared to give up in order to receive imputation credits? It is precisely this question that is addressed by market value studies that seek to quantify the relative value (to investors in the market for equity funds) of dividends, capital gains, and imputation credits.

---

[37] 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. See also SFG (2014 QCA).

[38] This is apparent in Row 35 of the AER's Post-Tax Revenue Model.

74 The alternative is to reduce the regulatory allowance for returns from dividends and capital gains according to the proportion of investors who may be eligible to redeem credits, rather than according to the value of those credits. This approach will inevitably result in investors being mis-compensated because there is no attempt to consider whether the *value* of what investors are required to give up (dividends and capital gains) is equivalent to the *value* of what they receive in its place (imputation credits).[39]

75 On this issue, the AER's recent final decisions appear to accept the following advice from Handley (2015):

> SFG's description of the regulatory framework is one where the regulator first determines the amount of dividends/capital gains that investors would require in the absence of imputation and then reduces this amount by the value investors receive from imputation credits. I believe a simpler description is that the regulator determines the appropriate after-company-before-personal-tax rate of return. This return by definition consists of three components: capital gains, dividends and imputation credits – there is no "substitution" of dividends/capital gains for imputation credits as SFG suggests.[40]

76 In our view, the regulator does determine the total allowed return on equity, which consists of three components. Then the regulator determines how much of that return it considers will be generated in the form of imputation credits. The regulator then reduces the return that would otherwise be available to equity holders (via the other components of return, which are dividends and capital gains) accordingly. This can be seen in Row 35 of the Analysis sheet in the Post Tax Revenue Model (**PTRM**) – what would otherwise be available to the equity holders is reduced by the assumed value of imputation credits.

77 In our view, it is abundantly clear that there are three components to the return on equity – dividends, capital gains, and imputation credits – and that a greater assumed value of imputation credits will result in a reduction in the regulatory allowance that generates dividends and capital gains. This is precisely what occurs in Row 35 of the PTRM – the return that could otherwise be provided to equity holders is reduced by the regulator's assessment of the value of imputation credits. Any suggestion that the regulatory allowance that generates dividends and capital gains is independent of the regulatory assumption about imputation credits is erroneous.

4.4 Rule requirements

4.4.1 The requirements of the National Electricity Rules (NER)

78 Prior to the 2012 revision, the Rules stated that:

---

39 The evidence suggests that such an approach will systematically under-compensate investors since the investors who are eligible to redeem credits do not value them at the face amount.

40 Handley (2015), p. 31.

> γ is the assumed utilisation of imputation credits.[41]

79 At the time of the 2012 Rule change, all regulators (including the AER)[42] had always interpreted this provision to require an estimate of the *value* of imputation credits, where "value" was interpreted as "in the market for equity funds" or "market value." Differences of opinion existed about how to best estimate the market value of credits, but there was no dispute about what gamma meant or how it should be defined.[43]

80 In this context, the AEMC amended the Rules to state that:

> γ is the value of imputation credits.[44]

81 This expression is economically equivalent to the longstanding prevailing regulatory practice at the time of the rule change.

82 In any event, the Rules now require regulators to produce an estimate of the *value* of imputation credits.

4.4.2 The AER's interpretation of the Rules

83 In its Guideline, the AER proposed that it would no longer adopt the previous regulatory practice of estimating theta as the market value of distributed credits, but that it would instead define theta to be the redemption rate – the proportion of credits that are likely to be redeemed.[45]

84 In the *Gamma Case*,[46] the Tribunal agreed with our view that the redemption rate cannot be used to estimate theta, but can only be used as an upper bound for theta. The AER states that all parties to that case considered theta to be the market value of distributed credits, in accordance with the longstanding regulatory practice at the time. Thus, the AER suggests that the Tribunal's ruling might be interpreted as requiring that redemption rates cannot be used to estimate the *market value* of distributed credits, leaving open the possibility that they might be used to estimate theta if it was defined in some other way.[47]

85 The AER now proposes to simply re-define theta to be the redemption rate. Under this definition, it is tautologically true that the redemption rate could be used to estimate theta. However, that approach would, on its face, appear to be

---

41 NER cls. 6.5.3, 6A.6.4 (as at version 52).

42 See, for example, the AER's March 2013 Final Decision for SP AusNet, p. 151, published shortly before the AER's draft Rate of Return Guideline.

43 See, for example, Australian Competition Tribunal, 2010, Application by Energex Limited (No 2) [2010] ACompT 7, 13 October; Australian Competition Tribunal, 2011, Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9, 12 May.

44 NER cls. 6.5.3, 6A.6.4 (current since version 53); NGR r. 87A(1) (current since version 14).

45 See the chronology of the AER's redefinition of theta in the following subsection of this report.

46 Application by Energex Limited (No 2) [2010] ACompT 7; Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9.

47 AER Rate of Return Guideline, Explanatory Statement, pp. 166-173.

inconsistent with the Rules, which require an estimate of the *value* of imputation credits.

86 To satisfy the *value* definition of gamma that appears in the Rules, the AER's Rate of Return Guideline proposes that the term *value* in the Rules should not be interpreted as taking its common meaning of "worth" or "price," but should instead be interpreted in "a generic sense to refer to the number that a particular parameter takes."[48]

87 In its recent decisions, the AER abandons its "generic sense" interpretation of value.[49] It instead defines the redemption rate to be the "utilisation value" and the "pre-personal-tax and pre-personal-cost value." The AER is clear that both of these terms still mean the redemption rate – the change is simply a re-definition to now include the word "value."[50]

88 The alternative to the AER's interpretations of "value" is an interpretation in the ordinary sense of that word – what is the actual worth of credits to investors in the market for equity funds; what is the price that an investor would actually be prepared to pay for a credit. In our view, this is the correct interpretation of "value" and is consistent with the longstanding prevailing regulatory practice prior to the rule change.

4.5 The evolution of the AER and QCA interpretation of "value"

4.5.1 Draft Guideline

89 In its Draft Rate of Return Guideline, the AER defined theta to be the redemption rate or the "utilisation rate" – the proportion of distributed credits that are redeemed:

> The utilisation rate is the before-personal-tax reduction in company tax per $1 of imputation credits that the representative investor receives.[51]

90 The AER also defined gamma in terms of the proportion of credits that are likely to be redeemed:

> The proportion (γ) is the proportion of company tax paid that investors redeem.[52]

91 The AER went on to define gamma as:

---

48 AER Rate of Return Guideline, Appendix H, p. 138.

49 See Section 2.4 below.

50 We expand on our discussion of the evolution of the AER's conceptual redefinition of theta in Section 2.4 below.

51 AER Draft Rate of Return Guideline, Explanatory Statement, p. 126

52 AER Draft Rate of Return Guideline, Explanatory Statement, p. 234

> …an estimate of the expected proportion of company tax which is returned to the representative investor through utilisation of imputation credits[53]

and:

> …the representative investor's expected utilisation of franking credits as a proportion of the total company tax paid.[54]

4.5.2 Final Guideline

92 In its Final Guideline, the AER continued to directly define theta to be the redemption rate:

> The utilisation rate, which is the extent to which investors can use the imputation credits they receive to reduce their personal tax.[55]

and as:

> …the complex weighted average (by value and risk aversion) of individual investors' utilisation rates. In turn, these reflect each investor's expected ability to use imputation credits to reduce their tax (or get a refund).[56]

93 The Guideline also states that:

> The utilisation rate is the before-personal-tax reduction in company tax per one dollar of imputation credits that the representative investor receives.[57]

94 This definition is curious in that it refers to some sort of reduction in *company* tax whereas all of the AER's previous definitions refer to the reduction in *personal* tax that is due to the redemption of credits.

95 In the Final Guideline, gamma is also defined in different ways that are difficult to comprehend. For example:

> γ [gamma] is the proportion of tax collected from the company which gives rise to the tax credit associated with a franked dividend.[58]

96 However, *all* company tax paid in Australia gives rise to an imputation tax credit, by definition, and *all* franked dividends have the same amount of franking credits attached to them.

97 The Guideline then defines theta in terms of the *value* that investors receive from the credits that are distributed to them:

> A utilisation rate —which is the value investors receive through imputation credits as a proportion of the credits that the benchmark efficient entity distributes.[59]

---

53 AER Draft Rate of Return Guideline, Explanatory Statement, p. 118

54 AER Draft Rate of Return Guideline, Explanatory Statement, p. 122

55 AER Rate of Return Guideline, Explanatory Statement, p. 159.

56 AER Rate of Return Guideline, Explanatory Statement, p. 159, Footnote 530.

57 AER Rate of Return Guideline, Explanatory Statement, p. 165.

58 AER Rate of Return Guideline, Explanatory Statement, p. 158.

59 AER Rate of Return Guideline, Appendix H, p. 142.

98 The Guideline also goes on to define gamma in terms of the *value* of imputation credits:

> γ can be interpreted as the value of a dollar of tax credit to the shareholder.[60]

99 Finally, the Guideline defines gamma in terms of the redemption rate and value simultaneously:

> We propose that the value of imputation credits within the building block revenue framework is an estimate of the expected proportion of company tax which is returned to investors through utilisation of imputation credits.[61]

100 Here it is important to note that the AER has rejected the longstanding interpretation of gamma as representing the market value of imputation credits.[62] Moreover, the Tribunal has ruled that the redemption rate cannot be used to estimate the market value of imputation credits,[63] and we agree. Thus, the AER does not suggest that the redemption rate can be used to estimate the market value of imputation credits.

101 However, the Rules require the AER to estimate "the value of imputation credits."[64] This leads the AER to adopt a different definition of "value" as follows:

> The ENA asserts the use of the word 'value' is intended to denote the concept of 'market value'. We do not agree with this strict interpretation. We do not consider the intended meaning of the word 'value' is made clear in the rules or in the AEMC's determination. Further, we consider the word 'value' in these contexts is being used in a generic sense to refer to the number that a particular parameter takes.[65]

4.5.3 Draft decisions

102 In its November 2014 draft decisions, the AER introduced the concept of "utilisation value:"

> We define the utilisation rate as the utilisation value to investors in the market per dollar of imputation credits distributed,[66]

and:

> [T]heta is the utilisation value to investors in the market per dollar of imputation credits distributed.[67]

---

60 AER Rate of Return Guideline, Appendix H, p. 138.

61 AER Rate of Return Guideline, Explanatory Statement, p. 158.

62 AER Rate of Return Guideline, Explanatory Statement, p. 159.

63 Application by Energex Limited (No 2) [2010] ACompT 7; Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9.

64 NER cls. 6.5.3, 6A.6.4 (current since version 53); NGR r. 87A(1) (current since version 14).

65 AER Rate of Return Guideline, Appendix H, p. 138.

66 Jemena Gas Networks Draft Decision, Attachment 4, p. 17.

67 Jemena Gas Networks Draft Decision, Attachment 4, p. 35.

103 The source of the term "utilisation value" was advice from Handley, who defines that term as follows:

> We define this utilisation value as the incremental reduction in personal tax, if any, which arises from the receipt of a franked dividend compared to the receipt of an otherwise equivalent unfranked dividend.[68]

104 That is, the term "utilisation value" is precisely equivalent to the term "redemption rate" or the "proportion of credits that is redeemed." In other words, theta is still simply defined to be the redemption rate, although it is no longer called the "redemption rate," but rather the "utilisation value." The AER makes the same point as follows:

> In this decision, consistent with Handley's advice, we define the utilisation rate as the utilisation value to investors in the market per dollar of imputation credits distributed. However, we consider that the definitions used in the Guideline and in this decision are equivalent.[69]

4.5.4 Final decisions

105 In its April 2015 final decisions, the AER refers to the "before-personal-tax and before-personal-costs value" of imputation credits:

> …we consider that the utilisation rate relates to the before-personal-tax and before-personal-costs utilisation value to investors in the market per dollar of imputation credits distributed[70]

and:

> …the per dollar value of an imputation credit gamma should be measured prior to any personal tax on the credit and prior to any personal costs associated with the receipt of the credit.[71]

106 The AER notes that this "before-personal-tax and before-personal-costs value" is the same as its definition of "utilisation value" in its draft decisions (which is the same as the redemption rate, as set out above):

> Our definition of the utilisation rate in this final decision and the draft decisions is the utilisation value to investors in the market per dollar of imputation credits distributed.[72]

4.5.5 The QCA definition of theta

107 The QCA defines the second parameter (theta) to be the "utilisation rate," which is specified to be:

> …the rate at which shareholders actually use the credits (the utilisation rate) when they file their taxes. [73]

---

68 Handley and Maheswaran (2008), p. 84.

69 Jemena Gas Networks Draft Decision, Attachment 4, p. 36.

70 TransGrid Final Decision, Attachment 4, p. 30.

71 TransGrid Final Decision, Attachment 4, p. 12.

72 TransGrid Final Decision, Attachment 4, p. 47.

108 This definition is equivalent to the AER's definition – both regulators simply define theta to be the redemption rate.

4.5.6 Summary

109 Throughout the Guideline process, and since, the AER has used a number of different definitions for theta, all of which are equivalent to the redemption rate. That is, the AER approach, which has been followed by the QCA, is to simply define theta to be equal to the redemption rate – even though the name it has used has changed on numerous occasions. In our view, the redemption rate is not a measure of value, no matter what it is called or how it is motivated. Consequently any estimate of gamma that is based on the redemption rate is not an estimate of the value of imputation credits.

4.6 The Handley definitions of value

110 As set out above, the term "utilisation value" is sourced from Handley, who defines it to be the redemption rate. That is, the utilisation value is simply another name for the redemption rate.

111 Handley (2015) develops the notion of "pre-personal-tax and pre-personal-cost value" for the AER. This is a measure of what the value of a credit would be to an investor if we set aside all of the reasons why investors would actually value the credit at less than the face amount.

112 Consider a new car that has a list price (face value) of $40,000. Suppose that car has been used as a demonstration vehicle, so has 5,000 km on the odometer, a scratch along one side, and a tear in the upholstery of one seat.[74] The value of the car, before considering mileage, scratches and tears (i.e., the pre-mileage, pre-scratch, pre-tear value) would be the list price of $40,000. However, the actual value of the car in the market for cars (where value is defined in the ordinary sense of that word) would clearly be less than $40,000.

113 That is, "value" can be interpreted in the ordinary real world sense of that word – the actual worth to investors or the price that investors would be prepared to pay in the market for equity funds – or it can be interpreted in a theoretical way as the value that a credit would have to an investor if we assume away:

a. all of the reasons why the market value might be less than the face amount; and

b. all of the empirical evidence that the market value *is* less than the face amount.

---

73 QCA Market Parameters Decision, p. 24.

74 That is, there are reasons why the market would not value the car at face value – analogous to the reasons why investors would not value imputation credits at the face amount set out in SFG (2014 AER) and SFG (2015 AER) and SFG (2014 QCA).

114 If we adopt the standard interpretation of "value," we would use estimation approaches that seek to determine how much investors would be prepared to pay for credits in the market for equity funds – what is the amount of dividends or capital gains that investors would give up in order to obtain a credit.

115 If we adopt the theoretical interpretation, we would simply assume away any factor that would cause an investor to value credits at less than the face amount. Thus, the "pre-personal-tax and pre-personal-cost value" is also just another name for the redemption rate.

116 There is a strong analogy here to one of the arguments put in the *Gamma Case* before the Tribunal. In that case, there was debate about how the distribution rate should be estimated. The applicants submitted that there was direct real world empirical evidence that established that the actual distribution rate was 70%. By contrast, Dr Handley advised the AER that the real world empirical evidence should be supplanted by theoretical considerations. He proposed that, in theory, the 30% of credits that had not been distributed in *any* year since the start of imputation might all be distributed in *every* year of the forthcoming regulatory period, so that the empirically observed distribution rate of 70% should be supplanted by a theoretically assumed distribution rate of 100%.

117 Handley (2014, pp. 11-14) continues to advise the AER that it should assume that 100% of imputation credits will eventually be distributed, even though the consistent empirical evidence is that year after year after year the distribution rate averages 70%. The AER abandoned the use of a theoretically conceptualised distribution rate immediately prior to the *Gamma Case* and has rejected it ever since.

118 In the case at hand, the redemption rate definition of theta (whatever name it is given) is also a theoretically conceptualised one rather than a real-world observed one, as Handley (2015) explains:

> …the use of redemption rates as a means of estimating the value of credits is driven by conceptual considerations and theory…This also forms the basis for using the equity ownership approach.[75]

4.7 A theoretically conceptualised theta

119 Two ways have been proposed for estimating theta. One method involves the empirical estimation of theta from market prices, providing a direct estimate of the value of imputation credits in the market for equity funds. The alternative is to theoretically conceptualise what theta would be under a certain set of theoretical assumptions.

[75] Handley (2015), p. 28.

4.7.1 Lally's theoretical conceptualisation

120 One example of the theoretical conceptualisation approach is Lally (2014 QCA), whose key assumption is that there is no foreign ownership of Australian equity. This assumption leads Lally to conclude that theta should theoretically be set to 1, and that is his recommendation to the AER and the QCA.

121 The key assumption on which Lally's conceptualised theta is based is clearly unrealistic and it is inconsistent with the way every other WACC parameter is estimated. For example, the standard practice is to estimate the risk-free rate with reference to traded government bond prices which reflect the participation of foreign investors in that market – we don't theoretically conceptualise what government bond yields would be in the absence of foreign investors.

4.7.2 Handley's theoretical conceptualisation

122 Another example of the theoretical conceptualisation approach is Handley (2014, 2015). He recognises that (a) foreign investors can own Australian equity and (b) Australian investors can own foreign equity. His key assumption is that investors construct their investment portfolios in a way that violates the principles of Markowitz efficiency that underpin the CAPM.[76] Under the CAPM, all investors seek to maximise the utility (i.e., the risk/return trade-off) of their investment portfolio. The very first equation in Sharpe (1964) sets out this basic premise.

123 Indeed, the very basis of the CAPM is that we cannot consider one asset (or a subset of assets) in isolation, we must consider every asset in the context of the entire portfolio held by the investor. Investor's will optimise their entire portfolio by balancing the risk and return of the whole portfolio. Without this Markowitz portfolio optimisation, investors would not hold the risk-free asset and the market portfolio and, consequently, the CAPM would not exist.

124 The Handley approach is inconsistent with Markowitz portfolio optimisation – it requires that investors will consider their Australian equity investments independently of any other assets they hold. That is, they will compile a portfolio of Australian stocks without any regard to any other assets they may hold. Thus, no investor optimises their portfolio or their utility and no investor behaves in a manner that is consistent with the CAPM.

4.7.3 Selecting a theoretical conceptualisation of theta

125 As set out above, the AER has received advice on the theoretical conceptualisation of theta from Lally and Handley. Each has advised the AER that the other's theoretical conceptualisation is flawed and has no proper basis.

126 For example, Lally advises the AER that there is an inconsistency between the use of a CAPM and the use of an assumption that violates the principles of

---

[76] Harry Markowitz was awarded the Nobel Prize jointly with William Sharpe, the developer of the CAPM, in 1991.

Markowitz efficiency that underpin the CAPM, and that he disagrees with Handley's approach:

> …Handley (2008, section 2.2) appears to believe that there is no inconsistency and believes that all CAPMs start by defining the "market", from which the "relevant" set of investors follows. Thus, if the market is Australian equities, then the relevant set of investors includes foreigners to the extent they invest in Australian equities. I do not agree. CAPMs do not start with a definition of the "market" but a set of assumptions about investor behaviour and institutional features, and the particular assumptions imply which market portfolio and set of investors are relevant.[77]

127 Symmetrically, Handley (2015) advises the AER that the Lally approach is wrong on the basis that there is:

> …an assumption by Lally which contradicts a key joint assumption in the CAPM.[78]

128 Our view is that:

a. It would be inappropriate to adopt a conceptual theta on the basis of an assumption that there is no foreign investment in Australian shares (Lally); and

b. It would be equally inappropriate to adopt a conceptual theta on the basis of an assumption that investors do not seek to maximise their utility over their investment portfolio (Handley).

129 Theta is the outcome of the complex interaction of trading between different types of foreign and domestic investors. Consequently, the conceptualisation of theta requires the adoption of some strong simplifying assumptions. For example, the complex interaction of trading is simplified by assuming away the existence of foreign investors, or by assuming that investors trade in manner that is inconsistent with Markowitz efficiency and the CAPM. The alternative approach is to empirically estimate theta *as it is*, rather than to conceptualise what *it would be* under certain unrealistic assumptions.

4.8 Theoretical basis for the redemption rate approach

4.8.1 Overview

130 The theoretical conceptualisation approach that has been adopted by the AER, and followed by the QCA, apparently distinguishes between:

a. The value of distributed credits in the market; and

b. The market value of distributed credits.

---

77 Lally (2013 AER), pp. 14-15.

78 Handley (2015), p. 10.

131 The AER's view is that the former provides an appropriate basis for estimating theta and that the latter does not. Specifically, the AER states that the redemption rate represents "the value to investors in the market" and not "the market value,"[79] and the reverse is presumably true of dividend drop-off analysis and other market value estimation methods.

132 Our view is that the AER's justification of its new approach for theta has become increasing muddled and contradictory as it has changed from Guideline to draft decision to final decision – culminating in a confused attempt to rule out "market value" estimates while simultaneously retaining estimates of "the value to investors in the market" on the basis of theoretical reasoning.

133 By contrast, our approach is to simply estimate theta from observed market prices – the same way it has always been done, and the same way that every other WACC parameter is estimated.

4.8.2 The theoretical basis relied on by the AER and QCA

134 The AER justifies its position (which is followed by the QCA) on the basis that representative agent equilibrium models provide a conceptual theoretical basis for its approach of defining theta to be the redemption rate. However, SFG (2015 AER) explains in some detail that these models *do not* imply that there is an equivalence between theta and the proportion of credits that investors redeem.[80] SFG (2014 AER) made the same point in some detail.[81]

135 In advice commissioned by the AER, Lally (2013 AER) also makes the same point:

> The AER (2013, page 237) also defines the utilisation rate [theta] as the proportion of distributed credits that investors redeem. **This is not correct**; the redemption rate is merely an estimation method.[82]

136 Lally goes on to note that Handley (2008) had previously made the same error:

> …Handley (2008, section 2.2) appears to believe that there is no inconsistency and believes that all CAPMs start by defining the "market", from which the "relevant" set of investors follows. Thus, if the market is Australian equities, then the relevant set of investors includes foreigners to the extent they invest in Australian equities**. I do not agree**. CAPMs do not start with a definition of the "market" but a set of assumptions about investor behaviour and institutional features, and the particular assumptions imply which market portfolio and set of investors are relevant.[83]

137 In its recent draft and final decisions, the AER does not address the fact that Lally has advised them that they have erred on this point. Rather, the AER's

---

79 TransGrid Final Decision, Attachment 4, p. 46.

80 SFG (2015 AER), p. 10.

81 SFG (2014 AER), p. 76.

82 Lally (2013 AER), p. 13, emphasis added.

83 Lally (2013 AER), pp. 14-15, emphasis added.

response has been to seek no further advice on gamma from Dr Lally. The QCA has also been silent on this advice from Lally.

138 The AER also does not address the detailed submission on these points in SFG (2014 AER) or SFG (2015 AER). Rather, the AER simply notes that Dr Handley continues to advocate his own unique theoretical approach wherein investors do not optimise their portfolios, and Dr Lally's advice on these points is not mentioned.

139 In summary, Lally and we have both submitted that the theoretical basis on which Handley and the AER and the QCA rely is flawed. NERA (2015) also make the same point in a different way. For its JGN Final Decision, the AER commissioned an additional report from Handley (2015 JGN). That report reiterates Dr Handley's view that theta should be theoretically conceptualised rather than estimated with reference to market data. In particular, it suggests that the Handley theoretical framework is grounded in Officer (1994), but it is not, as set out in Section 4.10 below.[84]

4.9 A better approach: Empirical estimation

140 The alternative approach is to simply recognise that the outcome of the complex interaction of trading between investors can be observed in the stock price. We can use observed prices from financial markets to estimate parameters as they *are*, rather than conceptualising what they *would be* under a particular set of assumptions. This is the approach that is adopted for all other WACC parameters. For example, government bond prices reflect the complex interaction of trading by investors and we use those prices directly to estimate risk-free rates. We do not conceptualise what the risk-free rate would be if there was no foreign investment, or if investors traded in a particular simplistic manner that is inconsistent with the CAPM. Rather, we accept that there is foreign investment and that investors will adopt whatever strategy they like, and that the observed price will reflect all of those things. Similarly, when estimating beta and MRP we use observed stock prices and conduct empirical analysis – we do not conceptualise what those parameters would be under a particular set of assumptions.

4.10 Imputation credits, stock prices and the Officer framework: The basis for a market value interpretation

141 The mathematical formulas set out in Officer (1994) also support a value interpretation. In its recent draft decisions, the AER considers the key formula from Officer (1994), as set out in Figure 1 below.

---

84 Handley (2015 JGN), pp. 3-7.

Figure 1: AER's documentation of the key result from Officer (1994)

$$E = \frac{X_O - X_D - TAX + \gamma IC}{r_e}$$

where:

- E is the value of equity
- X_O is operating income
- X_D is the debtholders' share of operating income
- TAX is corporate tax paid
- IC is imputation credits generated, and
- r_e is the return on equity.

Source: Jemena Draft Decision, Attachment 4, p. 40.

142 To be clear, in this formula E represents the *market value* of equity, as in the worth to investors. The formula shows that the current market value of equity is equal to:

a. The present value of operating income; minus
b. The present value of payments made to debt holders; minus
c. The present value of tax paid to the government; plus
d. The present value of imputation credits.

143 In this formula, gamma represents the extent to which imputation credits are capitalised into the market value of equity. We note that this is precisely what is estimated by dividend drop-off analysis and other market value studies. The formula shows that one takes the present face value of imputation credits (IC/r_e) and then multiplies by gamma and the result makes up part of the market value of equity.

144 Another way to see this is to rearrange the formula to isolate gamma as follows:

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

where $E_{with-IC}$ represents the market value of equity including imputation credits, E_{ex-IC} represents the market value of equity excluding imputation credits and IC/r_e represents the present face value of imputation credits. It is clear in this formula that gamma does not represent the proportion of imputation credits that might be redeemed, but the extent to which imputation credits increase the market value of equity.

145 Handley (2015) responds to the analysis set out above as follows:

> There is no dispute that the (market) value of credits are capitalised into stock prices – this is clear from equation (2) above. However, SFG fails to see that

> within Officer's framework it is the before personal tax and before personal costs value of a credit – the redemption value – which is the item being capitalised.

146 This seems to suggest that:

a. In the real world it is the market value of imputation credits that investors capitalise into the stock price; whereas

b. In the theoretical setting that forms the basis of Handley's advice, it is the "redemption value" of imputation credits that is capitalised into the price. (The "redemption value" is yet another new term that is presumably equivalent to the redemption rate, "utilisation value," and "pre-personal-tax and pre-personal-cost value".)

147 That is, there is an observed stock price in the real world that has the market value of imputation credits capitalised into it. There may then be an alternative theoretical stock price that has the redemption rate capitalised into it. If one is analysing this theoretical world, the real world stock price would be of little use because it reflects the real world market value of imputation credits rather than the redemption rate. The AER makes a similar point when it states that the market value that is reflected in observed stock prices:

> ...is not consistent with our interpretation of the conceptual framework[85]

and:

> ...does not align with the conceptual definition of utilisation rate.[86]

148 Our point here is a simple one. There appears to be general agreement that real world stock prices will reflect the market value of imputation credits. Thus, stock prices can be used to estimate the market value of imputation credits. It is this market value (based on observations from the market for equity funds) that the regulator should consider when deciding on the extent to which there should be a reduction in the firm's ability to generate dividends and capital gains for its shareholders.

4.11 Is the redemption rate an upper bound or a point estimate?

149 There appears to be broad agreement that if theta is to be defined as the market value of imputation credits (as in worth to investors in the market), the redemption rate estimates cannot be used to estimate theta. They can, at best, be used to provide an upper bound for theta. By contrast, if theta is to be redefined as the redemption rate, then studies that estimate the redemption rate would (tautologically) provide an appropriate estimate of theta.

---

85 AER Rate of Return Guideline, Explanatory Statement, p. 159.

86 AER Rate of Return Guideline, Explanatory Statement, p. 168.

150 On several occasions, Handley has referred to the redemption rate as providing an upper bound rather than a point estimate. This is consistent with the view that theta represents the market value of imputation credits and that the redemption rate represents an upper bound that the market cannot exceed. In this regard, Handley (2015) notes that he has previously stated that:

> The extent to which observed stock prices reflect the value of franking credits can only be determined empirically.[87]

151 We agree entirely with that statement. In his previous report, Handley (2008) goes on to describe the tax statistic approach to estimating the redemption rate and he concludes that:

> …this estimate [i.e., the redemption rate] may be interpreted as a reasonable upper bound on the value of gamma.[88]

152 That is, Handley suggests that there are two alternative ways of determining theta (and consequently gamma). One approach is to empirically estimate the value of imputation credits from observed stock prices. The other approach is to consider the proportion of credits that are redeemed. He says that the latter approach would not produce a point estimate, but only an upper bound.

153 Handley (2015) now says that the redemption rate provides a point estimate of theta. He explains that:

> An unfortunate side issue relates to my previous use of the term "upper bound". The point of using the term was this: we cannot be sure what is the value of imputation credits reflected in market prices, but we know that it should not exceed its redemption value, since this, by definition, represents the ultimate source of value of a credit. With hindsight, using "upper bound" in this context was unnecessary and confusing.

154 We agree that it is the market value of credits that is reflected in market prices. We also agree that the market price cannot exceed the redemption rate. But we cannot see why this implies that the redemption rate can now be used as a point estimate of theta, or why it would have led anyone to have mistakenly referred to what they believed to be a point estimate as an upper bound instead.

155 Moreover, in his earlier report, Handley (2008) recommends a range for gamma where most of that range is based on dividend drop-off estimates and the upper bound of the range is determined by his redemption rate estimate.[89] That is, the redemption rate estimate was used as an "upper bound" – a figure that a reasonable estimate for theta (from market value studies) could not exceed.

---

87 Handley (2015), p. 14.

88 Handley (2015), p. 14.

89 Handley (2008), p. 22.

4.12 Further guidance on market value vs. redemption rate

156 The standard treatment of imputation credits in Australian finance textbooks is to interpret gamma in terms of the market value of imputation credits. We are unaware of any published work that interprets gamma in terms of the redemption rate.

157 For example, in their corporate finance textbook, Associate Professor Partington (who is a regular consultant to the AER and who has made submissions on gamma to the QCA on behalf of the Queensland Resources Council) and his co-authors state (correctly in our view) that:

> γ=the market value of franking credits as a percentage of face value.[90]

158 They also note (correctly in our view) that the evidence suggests that investors value imputation credits materially below the face amount:

> The results have been mixed, but they suggest that the market value of franking credits is positive, but significantly less than the credit's face value.[91]

and:

> …the market value of the franking credit is likely to differ from its face value. We do not know exactly what the market value is, but the evidence suggests that franking credits are valued at a significant discount to their face value.[92]

159 Partington et. al also provide an explanation (with which we agree) as to why imputation may have had an immaterial effect on the corporate cost of equity capital:

> The impact of imputation may not have been that big. There are several reasons for this. As suggested by Bob Officer, in a small open economy like Australia, equilibrium rates of return are likely to be determined by capital flows from international investors. If so, domestic tax changes are likely to have a reduced effect, or no effect at all, on equilibrium rates of return.[93]

160 In a recent working paper, Ainsworth, Partington and Warren (2015) "examine the implications of the imputation system for…cost of capital," among other things. They begin by drawing the important distinction between what they call "value in use" and "value in exchange." Specifically, they make the point that just because some investors may receive a benefit at the time they redeem an imputation credit, it does not necessarily follow that credits must have a material effect on traded stock prices or the cost of capital. This is because share prices (and consequently the cost of capital) will be the equilibrium outcome of the

---

90 Brealey, Myers, Partington and Robinson (2000), p. 168.

91 Brealey, Myers, Partington and Robinson (2000), p. 169.

92 Brealey, Myers, Partington and Robinson (2000), p. 168.

93 Brealey, Myers, Partington and Robinson (2000), p. 168.

complex interaction of trading among all investors, and certain types of investors may be more influential in determining the equilibrium price:

> Also relevant is the basic economic distinction between 'value in use' and 'value in exchange'. There is no doubt that imputation credits have considerable value in use to Australian resident investors, who can use them to reduce taxes. Whether they have value in exchange – in other words, whether they are priced – is a separate matter.[94]

161 Ainsworth, Partington and Warren (2015) also set out the basic economic principle that the fact that an investor receives and redeems an imputation credit does not mean that the investor must value that credit at the full face amount:

> The fact that a domestic investor holds a stock and can fully utilise any imputation credits does not provide incontrovertible evidence that they attribute full value to imputation in exchange. It is entirely possible that a domestic investor could be holding a domestic stock due to expectations of receiving high pre-tax returns or other reasons, and not pricing in the imputation credits in the process. Just because an investor receives imputation credits does not necessarily mean they fully price them, and hence require a commensurately lower pre-imputation return from the company as a consequence.[95]

162 We note that the AER's current approach to gamma is based entirely on the proposition that every domestic investor who receives imputation credits *does* fully price every one of them and hence require a commensurately lower pre-imputation return from the company as a consequence.

163 Ainsworth, Partington and Warren (2015) go on to suggest that the relevant consideration is an empirical one – whether stock prices in financial markets are bid up to reflect some value for imputation credits:

> This fundamental issue can be posed as follows. Consider two companies with identical assets, with the exception that one also has a positive balance in its franking account and can distribute imputation credits, while the other has a zero balance. The question is: "Do the two companies sell for the same price?"[96]

164 Ainsworth, Partington and Warren (2015) note that the evidence generally suggests that the two companies above *do* sell for the same price.[97]

165 The fact that share prices might be independent of the amount of imputation credits the firm has available is consistent with the observation that, in practice, firms have little regard to imputation when estimating the cost of capital that they would use when evaluating potential new projects. In this regard, Ainsworth, Partington and Warren (2015) conclude that:

---

[94] Ainsworth, Partington and Warren (2015), p. 9.

[95] Ainsworth, Partington and Warren (2015), p. 14, emphasis added.

[96] Ainsworth, Partington and Warren (2015), p. 9.

[97] Ainsworth, Partington and Warren (2015), p. 17.

> Removing imputation would probably have no major impact on the manner in which most companies estimate cost of capital and evaluate investments. Imputation is typically *not* built into the cost of capital for most companies.[98]

166 Ainsworth, Partington and Warren (2015) give special consideration to the regulatory approach to lowering allowed returns to reflect the assumed effect of imputation credits on the corporate cost of capital. They note that this approach is very different from the commercial practice of making no adjustments at all to corporate valuation or cost of capital estimates in relation to imputation:

> The treatment of imputation credits for regulatory purposes stands in stark contrast to the approach elsewhere. Regulators make explicit allowance for imputation in their regulatory decisions (e.g. see AER, 2015). The regulators employ the model of Officer (1994), where imputation is taken into account and other tax effects incurred by investors are ignored. The application involves reducing the cost of corporate tax by the 'value of imputation credits', which lowers the pre-tax return that utilities are allowed to earn on regulatory capital. This has the effect of limiting the prices that utilities are permitted to charge.[99]

167 They go on to summarise the AER's recent approach as follows:

> The regulators estimate the value of imputation credits as the product of the distribution rate (i.e. the portion of income that is assumed to be distributed to shareholders), and the utilisation rate. The latter parameter reflects an estimate of the value of imputation credits in the hands of investors. In a recent decision, the Australian Energy Regulator (AER) applied a value of 0.4 to imputation credits (AER, 2015). While this value was formed with reference to a range of estimates and measures, it roughly equates to the product of a 70% distribution rate and a 60% utilisation rate. That is, regulatory practice assumes that distributed imputation credits are worth about $0.60 in the dollar.
>
> A notable feature of the regulatory approach is the hierarchy that is applied in considering various estimates of the utilisation rate. The AER firstly relies on the proportion of Australian equities holdings held by domestic investors, which it indicates to be in the range of 0.56 to 0.68 for all equity, and 0.38 to 0.55 for listed companies. They secondly consider the reported utilisation of imputation credits according to taxation statistics, suggesting a range for the utilisation rate for all equity of 0.4 to 0.6, with reference to analysis by Hathaway (2013). They place least reliance on what they call 'implied market value studies'. Thus least weight is placed on the body of research aiming to extract the value of imputation credits from market prices and returns, as described in Section 4.1. Their reasons are that the equity holding and tax data provide more direct and simple evidence, meanwhile downplaying market-based studies based on their methodological limitations and variable estimates.[100]

168 Ainsworth, Partington and Warren (2015) then call into question the basis of the AER's approach, in the context of their discussion about the standard economic concept of market equilibrium:

---

[98] Ainsworth, Partington and Warren (2015), p. 27.

[99] Ainsworth, Partington and Warren (2015), p. 27, emphasis added.

[100] Ainsworth, Partington and Warren (2015), p. 27.

> The discussion in Section 3.2 around how market equilibrium is determined is directly relevant to this issue. It raises some questions over the philosophy underpinning the regulatory approach.[101]

169 They further spell out the problems with the AER's approach. They note that investors will consider many factors when determining what assets they will purchase and what price they would be prepared to pay for them. This presents problems for the AER's "aggregation" approach, which simply counts up the number of credits that are distributed to domestic investors and *assumes* that those investors value all credits at the full face amount *and* that this is reflected in the equilibrium share price and cost of capital:

> In practice, an investor's demand for assets may reflect a whole range of considerations, including their expectations, the broader portfolio context, their liabilities, constraints, other costs, etc. This issue is particularly problematic for applying the aggregation approach through reference to observed holdings.[102]

170 In our view, Ainsworth, Partington and Warren (2015) reinforce many of the points made above. The AER's approach of simply counting up the number of credits that are distributed to domestic investors has no proper basis to it and is inconsistent with standard economic concepts of equilibrium and with standard commercial practice.

---

[101] Ainsworth, Partington and Warren (2015), Footnote 21, p. 27, emphasis added.

[102] Ainsworth, Partington and Warren (2015), p. 14, emphasis added.

5 Issues specific to the QCA

5.1 The Lally "conceptual test"

5.1.1 Overview

171 As set out above, Lally and Handley have each developed theoretical conceptualisations of theta. The Handley approach is based on an assumption that investors do not seek to maximise their utility over their investment portfolio. We have noted above that Lally has pointed out that the Handley approach violates the most basic notions of market equilibrium and is inconsistent with the very basis of the CAPM. Lally's approach is to instead assume that there are no foreign investors in the Australian market, so that all investors can redeem the imputation credits that are distributed to them.

172 Lally (2013 QCA, 2013 AER) goes on to develop a "conceptual test" that is designed to provide some bounds around a reasonable estimate of the utilisation rate. The QCA notes that the test is only satisfied by setting the utilisation rate close to one:

> …a utilisation rate of one (or close to one) in conjunction with the common approach of Australian regulators is reasonable (i.e. it produces a result that satisfies the test).[103]

173 The Lally "conceptual test," otherwise known as the "conceptual goal posts" has been considered in detail by the AER and the ERA. Both of these regulators have concluded that the test should be given no weight whatsoever when estimating theta.

5.1.2 Logical decision-making issues

174 Before considering the merits of the test itself, we address the decision-making logic of the QCA's use of this "test." As part of its decision-making process, the QCA must decide whether the Lally test does bound the reasonable values for the utilisation rate or whether it does not. That is the QCA must decide whether:

a. The test provides reliable bounds such that all reasonable values of the utilisation rate must fall within those bounds; or

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

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

176 Logically:

[103] QCA Market Parameters Decision, p. 99.

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

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

177 The QCA has adopted a utilisation rate that falls well outside of the bounds established by the Lally test. That is, the utilisation rate adopted by the QCA fails the Lally test by a material amount. However, the QCA concludes that:

> The Lally conceptual test is relevant but given the uncertainty about the bounds of the test, it is given less weight in establishing a final estimate of the utilisation rate.[104]

178 The QCA has not explained how it is that it has:

a. Given some weight to the Lally conceptual test; and then

b. Adopted a utilisation rate that fails the test by a large margin.

5.1.3 Reasons for rejecting the "conceptual test"

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

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

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

c. The Lally test is based upon the assumption that the market risk premium in every country is equal to the same multiple of stock market variance. However, the QCA cites Lally himself as concluding that "the statistical precision of the method is very low," [105] and the QCA concludes that this approach "does not warrant material weight at this time." [106] That is, the whole basis of the Lally "test" is an approach that the QCA itself considers to

---

[104] QCA Market Parameters Decision, p.100.

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

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

provide no useful information. That is, the test is based on the notion that an approach that the QCA considers to be so difficult to reliably apply in the real world (where data is available to guide the estimation) that no material weight should be applied to it, is somehow able to produce perfectly reliable output for Lally's hypothetical worlds (where no data is available because those worlds do not exist); and

d. The first version of the test relied upon government bonds having the same yield whether or not foreign investors are allowed to buy them, which is clearly untenable. In the second version of the test, the obvious difference in government bond yields in the two cases is simply dismissed as being an irrelevant consideration.

5.1.4 Regulatory rejection of the "conceptual test"

180 The Lally conceptual test has been rejected by every regulator that has considered it. In its November 2014 draft decisions, the AER concluded that:

> …we do not rely on the conceptual goalposts approach.[107]

181 In its ATCO Gas Final Decision, the ERA concluded that:

> …the conceptual goal posts approach has not found much support[108]

and:

> …the Authority accepts that there is a general concern about the validity of the range implied by the approach[109]

and:

> …the Authority does not rely on the conceptual goal posts estimates.[110]

5.2 The evolution of the QCA's approach to estimating gamma

182 At the time of its last WACC review in 2004, the QCA practice was to set the utilisation rate (or theta) to 0.625 and gamma to 0.5. At that time, the QCA used empirical market data and estimation techniques that were designed to estimate the market value of imputation credits, consistent with the approach of all other Australian regulators. In its conclusions to the 2004 WACC review, the QCA noted that:

---

[107] AER (2014), ActewAGL Draft Decision, Attachment 4, p. 69. The AER expressed similar views in its other 2014 draft decisions for the NSW electricity networks and Jemena Gas Networks.

[108] ERA (2015), ATCO Gas Final Decision, Paragraph 1920.

[109] ERA (2015), ATCO Gas Final Decision, Paragraph 1922.

[110] ERA (2015), ATCO Gas Final Decision, Paragraph 1923.

> 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.[111]

183 That is, the QCA's (market value) estimate of 0.625 was based on:

a. Redemption rate studies; and

b. Dividend drop-off studies,

which the QCA considered to produce estimates of "about 0.60."

184 This approach to estimating the utilisation rate has become untenable since the *Gamma Case*, where:

a. The Tribunal ruled that redemption rates cannot be used to estimate the value of imputation credits; and

b. The Tribunal also ruled that:

   i. The dividend drop-off study that supports an estimate of about 0.60 was unreliable and should not have been used; and

   ii. The SFG (2011, 2013) "state-of-the-art" estimate of 0.35 should be adopted instead.

185 That is, the whole basis for the QCA's previous gamma estimate of 0.5 is inconsistent with the Tribunal's ruling. This has led the QCA to re-evaluate its approach to estimating gamma. The result of this re-evaluation is a fundamental change to the very definition of gamma itself. The QCA has now concluded that it was wrong to have been trying to estimate the value of imputation credits over the last 10 years, because gamma does not in fact represent "the value of imputation credits"[112] at all, but rather represents something quite different. This in turn has led the QCA to now reject all of the empirical market data that it has previously relied upon and to estimate gamma using different methods that are more consistent with the QCA's revised definition of what gamma means. (Specifically, the QCA now considers that gamma should be estimated in terms of the proportion of credits that are likely to be redeemed, rather than in terms of the value of those credits to investors. Section 4 explains why the QCA's new approach is incorrect and inconsistent with the QCA's regulatory framework.)

---

[111] 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.

[112] Notwithstanding the fact that gamma is defined in exactly that way in the National Gas Rules and National Electricity Rules.

186 The result of these fundamental changes in the QCA's definition of gamma, and in the methods the QCA uses to estimate gamma, is that the QCA's final estimate has changed from 0.50 to 0.47.

6 Current estimates of the redemption rate

6.1 Overview

187 Whether the redemption rate is to be used as a point estimate of theta or as an upper bound for theta, the regulator will require an estimate of it. Two methods have been proposed for estimating the redemption rate: tax statistics and the equity ownership approach.

6.2 Tax statistics estimates

188 The tax statistics approach involves the analysis of ATO data in relation to the quantum of credits redeemed relative to the quantum of credits distributed. Two estimates are currently available:

a. The AER has accepted an estimate of 0.43 from Hathaway (2013)[113]; and

b. NERA (2105) report an estimate of 0.45.[114]

6.3 Equity ownership

189 The equity ownership approach involves estimating the proportion of Australian shares that are owned by resident investors and then assuming that 100% of the credits distributed to residents will be redeemed.

190 For the reasons set out in SFG (2015 AER, pp. 29-31), our view is that more recent estimates are more relevant than historical estimates and that the most recent estimates of the redemption rate are 0.44 using listed equity and 0.58 using all equity.

6.4 Summary of estimates

191 The estimates of the redemption rate that are currently available are:

a. From tax statistics: 0.43 (Hathaway, 2013) and 0.45 (NERA, 2015); and

b. From equity ownership: 0.44 (listed equity) and 0.58 (all equity).

---

113 TransGrid Final Decision, Attachment 4, p. 18.

114 NERA (2015), p. v.

The AER appears to have used a redemption rate estimate of 0.6 in its recent decisions.[115] In our view, that estimate is inconsistent with the weight of evidence set out above.

[115] See, for example, the references to theta being set to 0.6 in the TransGrid Final Decision, Attachment 3, pp. 301, 303, 304, 305, 307, 316, 318, 331, 435. The AER states (p. 307) that its estimates "are based on an imputation credit utilisation rate (theta) of 0.6. This is consistent with other parts of this decision (see attachment 4 – value of imputation credits).

7 Market value estimates of theta

7.1 Our preferred estimate

192 In a previous report to the AER,[116] we submitted that:

> In all of the alternative market value studies over the last five years, the authors have concluded that the evidence supports an estimate of theta between 0 and 0.35.[117] We note that, relative to these alternative market value studies, dividend drop-off analysis has a longer history, has been subjected to a higher level of scrutiny (especially the SFG 2011 study), and the strengths and weaknesses of the approach, and the econometric issues, are better understood. Consequently, we maintain a theta estimate of 0.35 – from dividend drop-off analysis – in this report noting that this is a conservative estimate in that the other relevant evidence produces lower estimates.[118]

193 We remain of the view that 0.35 is a conservative estimate of the market value of distributed imputation credits for the reasons set out in this report and our earlier report. We note that SFG (2014 AER, pp. 27-28) summarises the Tribunal's scrutiny of the SFG dividend drop-off study and its adoption of the SFG estimate.

7.2 QCA determination

194 The QCA has determined that no weight at all should be applied to dividend drop-off estimates. Two reasons have been proposed:

a. Dividend drop-off studies seek to estimate the value of imputation credits, whereas the utilisation rate is the proportion of credits that are redeemed and not the extent to which they are valued by investors; and

b. Dividend drop-off studies are affected by econometric issues to such an extent that no reliance should be placed on them.

195 The first issue is a conceptual one that is dealt with in Section 4 above. Our view is that gamma represents the value of imputation credits, not the number of credits that are redeemed. If, however, gamma actually has nothing to do with the value of imputation credits, then dividend drop-off analyses would indeed be irrelevant. In the remainder of this section we address the econometric issues that relate to dividend drop-off analysis, should they be considered to provide relevant evidence.

---

116 SFG (2014 AER).

117 See, for example, the list of studies set out in AER Rate of Return Guideline, Explanatory Statement, Appendix H, Table H.8, pp. 173-174.

118 SFG (2014 AER), p. 38.

7.3 Econometric issues

196 The QCA's recent determinations re-list the range of econometric issues that were set out in the reports of Lally (2013 QCA) and Lally (2014 QCA).[119]

7.3.1 Issues already addressed

197 We have made two previous submissions to the QCA that deal, in part, with dividend drop-off analysis. Those submissions address, in some detail, all of the issues that have been re-listed in the QCA's recent determinations. In particular:

a. We address issues relating to trading volumes around ex-dividend dates at SFG (2014 QCA, pp. 35-37);

b. We address the use of a constant term in the regression specifications at SFG (2014 QCA, pp. 37-38);

c. We address the interaction between the value of the cash dividend and the value of the imputation credit at SFG (2014 QCA, pp. 38-39);

d. We address the elimination of micro-cap companies at SFG (2014 QCA, pp. 39);

e. We address the stability and reliability of our estimates in SFG (2014 ERA);

f. We address the comparison between the ERA and SFG studies in SFG (2014 ERA);

g. We address the potential impact of increases in trading volume around ex-dividend dates at SFG (2014 QCA, pp. 61-62); and

h. We address clientele effects and the potential effects of short-term trading at SFG (2014 QCA, pp. 62-64).

198 The QCA's recent determinations appear to have no regard to the fact that our earlier submissions address every one of the econometric issues that have been raised. If the QCA considers that we have not adequately addressed one or more of the econometric issues they should state why they have reached that conclusion. To date, the QCA simply lists the issues that have been raised by Lally and makes no mention of our responses to each of those issues. If the QCA maintains its view that these econometric issues affect the reliability of dividend drop-off estimates, they should state why they consider our existing responses on each issue to be inadequate.

---

[119] QCA Market Parameters Decision, pp. 94-96.

7.3.2 Comparison with the ERA study

199 The QCA draws a particular comparison between the SFG dividend drop-off analysis and that of Vo, Gellard, and Mero (2013) (the ERA study).

200 The QCA begins by suggesting that the two studies produce different results, which goes to the reliability of the dividend drop-off method. The SFG study uses market-adjusted returns, as is standard in dividend drop-off analyses around the world. This adjustment implies that, but for the dividend, the stock would have moved in accordance with the broad market. Paragraphs 221 to 225 of our previous report explain why the standard market adjustment should be applied. The ERA study presents results with the standard market-adjusted returns and concludes that when the standard market adjustment is applied the best estimate of theta is 0.34, which corroborates the SFG (2011) and SFG (2013) estimates of 0.35.

201 The ERA study also presents results without the standard market adjustment. This approach implies that (but for the dividend) the stock price would have been unchanged over the day – whether the broad market was up 5% or down 5%. As explained in our previous report, this approach is not used in dividend drop-off studies because it introduces unnecessary error. The conclusions of the ERA study differ from those of the SFG studies only to the extent that the ERA study places some reliance on the non-standard approach of assuming that stocks in their sample are uncorrelated with the broad market.

202 In summary, when the ERA study uses the accepted and correct methodology, it confirms the SFG estimate. When the ERA study uses a non-standard and faulty methodology, it produces somewhat different conclusions.

203 The QCA also focuses on the robustness of the results to the removal of a small number of observations. This specific issue was addressed at some length in our SFG (2014 QCA) submission to the QCA (Paragraphs 45-77). That previous submission explains in detail why the SFG stability analysis produces reliable evidence and why the ERA analysis does not. In brief:

a. The ERA only performs stability analysis for the non-standard error-inducing approach of assuming that stocks in their sample are uncorrelated with the broad market;

b. The ERA focus their stability analysis on their "OLS" model, which they themselves had previously concluded to be "not appropriate." It would generally not be surprising that an inappropriate model would produce unstable results; and

c. Regardless of the above issues, the ERA's conclusions are inconsistent with their own results.

204 The QCA has no regard to any submissions about the relative merits of the ERA and SFG studies. Rather, the QCA treats them as equals and concludes that dividend drop-off studies are generally unreliable because some of the ERA

results differ from those reported by SFG.[120] However, it is not logical to conclude that dividend drop-off studies are generally unreliable on the basis that some results from a low-quality study differ from the results of a careful and thorough high-quality study. On this basis, any piece of reliable evidence could be voided by someone creating a low-quality study that produced a different estimate. In our view, a more reasonable approach would be to give weight to different studies according to the quality of each.

205 In the case at hand, the SFG study has been assessed by the Tribunal for its fitness for use in the regulatory setting. The Tribunal concluded that it has confidence in the SFG estimate[121] and that "No other dividend drop-off study estimate has any claims to be given weight vis-à-vis the SFG report value"[122] and that "the careful scrutiny to which SFG's report has been subjected, and SFG's comprehensive response, gives the Tribunal confidence in those conclusions."[123]

---

[120] QCA Market Parameters Decision, p. 95.

[121] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 38.

[122] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 38.

[123] Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), Paragraph 22.

8 Compiling the evidence into an estimate of gamma

206 Our approach is consistent with the standard practice of estimating gamma as the product of:

a. The distribution rate, *F*; and

b. The value of distributed credits, theta.

207 The distribution rate is a firm specific parameter because it depends upon dividend payout policies, which vary across firms according to their characteristics and circumstances. Theta is a market wide parameter because the value of a credit in the hands of an investor is independent of its source – in the hands of any particular investor, all imputation credits are identical.

208 Consequently, there is no reason to impose a constraint that the same data source must be used to estimate both parameters. Rather, any data that is relevant to the estimation of the distribution rate (i.e., "the proportion of imputation credits generated by the benchmark efficient entity that is distributed to investors"[124]) should be used to estimate that parameter, and any data that is relevant to the estimation of theta should be used for that purpose. The best estimates of each parameter should then be multiplied to produce the best estimate of gamma.

209 In our view, the AER's approach of using different subsets of the available evidence (e.g., all equity vs. listed equity) to establish a range of ranges for each parameter, and consequently for gamma, is neither transparent, nor necessary, nor correct.

210 Specifically, the AER considers that if listed equity is used to estimate theta, then only listed equity must be used to estimate the distribution rate – and that other data that is relevant to the estimation of the distribution rate must be set aside.[125] In our view, this would be a mistake. The distribution rate and theta are separate parameters. It is not the case that the estimate of one depends on, or builds on, the estimate of the other. In our view, all of the relevant estimation methods that are relevant to the estimation of a parameter should be used to inform the estimate of that parameter.

211 Handley (2015 JGN) agrees that the distribution rate is a firm-specific parameter and that theta is a market-wide parameter, but he disagrees with the proposition that all of the relevant estimation methods that are relevant to the estimation of a parameter should be used to inform the estimate of that parameter. Rather, he concludes that "it is obvious that both components should be based on consistent data sets that relate to the same market." To show why this conclusion is far from obvious, consider the case where there are sufficient

---

[124] TransGrid Final Decision, Attachment 4, p. 65.

[125] See for example, TransGrid Final Decision, Attachment 4, p. 63-64.

comparator firms to properly estimate a firm-specific distribution rate. The Handley approach would then have us estimate theta with reference to only the data for those comparator firms, even though theta is a market-wide parameter and would be properly informed by data from all firms.[126]

212 After considering all of the relevant evidence, we adopt a distribution rate of 70% for the reasons set out in Section 3 of this report:

a. That estimate is consistent with data for all companies;

b. That estimate is consistent with data for all listed companies excluding the top 20; and

c. The distribution rate is a firm-specific parameter and the top 20 firms are very large multinationals that are able to distribute imputation credits via profits earned offshore and the benchmark entity operates only within Australia.

213 For the reasons set out in Section 4 of this report, we consider that theta should be interpreted as the value of distributed credits – as in the price that an investor would be prepared to pay for a credit in the market for equity funds, or (equivalently) the extent to which credits are capitalised into stock prices.[127] In our view, the best available estimate of theta is 0.35. The source of this estimate is dividend drop-off analysis applied to data from 2000-2013. Other market value estimates of theta tend to be lower, in which case the 0.35 estimate would be conservative.

214 Our view is that redemption rates should be interpreted as an upper bound for theta. The estimates of the redemption rate that are currently available are:

a. From tax statistics: 0.43 (Hathaway, 2013) and 0.45 (NERA, 2015); and

b. From equity ownership: 0.44 (listed equity) and 0.58 (all equity).

Our preferred estimate of theta of 0.35 lies below these upper bound estimates, satisfying that test.

215 Our preferred estimate of gamma is 0.25, which is the product of the distribution rate (0.7) and theta (0.35). In our view this is the best estimate of gamma that is currently available.

---

[126] Handley (2015 JGN), p. 8.

[127] That is, the extent to which stock prices have been bid up to reflect the market's assessment of the value of imputation credits.

9 References

Ainsworth, A, G. Partington and G. Warren, 2015, "Do franking credits matter?" Research working paper, Centre for International Finance and Regulation.

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

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

Australian Energy Regulator, 2015, *Final decision for TransGrid Transmission 2015-16 to 2018-18, Attachment 3 – Rate of return,* April.

Australian Energy Regulator, 2014, *Draft decision, Jemena Gas Networks (NSW) Ltd Access Arrangement 2015-20*, November.

Australian Energy Regulator, 2014, *Draft Decision ActewAGL*, *Attachment 4*,

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

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

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

Australian Energy Regulator, 2013, Access arrangement final decision SPI Networks (Gas) Pty Ltd 2013-17, March.

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

Brealey, R., S. Myers, G. Partington and D. Robinson, 2000, *Principles of Corporate Finance: Australian edition*, McGraw Hill.

Economic Regulation Authority, 2015, *Final decision on proposed revisions to the access arrangement for the mid-West and South-West gas distribution system*, 30 June.

Handley, J., 2015 JGN, "Advice on the NERA report: Estimating distribution and redemption rates from taxation statistics," Report for the AER, 20 May.

Handley, J., 2015, "Further advice on the value of imputation credits," Report for the AER, 16 April.

Handley, J., 2014, "Advice on the value of imputation credits," report for the AER, December, 29 September, www.aer.gov.au.

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.

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

Lally, M., 2014 QCA, *Response to submission on the risk-free rate and the MRP*, Report for the QCA, 22 October.

Lally, M., 2013 QCA, *Response to submission on the risk-free rate and the MRP*, Report for the QCA, 22 October.

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

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

NERA, 2015, "Estimating distribution and redemption rates from taxation statistics," March.

NERA, 2013, *The Payout Ratio: A Report for the Energy Networks Association*, June.

Officer, R., 1994, "The Cost of Capital of a Company under an Imputation Tax System," *Accounting and Finance*, 34, 1-17.

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

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

SFG Consulting, 2015 AER, "Estimating gamma for regulatory purposes," 6 February.

SFG Consulting, 2014 AER, "An appropriate regulatory estimate of gamma," 21 May.

SFG Consulting, 2014 ERA, "Estimating gamma: Response to ATCO Gas Draft decision," 24 November.

SFG Consulting, 2014 QCA, "An appropriate regulatory estimate of gamma," 16 January.

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.

Sharpe, W., 1964, "Capital asset prices: A theory of market equilibrium under conditions of risk," *Journal of Finance,* 19, 425–442.

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

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

10.1 Non-imputation setting

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

Table 5. Calculation of required pre-tax profit

Quantity	Amount
Profit before tax	100
Less corporate tax (30%)	30
After-tax profit available for distribution to shareholders	70

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

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

where X is $100 and T is 30% in this case.

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

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

10.2 Imputation setting

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

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

Table 6. Calculation of total return to shareholders

Quantity	Amount
Profit before tax	100
Less corporate tax (30%)	30
After-tax profit available for distribution to shareholders	70
Value of imputation credits (0.25 times corporate tax paid)	7.5
Total return to shareholders	77.5

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

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

and imputation credits with a value of:

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

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

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

which can also be written as:

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

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

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

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

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

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

Table 7. Regulatory implementation of imputation credits

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

10.3 Estimated tax cost

227 The Rules define the Estimated Tax Cost (ETC)[128] as:

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

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

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

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

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

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

230 In the above example, we have:

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

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

[128] NER Clause 6.5.3.

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

$$27.10 \times 0.25 = 6.77.$$

232 The required pre-tax profit is then determined as:

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

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

10.4 Returns with and without imputation credits

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

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

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

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

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

which, in the above example is:

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

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

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

236 In the above example, we have:

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

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

10.5 Calculations in the Australian regulatory framework

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

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

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

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

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

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

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

243 For example, IPART (2013) uses a number of versions of the dividend discount model to inform its estimate of the required return on equity. The dividend discount approach takes no account of imputation credits at all, and consequently produces an estimate of the ex-imputation required return on equity. IPART use the Officer formula set out above to convert the ex-imputation estimate into a with-imputation estimate, for use in the regulatory model.

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

FRONTIER ECONOMICS | MELBOURNE | SYDNEY
Frontier Economics Pty Ltd 395 Collins Street Melbourne Victoria 3000
Tel: +61 (0)3 9620 4488 Fax: +61 (0)3 9620 4499 www.frontier-economics.com
ACN: 087 553 124 ABN: 13 087 553 124