

Response to issues raised at the AER Roundtable

Report prepared for ENA, APIA, and Grid Australia

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Executive summary and conclusions

Context

1. This report has been prepared by Professor Stephen Gray, Professor of Finance at the University of Queensland Business School and Managing Director of Strategic Finance Group (SFG Consulting), a corporate finance consultancy specialising in valuation, regulatory and litigation support advice.
2. I have been engaged by ENA, APIA, and Grid Australia to provide short responses to certain matters that were raised at the Roundtable on Weighted-Average Cost of Capital (WACC) convened in Melbourne on 10 October by the Australian Energy Regulator (AER). Specifically, I have been asked to summarise my views on three issues:
 - a. The use of franking credit redemption rates as an estimate of theta;
 - b. The “adjusted” estimates of theta presented in Lally (2007); and
 - c. The level of internal consistency that must be maintained in the WACC analysis. This includes:
 - i. Where a parameter is used in two parts of the WACC analysis, must the same value be adopted in both places?
 - ii. Whether WACC parameters should be estimated with reference to market data or set on the basis of theoretical reasoning/assumption. That is, whether WACC parameters should be estimated as they *are*, or as they *would be* if certain underlying assumptions were to hold precisely.

Conclusions

3. My conclusions on these issues are as follows:
 - a. Redemption rates cannot be used as an estimate of theta as they are an indication of how many franking credits are redeemed, whereas WACC estimation requires an estimate of how much investors *value* franking credits. All other WACC parameters are estimated with reference to market values rather ;
 - b. The adjustment proposed in Lally (2007) seeks to convert an estimate of the value of franking credits into an estimate of redemption rates. Since WACC estimation requires an estimate of value, and redemption rates are something quite different, the proposed adjustment should not be used.
 - c. Internal consistency should be maintained in any economic analysis (including WACC estimation) or *any* outcome is possible. In particular:
 - i. Where a parameter is used in two parts of the WACC analysis, the same value should be adopted in both places.
 - ii. Because capital is raised in a real-world market, WACC parameters should be estimated with reference to market data – as they *are*, not as they *would be* if certain underlying assumptions were to hold precisely.

1. The use of franking credit redemption rates as an estimate of theta

Methods for estimating theta

4. The experts attending the Roundtable agreed¹ that four methods have been used to estimate theta:
 - a. Dividend drop-off analysis;
 - b. Simultaneous security price analysis (e.g., examining simultaneous prices of stock and futures contracts);
 - c. Franking credit redemption rates; and
 - d. Assumption.
5. There also appeared to be general agreement among the experts that it was not appropriate to simply assume a value for theta, but rather that some regard should be had to the empirical estimates that can be obtained from the available market data.² I set out a number of considerations that one would have regard to in determining how much weight to apply to a particular piece of empirical evidence, and this was generally agreed among the other experts.

Relevant Rules

6. When considering the method that should be used to estimate theta, one should first have regard to the relevant Rules. In my earlier report I noted that:

the relevant Rules (6.A 6.4 and 6.5.3) refer to gamma as being the “assumed utilisation of franking credits.” This must be interpreted widely to allow for the facts that (a) the distribution rate must be considered when estimating gamma and (b) the rate at which franking credits are utilised is not an estimate of market value, as explained in this report.³

7. The Rules also set out a mathematical formula, in which the value of gamma is used to adjust the estimated corporate tax payment for the regulated entity. In my view, this context makes it very clear that gamma is to be given the meaning that is universally understood in commercial and regulatory practice – gamma is the product of a distribution rate (F) and the relevant value of credits once distributed (theta).
8. Any suggestion that the reference in the Rules to “utilisation” should be interpreted as a reference to “redemption rates” is patently wrong in my view. Such an interpretation would be extraordinary, as it would suggest that gamma (not theta) would be estimated with regard to redemption rates, with the consequence that the distribution rate is irrelevant. It is not possible that this is the intention of the rules and such an interpretation would be quite inconsistent with the mathematical formula in the rules that illustrates how gamma is to be applied.

¹ Transcript, P. 15, Line 20 and following.

² Transcript, P. 17, Lines 19-20.

³ Gray (2008, para. 4).

9. In my view, the word “utilisation” must be interpreted broadly in terms of “value” and not in terms of the redemption rate. To do otherwise would be inconsistent with the mathematical formula that appears in the Rules. This means that one must consider the distribution rate (F) and then apply one (or more) of the methods set out above to estimate theta, which is the standard regulatory practice. I raise this point because there is sometimes confusion in terms between “utilisation” and “redemption.”⁴ For the reasons set out in my report, and at the Roundtable, it is my view that redemption rates have little (if anything) to do with the value of theta that is a component of the estimate of gamma, which is to be used in the formula set out in the Rules.

Redemption rates

10. The Australian Tax Office makes available various statistics on the redemption of franking credits. Some researchers have used this data to estimate what is in effect the ratio of (i) all franking credits that were redeemed over a specific period, to (ii) all franking credits that were distributed during the same period. This ratio is termed the “redemption rate” or sometimes the “utilisation rate.”

Use of redemption rates

11. None of the experts at the Roundtable proposed that an estimated redemption rate should be used as an estimate of theta.
12. Assoc. Prof. Handley indicated that his view was that redemption rates could be used as an “upper bound” for the estimate of theta. This is consistent with his published paper on this topic⁵, which never suggests that the redemption rate should be used as an estimate of theta.
13. If it is true that redemption rates do provide an upper bound for theta, it necessarily implies that a regulator (or anyone seeking to estimate WACC) would require some means of determining how far the true value of theta is below this upper bound. What is required is an estimate of theta. Knowing an upper bound for theta is insufficient – one also requires some method of estimating the true value of franking credits within this upper bound. In my view, this must lead one to use one of the methods that are based on the prices of traded securities – the dividend drop-off or simultaneous price approaches.
14. My view⁶ is that redemption rates have little relevance to the estimation of theta. Assoc. Prof. Handley expressed the view that they can be considered to provide an upper bound for theta, but that one should also consider the results from other techniques. Whether one concludes that redemption rates are irrelevant or an upper bound, the implications for a regulator are the same – some other technique must be used to estimate a value for theta. There is no suggestion that estimates of redemption rates themselves provide an estimate of theta.

Interpretation of redemption rates

⁴ Transcript P. 16, Line 11 and following.

⁵ Handley, J. and K. Maheswaran (2008)

⁶ See the subsection that follows.

15. It is my view that redemption rates provide information about the proportion of shareholders that use the franking credits that are distributed to them. Redemption rates tell us nothing about how much investors as a whole, or any investor in particular, *values* a franking credit that they have redeemed – and that is what is required of our estimate of theta. Indeed it is market values that are the basis of all WACC parameters. For example, the risk-free rate of interest may be estimated as the market yield on government bonds, not with reference to how many investors use them.
16. Consider, for example, a shareholder who receives a \$1 franking credit and then redeems it. The question is what that franking credit is worth to the shareholder – how much more would the shareholder be prepared to pay for the share in order to receive that franking credit?
17. The first point to note is that a \$1 franking credit need not be worth \$1, even to an investor who redeems it. There are a number of reasons for this. For example, a franking credit received today cannot be redeemed until the end of the tax year and a cash payment is not received until the shareholder's tax return processed by the ATO – so there is a time value of money effect. Moreover, the franking credit is added to the shareholder's taxable income and is taxed at their marginal rate. These things may or may not have an impact on the value of the franking credit to the shareholder. The point here is that it would be wrong to simply assume that this shareholder values the franking credit at its face value. What is needed is another technique or methodology that can be used to estimate the value of franking credits to investors – something that goes beyond documenting how many of them are redeemed. It is likely for this reason that Assoc. Prof. Handley refers to redemption rates only as an “upper bound” for theta.
18. Hathaway and Officer (2004) conduct a dividend drop-off analysis and also examine redemption rates. They estimate the redemption rate to be around 0.5 and they conclude that their drop-off analysis also supports an estimate of theta of 0.5. In my view, both of these results should be interpreted in light of the implications for the value of cash dividends, and this is explained in the following paragraphs.
19. The logic of using the redemption rate as an estimate of theta is as follows:
- 50% of shareholders do not redeem franking credits and are consequently assumed to place no value on receiving them;
 - 50% of shareholders do redeem franking credits and are consequently assumed to place full value on receiving them;
 - The weighted-average valuation of franking credits is $0.5 \times 0 + 0.5 \times 1 = 0.5$ – so the average valuation of franking credits is 50%.
20. But now consider the logic of comparing this estimate with that from dividend drop-off analysis. As noted in Section 3 below and in my earlier report, the 0.5 estimate of theta from drop-off analysis is *conditional* on shareholders valuing cash dividends at 80% of face value.⁷ Moreover, it is difficult to imagine any scenario in which any shareholder would value franking credits more than

⁷ Dividend drop-off analyses consistently report that the market value of a \$1 cash dividend and the associated 43 cent franking credit (the credit that is attached to a \$1 fully franked dividend when the corporate tax rate is 30%) is \$1. Beggs and Skeels (2006) and Hathaway and Officer (2004) conclude that this \$1 total value should be apportioned 80 cents to the dividend and 20 cents to the franking credit. Thus, the dividend is valued at 80% of its face value and the franking credit is valued at around 50% of its face value. It is in this sense that the 50% value of franking credits is conditional on the cash dividend being valued at only 80% of its face value.

cash dividends.⁸ This means that the dividend drop-off results imply that franking credits received by shareholders will be valued at a maximum of 80% of their face value.

21. Consequently:
- a. According to the dividend drop-off result, franking credits cannot be valued at more than 80% of face value (because dividends are valued at 80% of face value and franking credits cannot be worth more than dividends). It would be inconsistent and wrong to compare this to an estimate from redemption rates that is constructed on the basis that those franking credits that are redeemed must have been fully valued at their face value.
 - b. Alternatively, if one starts with the assumption that shareholders fully value franking credits that are distributed to them (as the redemption rate method does), it would be inconsistent and wrong to then consider dividend drop-off results that imply that cash dividends are valued at only 80% of face value – it being implausible that franking credits are more valuable than cash dividends.
22. My point here is simply that if redemption rates and drop-off analysis are to be compared, it is imperative that the *whole* result be considered and that any internal inconsistencies must be addressed.

Conclusions

23. My view is that franking credit redemption rates have little relevance to the estimation of theta and that one should focus on the methods that are based on the market prices of traded securities, as is the case for all other WACC parameters. I have reached this conclusion for the following reasons:
- a. Redemption rates tell us the proportion of franking credits that are redeemed by shareholders, they do not tell us how much shareholders *value* the franking credits that they redeem, which is what is required in an estimate of theta;
 - b. There are a number of reasons (including taxes and the time value of money) why a shareholder who redeems a franking credit would value it at less than its face value. This is consistent with Assoc. Prof. Handley's view that redemption rates can only provide an upper bound, and not an estimate, for theta;
 - c. Inconsistencies between estimates of theta based on redemption rates and those based on market data are likely due to the fact that the two approaches are measuring different things. This is also consistent with Assoc. Prof. Handley's view that redemption rates do not estimate theta, but rather provide an upper bound; and
 - d. Even if redemption rates do provide an upper bound for the estimate of theta, one still requires a technique to estimate the *value* of theta and this will lead one to the approaches that are based on the market prices of traded securities.

⁸ For example, both attract the same tax treatment but the cash dividend is available immediately whereas those shareholders who can utilise franking credits must wait a period before doing so.

2. Adjusted estimates of theta from Lally (2007)

The proposed adjustment

24. During the Roundtable discussion, Assoc. Prof. Lally expressed his view that all dividend drop-off analyses that have so far appeared in the literature are subject to a significant methodological error. In his view, the consequence of this error is that what the authors of these studies have interpreted as an estimate of theta is in fact not an estimate of theta at all. Rather, this empirical estimate must be scaled by another parameter to produce an estimate of theta. Assoc. Prof. Lally's views on this issue are set out in Lally (2007, pp. 13-15).
25. There was general agreement among the experts at the Roundtable that dividend drop-off analysis has consistently produced a result that the combined value of a cash dividend and the associated franking credit is equal to the value of the cash dividend.⁹ For example, a \$1 cash dividend and the associated 43 cent franking credit¹⁰ has a combined value of \$1. This result has been consistently reported across different authors, different time periods, and different samples of firms.¹¹ This result is also consistent with studies that examine the simultaneous prices of stocks, futures and options contracts.¹²
26. Dividend drop-off analysis then seeks to disaggregate the combined value of dividend plus franking credit into the component pieces – how much of the total value is attributable to the cash dividend and how much is attributed to the franking credit? The result of this step is two parameter estimates:
- a. The estimated value of cash dividends; and
 - b. The estimated value of franking credits.
27. Lally (2007) correctly notes that dividend drop-off analyses have consistently estimated the value of cash dividends to be around 80% of their face value and the value of franking credits to be around 50% of their face value.¹³
28. The finance literature has proposed a number of reasons why cash dividends might be valued at less than their face value. Lally (2007) notes that one such reason is personal taxes. When a shareholder receives a dividend, they are bound to pay personal tax on it at the end of the tax year. This may result in a shareholder being indifferent between a \$1 dividend (on which

⁹ Transcript, P. 15, Line 42 and following.

¹⁰ At a 30% corporate tax rate, a \$1 fully franked dividend has a 43 cent franking credit attached to it.

¹¹ See, for example, Hathaway and Officer (1999), Hathaway and Officer (2004), Beggs and Skeels (2006) and Bellamy and Gray (2004).

¹² See, for example, Cannavan, Finn and Gray (2004).

¹³ Bellamy and Gray (2004) note that the amount of the cash dividend and the franking credit are closely related – indeed for fully-franked dividends, the franking credit is a fixed multiple of the cash dividend. This results in the statistical problem of multicollinearity in the dividend drop-off regression. The implication of this is that, although the combined value can be reliably estimated, it is difficult to reliably separate this combined value into the component pieces. Moreover, there are issues of internal consistency (addressed later in this report) that may lead one to reject the “estimate” of cash dividends being worth only 80% of their face value. For the remainder of the present section, however, I take the component estimates as given.

personal tax must be paid in the short term) and an 80 cent capital gain (on which tax can be delayed substantially and is at a lower rate).¹⁴

29. Lally (2007) then goes on to note that franking credits are also subject to personal tax. He extrapolates the personal tax discount on dividends to franking credits. That is, he assumes that the existence of personal taxes alone will result in franking credits being valued at 80% of their face value.
30. He then notes that there is an additional reason why the market may value franking credits at less than their face value – they cannot be used by some investors.
31. Lally (2007) then proposes that the estimated value of franking credits should be scaled up by the personal tax discount to produce an estimate of what he calls the “utilisation rate.” Using the estimates above, he proposes that the utilisation rate (U) would be estimated as:

$$U = \frac{0.5}{0.8} = 0.625.$$

32. The interpretation that Lally (2007) applies to this calculation is in two parts. First, only 62.5% of franking credits can be utilised by shareholders – the remainder presumably being distributed to non-residents. Consequently, every dollar of franking credits that is distributed can only be worth 62.5 cents. But second, those franking credits that *are* utilised by shareholders are only valued at 80%. So the net valuation of franking credits is $0.625 \times 0.8 = 0.5$.
33. Lally (2007) argues that the appropriate estimate of theta is the utilisation rate and that the dividend drop-off estimates of theta must be adjusted in the proposed way to provide an estimate of the utilisation rate.

Analysis and conclusions

34. I have argued in the previous section that the appropriate estimate of theta is the value that the market ascribes to franking credits that have been distributed to shareholders. I have set out a number of reasons why the utilisation or redemption rate is not an appropriate estimate of theta. I have also noted that Assoc. Prof. Handley is of the view that redemption rates do not provide an estimate of theta, but rather provide an upper bound for theta. All of these reasons apply to the arguments raised by Lally (2007), which proposes to adjust an estimate of the *value* of distributed franking credits into an estimate of the redemption rate. My view, and apparently that of Assoc. Prof. Handley, is that we should seek to do the exact opposite. To the extent that any conversion is required, we need to convert a redemption rate into an estimate of how the market *values* franking credits.
35. This should be apparent from the way theta is used. The estimate of theta becomes a component of the estimate of gamma. To the extent that gamma is set above zero, either the cost of capital is reduced or the net cash flows to investors are increased. This reflects the extent to which investors *value* franking credits, not the extent to which investors *redeem* franking credits. To see

¹⁴ There is a substantial literature that contests this view. For example, Boyd and Jagannathan (1994) note that many market participants are equally taxed on dividends and capital gains and develop a costly arbitrage model of equilibrium, which they then test empirically. They conclude that when properly estimated, a \$1 cash dividend is valued by the market at \$1. Again, I note that the literature disputes the conclusion that a \$1 dividend can be valued at only 80 cents, but I put this aside for the moment to focus on the issue at hand.

this point clearly, suppose it were the case that 100% of franking credits were redeemed, but that a 99% tax rate was applied to them so that they were valued by the market at only 1% of their face value. The analysis in Lally (2007) implies that theta should be set to 1 and that franking credits have substantially reduced the cost of equity capital for the firm. My view is that franking credits that are of little value to the market would have commensurately little impact on the cost of equity capital.

3. Internal consistency in WACC analysis

36. Two aspects of internal consistency were addressed at the Roundtable. These are considered in turn below.

Consistency between parameter estimates

Dividend drop-off analysis

37. The experts at the Roundtable agreed that dividend drop-off analysis has consistently produced the result that a \$1 dividend and the attached 43 cent franking credit is valued by the market at \$1. This result is consistent across authors, time periods, and different sub-sets of firms.
38. The experts also noted that the dividend drop-off results of Beggs and Skeels (2006) and Hathaway and Officer (2004) imply that this \$1 of total value is disaggregated between the two components such that cash dividends are valued at 75-80% of face value and franking credits are valued at around 50% of face value.
39. In particular, the estimated value of franking credits (θ) is *conditional* on cash dividends being valued at 80% of their face value.

Internal inconsistency

40. My earlier report on this issue notes that this result is inconsistent with the way the required return on equity is estimated by Australian regulators. In particular:
- a. the required return on equity is estimated after imposing that cash dividends are valued at 100% of face value, whereas
 - b. θ is estimated on the basis that cash dividends are valued at 75-80% of face value.
41. The version of CAPM that is used to estimate the required return on equity imposes that cash dividends are valued at 100% of face value. It is my view that if the required return on equity is estimated on this basis, internal consistency demands that θ must be estimated on the same basis. That is, where a parameter is used in two different places in the WACC estimation procedure, the same value should be used in both places.

Restoring consistency

42. Logically, there are two ways to restore consistency:
- a. Use an estimate of the value of cash dividends of 100% of face value in both places (required return on equity and θ); or
 - b. Use an estimate of the value of cash dividends of 75-80% of face value in both places

Conclusion

43. In my view, the easiest way to resolve the inconsistency is to continue to use the standard CAPM and to estimate θ in a way that is consistent with the CAPM. Since the standard CAPM

estimates the required return on equity on the basis that cash dividends are valued at 100% of face value, theta should be estimated on the same basis.

44. This is straightforward. We know that there is a consistent result that the combined value of a \$1.00 dividend and the attached franking credit is \$1.00. This has been consistently and reliably estimated from market data. The estimated value of franking credits is obtained by subtracting from this the estimated value of a \$1.00 cash dividend. Under the CAPM, this \$1.00 dividend must have a value of \$1.00. This leaves negligible value to be ascribed to the franking credit.

Consistency of model assumptions

Context of issue

45. During the Roundtable discussion, Assoc. Prof. Lally indicated that the Officer CAPM assumes that the Australian market is perfectly segmented from world capital markets and that consistency demands that all foreign investors be omitted from consideration.
46. He says that the assumptions of the model must be imposed when estimating theta. He argues that one of these assumptions is that there are only resident investors. Consequently, one must estimate theta not as it *is*, but as it *would be* if there were only non-resident investors. He goes on to argue that the appropriate estimate of theta is the redemption rate and that if there are only resident investors the redemption rate will be 100%. This, in turn leads him to an estimate of 1 for theta – an estimate that required no analysis of any market data whatsoever.
47. In the previous sections I have set out my views about the appropriate way to estimate theta. My view is that it is inappropriate to *assume* a value for theta without any consideration of the available market evidence.¹⁵ That is effect of Assoc. Prof. Lally's reasoning above – he is able to conclude an estimate of theta without any analysis of any market data.
48. It is also my view that redemption rates are not an appropriate estimate of theta. Even if we did know that 100% of franking credits were redeemed, we would still need to estimate how the market *valued* those credits. It is quite conceivable that they are valued at less than face value, even though they are redeemed. This might be due to the fact that they are taxed or because there is a substantial time delay before they can be redeemed and so on.
49. But I set these issues aside for now and focus on the issue of internal consistency.

Implications of estimating parameters as they would be without non-resident investment

50. I begin by noting that if theta is to be estimated not as it *is*, but as it *would be* if there were only non-resident investors then the same must apply to all other WACC parameters. For example, we would need to estimate what the yield on 10-year government bonds would be if only resident investors were allowed to buy them. Presumably, the elimination of access to 98% of the world's capital markets would substantially increase this yield. My view is that it is simply infeasible to estimate WACC parameters on the basis of what they would be if there was no non-resident investment.

¹⁵ In particular, my view is that because capital is raised in a real-world market, WACC parameters should be estimated with reference to market data – as they *are*, not as they *would be* if certain underlying assumptions were to hold precisely.

Use of economic models

51. In my view it is also unnecessary and inappropriate to estimate WACC parameters on this basis. Every economic model is based on a set of simplifying assumptions, which is why they are called “assumptions” and not “descriptions of reality.” In economics, we do not judge a model by whether its assumptions are realistic, but by whether the model is useful to us – whether it works, whether it serves a useful purpose. That is, a model is useful if it helps us to understand a complex economic phenomena, or if it consistently produces predictions that approximate real outcomes.
52. The CAPM is an economic model that is based on a number of assumptions. A number of steps of internally consistent logic (or mathematics) are applied to those assumptions and the result is a pricing formula. This is the pricing formula that must apply if all of the assumptions of the CAPM hold. Clearly, the assumptions of CAPM (like any economic model) do not hold. But this is not the test of an economic model. Rather, the test is whether the model is useful. If it is the case, for example, that asset prices behave (approximately) *as if* the assumptions were true, the model may be of great use – the assumptions simplify the analysis and produce a simple pricing formula that provides a reasonable description of reality. Indeed the CAPM is widely used in practice and is the dominant tool for estimating the cost of equity capital. This is not because of the reality of its assumptions, but because it serves a useful purpose – it is simple (due to its underlying assumptions) and it works in the sense that it serves a useful purpose in practice.

Parameter estimation

53. Having obtained a pricing formula from the CAPM, the next step is to estimate appropriate parameter inputs. There are two approaches that might be adopted in this regard:
- a. Use market data to estimate each parameter¹⁶, or
 - b. Use theoretical reasoning to determine what the parameter value would be if all of the assumptions of the CAPM held precisely.
54. It is the universal practice of market professionals to use market data to estimate each parameter. In my view this is entirely appropriate. Having obtained a pricing formula from the CAPM, it is appropriate to use market data¹⁷ to obtain the best possible parameter estimates – as they *are* in the market place, not as they *would be* in a fictitious world in which a set of underlying assumptions held precisely.

Conclusion

55. My view is that it is appropriate to use market data¹⁸ to obtain the best possible parameter estimates – as they *are* in the market place, not as they *would be* in a fictitious world in which a set of underlying assumptions held precisely. In relation to theta, this means that the simultaneous security price or dividend drop-off approach should be used, and that the theoretical reasoning/assumption approach should be rejected.

¹⁶ Different pieces of market data evidence would receive different weight according to the considerations that I outlined at the Roundtable. For example, less weight would be applied to empirical estimates that are statistically imprecise or economically implausible.

¹⁷ Again, applying the considerations I outlined at the Roundtable.

¹⁸ Again, applying the considerations I outlined at the Roundtable.

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