A regulatory estimate of gamma under the National Gas Rules

Report prepared for DBP

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Executive summary and conclusions

Instructions and background

1. The Strategic Finance Group: SFG Consulting (SFG) has been engaged by DBP (various Dampier to Bunbury Natural Gas Pipeline entities) to provide new information about the gamma parameter to be used in estimating the allowed return as part of the regulatory process with the West Australian Economic Regulation Authority (ERA).

2. Specifically, we have been asked to provide an estimate of gamma that is consistent with the National Gas Rules.

3. Over the past 18 months, the Australian Energy Regulator (AER) has undertaken a review of weighted-average cost of capital (WACC) parameters, including gamma. This review has occurred in the context of the National Electricity Rules. As part of that review, the Joint Industries Associations (JIA)[1] submitted a number of expert reports in relation to gamma and proposed a point estimate of 0.2 as being consistent with the requirements of the National Electricity Rules.

4. The AER has rejected those submissions and has proposed a point estimate of 0.65. The AER's reasons for rejecting the JIA submissions on gamma are set out in the following documents:

   a. The Australian Energy Regulator's (AER's) Final Decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, 1 May 2009 (*WACC Review Final Decision*); and

   b. The supporting paper commissioned by the AER and prepared by Associate Professor Handley: Further comments on the value of imputation credits, 15 April 2009 (*Handley Final Report*).

5. Since the AER's *WACC Review Final Decision*, no regulated entity (in gas or electricity) has accepted the 0.65 estimate of gamma – all have proposed values lower than this.

Role of this report

6. We note that the reasons for the JIA's proposed estimate of gamma of 0.2 have been set out in detail in submissions to the AER's Review of WACC Parameters. Consequently, we provide only a brief summary of those reasons in this report.

7. The AER's reasons for rejecting the JIA submissions on gamma are set out in the *WACC Review Final Decision* and the *Handley Final Report*. In our view, the AER has erred in its reasons for rejecting the JIA submissions on gamma and in selecting a point estimate of 0.65. In this report, we set out each of the AER's reasons and provide a response to it.

8. Specifically, the focus of this report is on a number of key issues that have been identified following the AER's *Final Decision* and the supporting report of Handley (2009). These issues include the following:

[1] Australian Pipeline Industry Association, Electricity Networks Association, and Grid Australia.

a. Whether valuation experts and professionals make adjustments for gamma when performing corporate valuation exercises, and if not, the reasons why market practice is to set gamma equal to zero;

b. Whether an assumed payout rate of 100% is reasonable, sensible, or even possible;

c. Whether Associate Professor Handley's treatment of the range of conceptual issues and assumptions that arise when using redemption rates to estimate theta are consistent with any sort of CAPM or any equilibrium model at all;

d. The appropriate time period over which to estimate theta, and whether there is any evidence of a structural break in 2000;

e. Whether the Beggs and Skeels (2006) dividend drop-off estimate or the updated SFG estimate using more recent data should be preferred;

f. Whether tax statistics and redemption rates have any relevance when estimating theta; and

g. Where a particular parameter is used in two places in the WACC estimation exercise, whether consistency requires that the same value should be used for that parameter in each of the two places.

Conclusions on key issues

Market practice

9. Our main conclusions in relation to market practice are that:

a. There is general agreement that market professionals make no adjustment for franking credits when estimating WACC or when valuing firms;

b. This is entirely equivalent to "setting gamma to zero;"

c. The AER is wrong to conclude that "any assumed value for imputation credits (i.e., between zero and one) should not affect company values provided it is incorporated consistently in the firm's cash flows as well as the discount rate." [2] This proposition is false and all conclusions based on it are unsupported.

Assumed payout rate

10. The basis of the AER's assumed payout ratio of 1.0, and our responses to these proposed reasons, are as follows:

a. "[A payout ratio of 1.0] is consistent with the Officer (1994) WACC framework which assumes a full distribution of free cash flows." [3]

We note that Officer (1994) includes a detailed worked example that clearly does *not* assume a full distribution of free cash flows. When Officer (1994) implements the framework of Officer (1994), he does not assume a payout ratio of 1.0.

[2] Final Decision, p. 409.
[3] Final Decision, p. 420.

b. "[A payout ratio of 1.0] is consistent with the AER's post-tax revenue model (PTRM), which explicitly assumes a full distribution of free cash flows."[4]

We note that the AER itself states that this is the wrong basis by which to estimate the distribution rate. Rather, the AER itself concludes that "the assumed utilisation of imputation credits should not be based on a benchmark efficient NSP. Rather, the AER considers that a best estimate of gamma should be based on a market-wide estimate for businesses across the Australian economy"[5] and that "a reasonable estimate of the annual payout ratio is the market average of 0.71"[6]

c. "[A payout ratio of 1.0] avoids any further costly debate on the estimation of the additional parameters that would be required to establish the 'true' time value adjustment to retained credits, which the AER has demonstrated to be immaterial under a set of reasonable assumptions."[7]

We show that the basis for this conclusion is flawed. Moreover, the alternative does not require any additional parameters to be estimated. In our view, the appropriate approach is to simply adopt the empirical estimate of the payout ratio, which is 71%.

11. In any event, the same estimate of dividend payout should be used throughout the WACC estimation. The *Final Decision* uses the actual observed empirical estimate of dividend payout when estimating market risk premium, but uses an assumed payout of 100% when estimating gamma.

Conceptual issues

12. Our main conclusions in relation to conceptual asset pricing issues are as follows:

a. When estimating theta (and consequently gamma) using empirical evidence from observed prices of traded securities, conceptual issues relating to the derivation of asset pricing models do not arise.

b. However, when estimating theta using the weighted-average redemption rate approach, these conceptual issues do arise. This is because the weights that must be applied under this approach are the outcome of the precise version of the model that is assumed.

c. The weights that are used cannot be arbitrarily selected – they must be the outcome of a proper asset pricing model such as the CAPM.

d. Any form of the CAPM requires that:

i. The *m* investors must, between them, hold 100% of the *n* assets in the economy; and

ii. The *m* investors own nothing other than the *n* assets.

[4] Final Decision, p. 420.
[5] Final Decision, p. 394.
[6] Final Decision, p. 420.
[7] Final Decision, p. 420.

e. The "model" envisaged by Associate Professor Handley violates both of these basic requirements. The Handley model does not satisfy the basic market clearing condition so any proposed equilibrium does not exist, cannot exist and cannot be derived. Consequently it cannot be used to develop a set of weights to be applied when constructing a weighted-average redemption rate estimate of theta.

Appropriate time period for estimating theta

13. Our main conclusions in relation to the time period that should be used to estimate theta are as follows:

a. In the absence of evidence of a structural break, a long sample of data should be used to estimate theta. This is consistent with the recommendations of Boyd and Jagannathan (1994) and with the most basic statistical principles that, other things equal, more data leads to more reliable estimates;

b. Rather than *assume* a structural break in July 2000, one should examine the empirical data to determine if a break did occur; and

c. The only evidence of a structural break comes from Beggs and Skeels (2006). However, this conclusion is conditional on results from the short period before 2000 during which the estimated value of a one dollar dividend is $1.18 and the estimated value of franking credits fell sharply. But for these curious results (which can occur when dividend drop-off analysis is applied to short sub-periods of data), the Beggs and Skeels estimates from post-2000 are not significantly different from those pre-2000.

Inferring theta from market prices

14. Our conclusions in relation to the post-2000 dividend drop-off estimates of theta are as follows:

a. If the Beggs and Skeels variation of the methodology is the most appropriate and if only post-2000 data should be used, an estimate using an updated data set should be preferred to that reported by Beggs and Skeels (2006);

b. Professor Skeels states that the best such estimate of theta is currently 0.23; and

c. All dividend drop-off estimates of theta are conditional on the particular value of cash dividends that is adopted.

d. A recent audit (SFG, 2010) confirms the robustness of these estimates.

Use of tax statistics

15. The AER concludes that average redemption rates can be used to provide an estimate of the upper bound for theta. Under this approach we must assume a conceptual asset pricing model, from which we seek to infer what the price of franking credits would be if we did observe trading in them. This conceptual model then determines the weights that are to be applied to franking credits distributed to various parties. The alternative approach is to observe the market-clearing price of traded securities – an equilibrium price that incorporates the complex interactions between all market participants. The main advantage of using observed market prices of traded securities is that we don't have to assume – we can *observe* instead. For this reason, using market

prices of traded securities (as we do for all other WACC parameters) should be preferred to the use of redemption rates weighted according to a conceptual model.

16. The AER has based its support of weighted-average redemption rates on a number of propositions:

    a. Gamma does not affect the cost of capital;

    b. The forcible removal of foreign investment would (in reality) not affect the cost of capital of Australian firms; and

    c. The forcible removal of foreign investment would increase the estimate of theta under *all* methodologies.

17. The first two of these propositions is false and the third is an assumption. Consequently, we conclude that there is no basis for the continued use of weighted-average redemption rates – even as an estimate of the upper bound value of theta.

Consistency issues

18. We note that the AER assumes a payout rate of 100% when estimating gamma, but adopts the lower actual payout rate of Australian firms when estimating market risk premium.

19. Inconsistent estimates of the value of cash dividends are used in two places in the AER's reasoning:

    a. The AER's empirical estimates of theta (and consequently gamma) are conditional on an estimated value of cash dividends of 75-80 cents per dollar; and

    b. The AER's estimate of the required return on equity using the CAPM is conditional on cash dividends being valued at 100 cents per dollar.

20. In our view, the estimate of 100 cents per dollar should be used consistently throughout the WACC estimation process. This is because:

    a. Dividend yield studies are consistent with an estimate of 100 cents;

    b. The relevant and important dividend drop-off studies are consistent with an estimate of 100 cents;

    c. An estimate of 100 cents (and the corresponding estimate of the value of franking credits) fits the Australian data just as well as the 80 cent estimate (and its corresponding estimate of the value of franking credits) reported by Beggs and Skeels (1996).

General observations

21. In its *Final Decision*, the AER relies on three key inputs when estimating gamma:

    a. The AER assumes a distribution rate of 100%. Section 2 of this report shows that this is at odds with empirical observation and is impossible as a practical matter;

b. The AER uses a lower bound for theta of 0.57 based on the dividend drop-off work of Beggs and Skeels (2006). Professor Skeels is of the view "that the SFG estimate of theta of 0.23 represents the most accurate estimate currently available;" [8] and

c. The AER uses an upper bound of 0.74 based on the redemption rate analysis of Handley and Maheswaran (2008). Section 6 of this report shows that this approach is at odds with the approach of using empirical observations of market prices, which is used to estimate all other WACC parameters. Moreover, we also show that the basis for using this approach is flawed in several respects. Finally, we note that even if this approach is to be used, Synergies (2009) questions the results reported by Handley and Maheswaran (2008).

22. We conclude this analysis with three final observations:

a. The AER's final estimate of 0.65 is obtained by applying 50% weight to its "lower bound estimate" of 0.57 and its "upper bound estimate" of 0.74. Associate Professor Handley considers the AER's 0.74 estimate to be outside the range that can be considered reasonable.

b. The weighted-average redemption rate estimate of 0.74 has never been proposed as anything other than as "an upper bound estimate" of theta. By contrast the dividend drop-off estimate is a point estimate. The AER then selects its final estimate of theta as the mid-point between an upper bound and a point estimate. Clearly this must result in an upward bias.

c. To the extent that gamma is greater than zero, shareholders are assumed to receive some benefit from franking credits and they are assumed to pay the present value of that benefit in the form of a higher share price. Foreign investors obtain no benefit from franking credits. Yet, to the extent that gamma is greater than zero they are assumed to pay for franking credits. In our view, it is incumbent upon anyone proposing to assume that gamma is greater than zero to explain why foreign investors would willingly pay for franking credits that they cannot use.

An estimate of gamma commensurate with the National Gas Rules

23. National Gas Rule (NGR) 87(1) requires that:

> The rate of return on capital is to be commensurate with prevailing conditions in the market for funds and the risk involved in providing the Reference Service.[9]

24. We conclude that:

a. The prevailing market practice is to set gamma to zero or, equivalently, to make no adjustment to the WACC in relation to any assumed value of franking credits; and

b. The prevailing market evidence supports a value of gamma within the range of 0 to 0.23. In our view the weight of market evidence supports a point estimate of 0 and that there is no market evidence to support any estimate above 0.23. Moreover, the estimate of 0.23 is conditional on cash dividends being valued at substantially less than their face value, and is

[8] Skeels (2009), p. 5.
[9] National Gas Rules Version 2, Rule 87 (1)

therefore inconsistent with the use of the CAPM. Consequently, our view is that weight of market evidence, properly interpreted, supports a point estimate of 0 – that franking credits have no material impact on the cost of capital of Australian firms. The reasons for these conclusions are predominantly set out in our response to the AER's *WACC Review Final Decision*, in this report.[10]

25. We also note that under the approach adopted by the ERA, a proportion, $\frac{\gamma T}{1-T(1-\gamma)}$, of the return to equity holders is assumed to come in the form of franking credits. For estimates of 0.65 and 30% for gamma and the relevant tax rate, this amounts to a proportion of 22%. That is, the equilibrium required return on equity is first estimated – this is the return that investors must expect to receive before contributing equity capital to the firm. Under the AER parameter estimates, 22% of this is assumed to come in the form of franking credits.

26. We also note that non-resident investors cannot utilize any franking credits that are distributed to them. Consequently, under the AER parameter estimates, non-resident investors will (by definition) receive a return that is 22% below the equilibrium required return.

27. In our view, this is not commensurate with the prevailing conditions in the market for funds. In the current market for equity funds, non-resident investors are required to provide a material amount of the equity that is required to fund energy distribution assets. Providing these investors with a return that is 22% the regulator's own estimate of the equilibrium required return on equity cannot be commensurate with the market for funds.

[10] Refer also to the JIA submissions in relation to gamma for additional detail.

1. Market Practice

Overview and context

28. In this section, we consider the evidence about commercial and market practice in relation to franking credits. We begin by noting that the issue is *not* about whether some investors might value or benefit from franking credits. Unquestionably, some investors do value the franking credits they receive and some do not. Rather, the key issue is whether dividend imputation affects the equilibrium cost of capital of Australian companies, and consequently the revenue requirement of the benchmark firm.

29. One (but not the only) consideration that is relevant when estimating gamma is whether market professionals in practice actually adjust their cost of capital estimates for an assumed equilibrium value of franking credits in the way that the AER proposes. Our recent *SFG Market Practice Report* suggests that they do not. Specifically, that report shows that the great majority of market professionals make no adjustment at all to either the cash flows or the discount rate to reflect any assumed value of franking credits. In that report, we summarise the relevant evidence about market practice as follows:

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

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

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

30. We also note that credit rating agencies such as Moody's and Standard and Poor's also make no adjustments in relation to franking credits to any quantitative metric that they compute when developing credit ratings for Australian firms.

Reasons for making no adjustment

31. In its Final Decision, the AER concludes that:

> The AER agrees that the clear evidence is that the majority of market practitioners do not make any adjustment for the value of imputation credits.[11]

32. The AER then goes on to quote a conclusion from our recent *SFG Market Practice Report*:

> SFG states that the dominant market practice in Australia is to set gamma to zero when estimating the cost of capital and when conducting valuation exercises.[12]

[11] Final Decision, p. 407.

33. The AER then concludes (*Final Decision*, p. 408) that "the evidence does not support this assertion." However, our conclusion is identical to that of the AER. Market practice is to estimate the other WACC parameters in the standard way, aggregate them together into a WACC estimate, and to make no adjustment for franking credits to either the WACC or the cash flows. This is entirely equivalent to "setting gamma to zero." If gamma takes a positive value, there is an adjustment to the WACC or the cash flows. If gamma is set to zero there is no adjustment. The AER agrees that practitioners make no adjustment – this is equivalent to saying that they set gamma to zero. Put another way, how is it possible that practitioners set gamma to something other than zero, but that this requires no adjustment?

34. When the standard CAPM is used to estimate the required return on equity we have:

$$r_e = r_f + \beta_e \times MRP .$$

35. If an adjustment is to be made to the discount rate, that adjustment takes the following form:

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

36. If "no adjustment is made for franking credits" the adjustment term (in square brackets above) is ignored and the WACC is based simply on r_e. If "gamma is set to zero," we have:

$$r_e\left[\frac{1-T}{1-T(1-0)}\right] = r_e\left[\frac{1-T}{1-T}\right] = r_e$$

and again the WACC is based simply on r_e. Consequently, "making no adjustment for franking credits" and "setting gamma to zero" are exactly equivalent and simply different ways of expressing the same concept.

37. The AER reiterates in its *Final Decision* that:

> The AER considered it possible that for practical reasons market practitioners elect to exclude the value of imputation credits from both the cash flow and discount rate.[13]

38. It is not clear how this differs from practitioners "setting gamma to zero" when estimating cash flows and "setting gamma to zero" when estimating the discount rate. It is also not clear how (or why) practitioners could adopt a value for gamma other than zero, and then make no adjustment to either the cash flow or the discount rate when performing any sort of valuation analysis.

39. It is our view that the AER has misunderstood what it means to "set gamma to zero" and the role than gamma plays in the WACC estimation and corporate valuation process.

[12] Final Decision, p. 407.
[13] Final Decision, p. 404.

Value of credits vs. adjustment to WACC

40. The AER concludes that its decision to set gamma to 0.65 is not inconsistent with the observed market practice of making no adjustment in relation to gamma at all, to either cash flows or discount rates, when performing valuation exercises. Part of the justification for this conclusion is the recognition by some practitioners that franking credits have value to some investors. For example, the AER quotes a report from KPMG which suggests that:

> Imputation credits are valuable to investors,[14]

and notes that Associate Professor Handley concludes that:

> whilst some experts no doubt assume/believe that imputation credits have zero value, the evidence does not support the assertion that standard practice is the blanket assumption that credits have no value.[15]

41. The AER itself concludes that it:

> …does not consider the evidence supports the notion that market practitioners believe imputation credits have zero value…[16]

42. We agree entirely with this. Indeed it is our view that it is quite obvious that franking credits are valued by some investors and not by others. But this is not the relevant question. The key issue here is whether (and to what extent) franking credits affect the equilibrium cost of capital of Australian firms, and consequently the revenue requirement of the benchmark firm. This is an entirely different question.

43. However, the AER states that it is seeking to:

> …arrive at a reasonable estimate of the value of imputation credits…[17]

In our view, this is the wrong question. The goal is not to determine the value of franking credits to a particular type of investor. Rather, the goal is to determine the effect that franking credits have on the equilibrium cost of capital – on the forward-looking rate of return that is commensurate with prevailing conditions in the market for funds. This is quite different from the question of how valuable franking credits might be to a particular investor.

44. The AER/Handley view appears to be that "setting gamma to zero" is equivalent to suggesting that they "have no value" to investors. This is not the case. We noted above that the key issue here is *not* about whether some investors might value or benefit from franking credits. Unquestionably, some investors do value the franking credits they receive and some do not. Rather, the key issue is whether dividend imputation affects the equilibrium cost of capital of Australian companies. These are quite different issues. It is entirely possible that some (or many) investors do value franking credits, yet this does not affect the equilibrium cost of capital of Australian companies.

[14] Final Decision, p. 408.
[15] Final Decision, p. 408.
[16] Final Decision, p. 408.
[17] Final Decision, p. 408.

45. In our view, all market professionals clearly know that franking credits are of benefit to some investors and not to others. Given this knowledge, they make no adjustment in relation to gamma to cash flows or discount rates. That is, market professionals distinguish between:

    a. Whether franking credits are of value to some investors; and

    b. Whether dividend imputation affects the equilibrium cost of capital of Australian firms.

46. Indeed this is precisely the point that is being made in the KPMG quote that is highlighted by the AER. Handley (2009) cites KPMG's conclusion that even though franking credits are valuable to some investors, this does not necessarily imply that an adjustment should be made to the equilibrium cost of capital:

> …whilst imputation credits are valuable to investors, including such value in company valuations or the cost of capital involves more complex considerations.[18]

47. The recognition by some market professionals that franking credits have value to some investors does not suggest that setting gamma to 0.65 is somehow consistent with market practice. What is relevant is that given this knowledge, market professionals make no adjustment in relation to gamma to cash flows or discount rates when performing corporate valuations.

48. There are many other things that are of benefit to some investors, but which do not affect the rate of return available to investors. The effect of dividend imputation is to reduce the amount of personal tax that resident investors pay on their dividend income from the firm. A reduction in capital gains tax rates is also of value to resident investors, but there is no suggestion that this benefit affects the equilibrium corporate cost of capital. A general reduction in personal tax rates is also of value to resident investors, but again there is no suggestion that this benefit affects the equilibrium corporate cost of capital. Finally, the issuing of shareholder discount cards is of benefit to some investors, but again there is no suggestion that this benefit affects the equilibrium corporate cost of capital. That is, there are many government and corporate policies that provide some benefit to a group of investors, but which are not considered to have any impact on the equilibrium cost of capital of the firm. The actions of market professionals are consistent with them including franking credits in this class.

Consistency between cash flows and discount rate

49. The AER concludes that:

> Intuitively, any assumed value for imputation credits (i.e. between zero and one) should not affect company values provided it is incorporated consistently in the firm's cash flows as well as the discount rate.[19]

50. There is universal agreement that there must be a consistency between the definition of the cash flows and the definition of the discount rate. Officer (1994) sets out various consistent definitions of cash flows and discount rates. He also shows that for a given value of gamma the different consistent combinations of cash flow and discount rate produce the same estimates of the value of the firm. There is no debate about any of this.

[18] Final Decision, p. 408.
[19] Final Decision, p. 409.

51. However, this does *not* imply that one can now select a *different* value of gamma and obtain the *same* firm value. This point was made in our recent *SFG Market Practice Report* and also in the *FIG submission*. However, the view of the AER is that different values of gamma do not affect company values so long as cash flows and discount rates are defined consistently.

52. The example from Officer (1994) can be used to illustrate the point. Officer shows that the cash flows and discount rate can be consistently defined as:

	Definition	Officer (1994) $\gamma = 0$	Officer (1994) $\gamma = 0.5$
Cash flow	$X_0(1-T)$	24.376	24.376
Discount rate	$r_i = k_E\left[\frac{1-T}{1-T(1-\gamma)}\right]\frac{E}{V} + k_D(1-T)\frac{D}{V}$	15.635	12.548%
Firm value	$V = \frac{X_0(1-T)}{r_i}$	**155.904**	**194.265**

or as:

	Definition	Officer (1994) $\gamma = 0$	Officer (1994) $\gamma = 0.5$
Cash flow	$(X_0 - X_D)(1-T(1-\gamma)) + X_D$	26.380	33.170
Discount rate	$r_i = k_E\frac{E}{V} + k_D\frac{D}{V}$	16.921	17.075%
Firm value	$V = \frac{(X_0 - X_D)(1-T(1-\gamma)) + X_D}{r_i}$	**155.904**	**194.265**

53. In summary, for a given value of gamma, the estimated firm value is the same so long as cash flows and discount rates are defined in a consistent manner. However, a change in the value of gamma obviously must result in a different estimate of the value of the firm. The AER is wrong to continue to conclude the reverse.

54. Moreover, it is on the basis of this flawed reasoning that the AER finally concludes that the "arguments from Handley make logical sense." [20]

Summary

55. Our conclusions are that:

a. There is general agreement that market professionals make no adjustment for franking credits when estimating WACC or when valuing firms;

b. This is entirely equivalent to "setting gamma to zero;"

[20] Final Decision, p. 409.

c. The AER is wrong to conclude that "any assumed value for imputation credits (i.e. between zero and one) should not affect company values provided it is incorporated consistently in the firm's cash flows as well as the discount rate." This proposition is false and all conclusions based on it are unsupported.

2. Assumed payout rate

Context and AER view

56. In its *Final Decision*, the AER concludes that:

> …a best estimate of gamma should be based on a market-wide estimate for businesses across the Australian economy.[21]

57. The AER also notes[22] that gamma is defined as the product of the payout ratio and the value of distributed credits (theta).

58. Under the Australian dividend imputation framework, franking credits are created when a firm pays tax on Australian profits and franking credits are distributed when firms distribute those profits as dividends.

59. The AER notes[23] that, on average, 71% of the franking credits that are created by Australian firms in a given year are distributed to shareholders and the remaining credits are not distributed. This occurs because firms do not distribute all of their earnings as dividends.

60. The AER recognises that, on average, the distribution rate of franking credits is 71% but then estimates gamma *as though* the distribution rate were 100%:

> …the adoption of a payout ratio of 1.0 does not imply an expectation that all credits will be paid out in each period. Rather as Handley advised, the full distribution of free cash flows is the standard assumption for valuation purposes, therefore for consistency, a 100 per cent payout of imputation credits is appropriate.[24]

61. This approach has also been adopted in the Draft Determination, where the AER notes that it recognises that, on average, the distribution rate of franking credits is 71% but that gamma should be estimated *as though* the distribution rate were 100%, or alternatively as though franking credits that are not distributed are just as valuable as those that are.[25]

Use of available estimates

62. In our view, an estimate of the distribution rate of franking credits is available, it appears to be uncontroversial, and it should be used. If we know that the distribution rate is 71%, we should use a distribution rate of 71%.

Consistency with Officer framework

63. In his seminal paper on this issue, Officer (1994) includes a worked example in an appendix to the paper. In that worked example, the firm creates 13.58 franking credits and distributes 10.38 of them – a distribution rate of 76%. It is clear that Officer, in developing this framework, is of

[21] Final Decision, p. 394.
[22] Final Decision, p. 410.
[23] Final Decision, p. 415.
[24] Final Decision, p. 410.
[25] Draft Determination, pp. 204-205.

the view that the distribution rate will be substantially less than 100%. This runs counter to the AER's conclusion that adopting an assumed payout ratio of 1.0:

> …is consistent with the Officer (1994) WACC framework which assumes a full distribution of free cash flows.[26]

Basis for estimating value of retained credits

64. In its *Final Decision*, the AER concludes that:

> …a reasonable estimate of the payout ratio using the analysis suggested by NERA is between 0.91 and 0.98. [27]

65. This is not true. It is clear that the payout ratio is nothing like either 91% or 98%. The empirical evidence shows that Australian firms do not pay out anything like this proportion of the franking credits that are created. Hathaway and Officer (2004), for example, show that the ratio of credits distributed to credits created each year averages 71%.

66. What the AER apparently means to say here is that it considers that franking credits that are not distributed to shareholders are 91% to 98% as valuable as those that are. The AER then goes on to conclude[28] that this is immaterially different from 100%, so that franking credits are equally valued by investors and have the same effect on the cost of capital of Australian firms whether they are distributed to shareholders or not.

67. The basis for this claim is in Table 10.6 in the *Final Decision*,[29] in which the AER performs a series of calculations on the basis that franking credits that are not distributed in a certain year are eventually distributed to shareholders either one or five years later and that on the basis of this:

> …the payout ratio increases from 0.71 to around 0.95 depending on the assumptions taken in accounting for time value considerations.[30]

68. The 71% figure that the AER adopts is from Hathaway and Officer (2004). This is the average, each year across all Australian companies, of the ratio of:

    a. the total amount of franking credits distributed to shareholders in a given year, to

    b. the total amount of franking credits created in that year.

69. The AER's calculations above are based on the notion that 71% of franking credits are distributed in the year in which they are created, and the remaining 29% are distributed the following year (or, in the alternative, within five years). This appears to fundamentally misinterpret just what Hathaway and Officer have measured with their 71% figure. Indeed the AER's interpretation of this is physically impossible.

[26] Final Decision, p. 420.
[27] Final Decision, p. 419.
[28] Final Decision, p. 420.
[29] Final Decision, p. 419.
[30] Final Decision, p. 419.

70. To see this, consider the figures set out in Table 1 below. Let Year 1 represent the first year of dividend imputation. Suppose that 100 units of franking credits were created across the economy in that year. In each subsequent year we increase the total amount of franking credits created by 3%, reflecting an assumption that corporate tax payments increase in approximately the same proportion as GDP. Each successive column is then interpreted as follows:

a. In Year 1, 100 franking credits are created, 71 are distributed and 29 are stored.

b. In Year 2, 103 franking credits are created, and consistent with Hathaway and Officer (2004), 71% of them (73) are distributed. Of the 73 franking credits that are distributed, 29 have been stored from the previous year and are now being distributed one year later. This means that of the 103 credits created in Year 2, 44 are distributed immediately and 59 are stored – to be distributed in the following year.

71. This process continues, and by Year 4 the stock of stored or undistributed credits is greater than the total amount of credits to be distributed. Specifically, at the end of Year 3 there are 90 stored credits. The total credits to be distributed in Year 4 is only 78. In other words, it is simply impossible that stored credits can be routinely distributed the year after they are created.

Table 1. AER assumption about distribution of franking credits

Year	1	2	3	4	5	6	7
Credits created	100	103	106	109	113	116	119
Credits distributed (71%)	71	73	75	78	80	82	85
Credits from previous year	0	29	59	78	80	82	85
Credits from current year	71	44	16	0	0	0	0
Credits stored	29	59	90	121	154	188	222

72. The same result applies in the case where stored credits are assumed to be distributed five years after they are created. At some stage we reach a point where the stored credits exceeds the credits to be distributed in a given year.

73. In summary, the basis of the AER's conclusion that franking credits are equally valued by investors and have the same effect on the cost of capital of Australian firms whether they are distributed to shareholders or not is that those credits that are not distributed immediately will be distributed so soon afterwards that the loss of time value is negligible. However, the table above shows that this is simply impossible.

74. Another way to see this is as follows. The AER notes that Associate Professor Handley claims that it would be "irrational" for a firm to generate some earnings that were never paid out – that all earnings are ultimately paid out by the firm, either as a "payout of free cash flows each period or by a settling up at maturity."

75. The more likely case is somewhere between these two extremes, whereby a firm reinvests some of its earnings one period to finance growth and thereby increase the earnings that are available in all successive periods. This scenario is more realistic than Associate Professor Handley's two theoretical extremes, whereby earnings are either paid out in full every period, or reinvested to generate a single balloon payout at "maturity" when the firm is presumably eventually dissolved.

76. Nevertheless, the general point that all free cash flows will eventually be paid out by the firm is true. But this payout will occur at some unspecified time in the future and is likely to be many years into the future. Indeed the commonly used perpetual growth assumption used in practice

for valuation is based upon the idea that the firm continues as a going concern indefinitely, implying that some credits will never be distributed. Even if the firm eventually reverts to a zero growth state, or ceases operations and pays a liquidating dividend, there is a time value of money loss associated with the retention of franking credits.

77. To see this, consider the following example. Suppose a firm generates pre-tax profit of $100 each year, pays $30 of corporate tax each year, and distributes the remaining $70 as a dividend each year. As a flat perpetuity, the firm could pay a $70 dividend and a $30 franking credit every year in perpetuity.

78. Now suppose that instead of distributing all earnings as a dividend in the first year, the firm retains $20 of profits. Also suppose that the return on equity (after corporate tax) is 10%. This means that the $20 of retained profits generates additional after-tax returns of $2 per year – in perpetuity. Now, as far as earnings and the value of the firm goes, this is irrelevant. The firm has reduced the present dividend by $20 and replaced it with an extra $2 dividend in perpetuity. The present value of that $2 perpetual dividend (at 10%) is $20. That is, whether the firm retains funds to reinvest them at the required return, or pays out the $20 as a current dividend, the outcome is the same.[31]

79. In this case, in that first year, the firm pays out a $50 fully-franked dividend with $21.5 of franking credits (i.e., the standard 0.43 of franking credits for every dollar of dividends). That means that $8.5 of the franking credits that are created that year are stored and not distributed.

80. Now suppose that the firm never retains another dollar of franking credits – that all earnings are distributed every year thereafter. In each year, after-tax profits will be $72, pre-tax profits will be $102.9, and tax paid (and franking credits created) will be $30.9. Every year the firm will generate $30.9 of franking credits, pay a $72 dividend and distribute all $30.9 of franking credits that it generated that year. Unless the firm subsequently decides to reduce its assets to generate cash to pay a dividend above $74, there is no way of distributing the $8.5 of franking credits that was stored from the first year.

81. Associate Professor Handley has simply claimed that all earnings must be eventually distributed and therefore all franking credits must be eventually distributed as well. The problem is that the retained franking credits do not generate a return on investment in the same manner that retained earnings does. When the firm retains $1.00 of earnings for investment, and if this reinvestment earns a return equal to its cost of capital, there is a zero valuation impact. From a present value perspective, lower dividends in the first period are exactly offset by higher dividends in subsequent period. When the firm retains the attached $0.43 of franking credits, in the subsequent period this still has a nominal value of $0.43, and therefore a lower present value.

82. The eventual distribution of this credit would never occur in the case of a firm which grows in perpetuity and where that growth is funded by the reinvestment of earnings. If growth does not continue into perpetuity, the eventual distribution of the credit could still occur at an extended time in the future – but only when the firm liquidates, in which case the liquidation value of the assets could be used to pay a liquidating dividend. In either case, the stored franking credit has zero or negligible value, even though the firm's policy of distributing earnings is entirely rational.

[31] In reality, a firm may only retain profits if it were of the view that they could be reinvested at a rate higher than the required return of 10% (at least for some period). Obviously, this makes no difference to the point being made in this example.

Consistency with estimate of market risk premium

83. In its *Final Decision*, the AER's estimate of the market risk premium is based primarily on empirical evidence relating to historical excess market returns as set out in a series of tables prepared by Associate Professor Handley.[32] In that analysis, Associate Professor Handley takes the excess return of a stock market index over and above the yield on government bonds each year. He then "grosses up" these estimates for various assumed values of franking credits. This grossing up procedure is based on the *actual* payout ratio of Australian firms, not on an *assumed* payout ratio of 100%.

84. In our view, consistency demands that the same payout ratio must be used throughout the WACC estimation process. It is inconsistent to use the actual observed payout ratio in one part of the WACC estimation and to use a different assumed value for the same parameter in another part of the same WACC estimation. In our view, the same actual observed empirical estimate should be used throughout the WACC estimation process.

Summary and conclusions

85. The basis of the AER's assumed payout ratio of 1.0, and our responses to these proposed reasons, are as follows:

a. "[A payout ratio of 1.0] is consistent with the Officer (1994) WACC framework which assumes a full distribution of free cash flows." [33]

   We note that Officer (1994) includes a detailed worked example in which clearly does *not* assume a full distribution of free cash flows. When Officer (1994) implements the framework of Officer (1994), he does not assume a payout ratio of 1.0.

b. "[A payout ratio of 1.0] is consistent with the AER's post-tax revenue model (PTRM), which explicitly assumes a full distribution of free cash flows." [34]

   We note that the AER itself states that this is the wrong basis by which to estimate the distribution rate. Rather, the AER itself concludes that "the assumed utilisation of imputation credits should not be based on a benchmark efficient NSP. Rather, the AER considers that a best estimate of gamma should be based on a market-wide estimate for businesses across the Australian economy" [35] and that "a reasonable estimate of the annual payout ratio is the market average of 0.71." [36]

c. "[A payout ratio of 1.0] avoids any further costly debate on the estimation of the additional parameters that would be required to establish the 'true' time value adjustment to retained credits, which the AER has demonstrated to be immaterial under a set of reasonable assumptions." [37]

   We show above that the basis for this conclusion is flawed and impossible. Moreover, the alternative does not require any additional parameters to be estimated. In our view, the

[32] Final Decision, p. 209 and Handley (2009), "Further comments on the historical equity risk premium."
[33] Final Decision, p. 420.
[34] Final Decision, p. 420.
[35] Final Decision, p. 394.
[36] Final Decision, p. 420.
[37] Final Decision, p. 420.

appropriate approach is to simply adopt the empirical estimate of the payout ratio, which is 71%.

86. In any event, the same estimate of dividend payout should be used throughout the WACC estimation. The *Final Decision* uses the actual observed empirical estimate of dividend payout when estimating market risk premium, but uses an assumed payout of 100% when estimating gamma.

3. Conceptual issues

Context and AER view

87. In its *Final Decision*, the AER concludes that:

> …foreign investors in the Australian market will be recognised in defining the representative investor, but only to the extent that they invest in the domestic capital market.[38]

88. This is based primarily on advice from Associate Professor Handley, who concludes that:

> …for the purposes of estimating gamma, foreign investors should be recognised only to the extent that they invest in the domestic market.[39]

89. In our view, one should not apply one approach "for the purposes of estimating gamma" and a different, inconsistent approach for the purposes of estimating other WACC parameters. We return to this internal consistency issue in a subsequent section of this report. In this section we address the conceptual issue relating to the definition of the market in relation to the estimation of gamma.

Relevance of the conceptual issue

Empirical estimates from market prices

90. We begin by noting that the conceptual issue relating to the definition of the market and the effect of foreign investors has no bearing whatsoever on the empirical estimates of gamma that are based on the prices of traded securities. For example, analyses of dividend drop-offs and the simultaneous prices of shares and futures contracts are based on traded security prices. To the extent that foreign investors (or any other group) has an influence, this is reflected in the observable traded price.

91. In our *SFG Gamma Submission*, we noted that government bonds trade in a free market, transactions occur, and a market-clearing price is determined. We observe that market clearing price, infer a yield to maturity from it, and use that as an estimate of the risk-free rate. In economic theory, that market-clearing price was determined by the representative investor. But the identity or characteristics of the representative investor does not need to be determined or assumed in order to estimate the risk-free rate. We simply observe traded market prices, use them to obtain the parameter estimate and move on.

92. Exactly the same applies to the estimation of theta. The empirical techniques that are based on market prices are not based on, and do not require, any assumption whatsoever about the identity or characteristics of the representative investor. The dividend drop-off approach, for example, is a procedure that is applied in exactly the same way irrespective of any theoretical debate about how we should think about the concept of a representative investor.

[38] Final Decision, p. 426.
[39] Handley (2009), "Further comments on the valuation of imputation credits," p. 17.

Weighted-average redemption rates

93. The alternative to using empirical estimates based on traded market prices, is to estimate gamma based on weighted-average redemption rates. This approach clearly *does* require an assumption about the appropriate market definition and the weighting that should be applied to foreign investors. In essence, the redemption rate approach requires an assumption about the weight to be applied to resident investors and the weight to be applied to foreign investors. The former is multiplied by one, the latter is multiplied by zero, and Associate Professor Handley considers the resulting weighted average to be an "upper bound" for theta.

94. In summary, the conceptual issues discussed in this section are irrelevant to the empirical estimates based on traded market prices. These issues are only relevant to estimates based on weighted-average redemption rates, where an assumption about the appropriate weights to be applied is required. For the redemption rate approach only, a range of conceptual issues in relation to the underlying asset pricing model must be determined. This then determines the weights to be applied to the different investor groups when constructing the weighted-average redemption rate.

Conceptual asset pricing issues

95. The conceptual issues in relation to the underlying asset pricing model appear to have converged on a setting in which there is a single market consisting of *n* risky assets held collectively by *m* investors. The AER states that:

> …the starting point for the Sharpe CAPM (and all subsequent versions of the CAPM) is to assume a given set of assets (*n* risky assets and a risk-free asset) and a given set of investors (*m*) who collectively determine the prices of those assets.[40]

96. Handley (2009) also sets out part of the derivation of the CAPM where there is a single market consisting of *n* risky assets held collectively by *m* investors.[41]

97. A crucial aspect of these models is that:

    a. The *m* investors must, between them, hold 100% of the *n* assets; and

    b. The *m* investors own nothing other than the *n* assets.

98. That is:

    a. None of the *m* investors can hold any assets outside the model; and

    b. There can be no investors outside of the model who can possibly buy any of the *n* assets inside the model.

99. In other words, the derivation of the CAPM and subsequent models that are based on it, require a closed system. A model in which investors who are inside the system are able to invest in assets outside the system, or where investors outside the system are able to invest in assets inside the system is very different from the CAPM or any subsequent model based on it. None of the

[40] Final Decision, p. 424.

[41] Handley (2009), "Further comments on the valuation of imputation credits," pp. 13-14.

CAPM derivations hold in such a case and the CAPM pricing equation (which is used to estimate the required return on equity) does not hold. In particular, the representative investor is certainly not anything like a simple weighted average.

100. To see this, consider the derivation presented by Brennan (1992) as cited by Handley (2009).[42] Here every investor maximises their end-of-period utility:

$$\underset{z_{ij}}{Max} V_i\left(\overline{W}_i, S_i^2\right)$$

$$\text{subject to:}$$

$$\overline{W}_i = \sum_{j=1}^{n} z_{ij}\overline{P}_{j1} - R\sum_{j=1}^{n}\left(z_{ij} - \overline{z}_{ij}\right)\overline{P}_{j0}$$

$$S_i^2 = \sum_{j=1}^{n}\sum_{k=1}^{n} z_{ij} z_{ik}\omega_{jk}$$

101. The first of these equations says that all investors maximise their end-of-period expected wealth. Utility is increasing in expected returns, $\overline{W}_i$, and decreasing in variance, S_i^2. z_{ij} represents the weight that investor *i* invests in each of the *j* assets. The second equation says that investor *i* must invest all of his wealth inside the system. Expected end-of-period wealth is the expected payoff on risky assets plus the return on the amount invested in the risk-free asset. The last equation is the expression for the variance of the returns of the investor's portfolio.

102. If, however, the *m* investors inside the system are able to invest in n_1 assets inside the system and n_2 assets outside the system, this optimisation becomes:

$$\underset{z_{ij}}{Max} V_i\left(\overline{W}_{i,IN} + \overline{W}_{i,OUT}, S_{i,IN}^2 + S_{i,OUT}^2 + 2\,\mathrm{cov}\left[\overline{W}_{i,IN}, \overline{W}_{i,OUT}\right]\right)$$

$$\text{subject to:}$$

$$\overline{W}_i = \sum_{j=1}^{n_1+n_2} z_{ij}\overline{P}_{j1} - R\sum_{j=1}^{n_1+n_2}\left(z_{ij} - \overline{z}_{ij}\right)\overline{P}_{j0}$$

$$S_i^2 = \sum_{j=1}^{n_1+n_2}\sum_{k=1}^{n_1+n_2} z_{ij} z_{ik}\omega_{jk}$$

103. That is, the end of period utility of each investor depends on the value of his investments inside the system plus the value of his investments outside the system and the relationship (covariance) between those two holdings.

104. Moreover, Brennan (1992, Eq. 8) applies the "market clearing condition" which says that:

a. The *m* investors must, between them, hold 100% of the *n* assets; and

b. The *m* investors own nothing other than the *n* assets.

105. This then leads to what Handley (2009, p.14) calls "the familiar Sharpe CAPM pricing equation."

106. In summary, there is no model in which:

[42] We adopt the full notation, as set out in Brennan (1992).

a. Any of the *m* investors inside the model can hold any assets outside the model; and

b. There are any investors outside of the model who can possibly buy any of the *n* assets inside the model.

107. When these possibilities are introduced, the investor's optimisation problem changes, the market clearing condition changes, and the familiar Sharpe CAPM pricing relation cannot be derived. It is simply not possible to derive any form of CAPM model unless:

a. The *m* investors, between them, hold 100% of the *n* assets; and

b. The *m* investors own nothing other than the *n* assets.

108. By contrast, Handley (2009) states that:

> any assets which may be held by any of the investors in other markets – and the corresponding wealth of those holdings – are not included in the model and therefore play no role in the pricing of the *n* risky assets in the market.[43]

109. As shown above, this is simply untrue and violates the most basic elements of equilibrium and the CAPM. It is impossible to derive any sort of equilibrium relationship when one considers only a sub-set of investors and a sub-set of assets. There is no such thing as an optimisation problem that applies to a sub-set of investments or a sub-set of investors. There is no such thing as a market clearing condition that considers a sub-set of investors and a sub-set of assets. The "model" envisaged by Associate Professor Handley does not exist and cannot exist and the CAPM pricing equation cannot be derived in the framework that he proposes.

110. Under Associate Professor Handley's "model" there are a group of Australian assets. These are the *n* assets referred to above. These assets are held partially by Australian investors and partially by foreign investors. In total there are *m* investors. But the Australian investors and the foreign investors also have assets outside Australia. Consequently, the market clearing condition in Paragraph 107.b is violated and the derivation of the asset pricing model breaks down. One cannot derive the CAPM or any CAPM-like pricing equation in this case. To derive a CAPM-like pricing equation it must be the case that the investors in the model own all of, and nothing but, the assets in the model. This is the market clearing condition referred to above. Without this market clearing condition there can be no CAPM-like pricing equation. In the Handley framework there is no market clearing condition because the investors inside the model are allowed to own assets that are outside the model, so there can be no CAPM-like pricing equation. Nothing resembling the CAPM can be derived in the Handley framework.

111. To obtain the CAPM pricing equation, we must have a properly defined market clearing condition in which the investors inside the model own all of, and nothing but, the assets in the model. There are two ways in which this can be achieved:

a. Assume away foreign investors entirely and assume away the ability of domestic investors to buy assets outside Australia. That is, we could assume that there are only Australian investors who own all of, and nothing but, the Australian assets. This would be an extreme assumption and is equivalent to simply setting gamma equal to one by assumption.

[43] Handley (2009, p. 14).

If this were to be done, consistency demands that one would have to re-estimate all other WACC parameters as they would be in the absence of foreign investment; or

b. Consider foreign investors and foreign assets within the model. To obtain a market clearing condition (which is a pre-condition for obtaining a CAPM-like pricing equation), one must consider *all* foreign investors and *all* foreign assets. Any weighted-average must be taken over all investors who are included in the market clearing condition. In this case, Australian investors make up an insignificant proportion of investors, so their tax position in relation to Australian dividends is effectively irrelevant in equilibrium.

Relevance of conceptual asset pricing issues

112. At this point we reiterate that none of these conceptual issues arise or require any consideration when gamma is estimated with reference to the observed prices of traded securities. These issues only become relevant when determining the weights to be applied when applying the weighted-average redemption rate approach. No such assumptions or considerations are required when using market data to estimate gamma. In that case, the equilibrium *outcomes* of the trading and investment decisions of all market participants can be *observed* in the form of traded prices rather than *assumed* in the context of a conceptual model.

Summary and conclusions

113. When estimating theta (and consequently gamma) using empirical evidence from observed prices of traded securities, conceptual issues relating to the derivation of asset pricing models do not arise.

114. However, when estimating theta using the weighted-average redemption rate approach, these conceptual issues do arise. This is because the weights that must be applied under this approach are the outcome of the precise version of the model that is assumed.

115. The weights that are used cannot be arbitrarily selected – they must be the outcome of a proper asset pricing model such as the CAPM.

116. Any form of the CAPM requires that:

a. The m investors must, between them, hold 100% of the n assets; and

b. The m investors own nothing other than the n assets.

117. The "model" envisaged by Associate Professor Handley violates both of these basic requirements. The Handley model does not exist and cannot exist and cannot be derived. Consequently it cannot be used to develop a set of weights to be applied when constructing a weighted-average redemption rate estimate of theta.

4. Appropriate time period for estimating theta

Context and AER view

118. In its *Final Decision*, the AER concludes that:

> …there is persuasive evidence to reject pre-July 2000 data from consideration in estimating theta.[44]

Weighted-average redemption rates

119. The AER argues that one reason for this conclusion is that:

> …a weighted-average valuation across all investors in the Australian capital market…would…increase as a result of the 2000 tax changes.[45]

120. That is, prior to the 2000 tax change there were three types of investors:

a. Resident taxpayers who could use franking credits;

b. Resident untaxed individuals and entities who could not use franking credits; and

c. Non-resident investors who could not use franking credits.

121. Under the weighted-average utilisation approach, one multiplies the proportion of investors in each group by one if they can utilise franking credits and by zero if they cannot. Consequently, the weighted-average utilisation will increase by the proportion of resident untaxed individuals and entities – because these investors were previously unable to utilise franking credits, but were made able to utilise them as a result of the 2000 tax change.

122. There are two pieces of evidence in relation to redemption rates before and after 2000:

a. Hathaway and Officer (2004) *estimate* redemption rates using aggregate tax statistics. They conclude that the best estimate is "a redemption factor of about 40% for distributed credits" and that no increase occurred in July 2000.[46]

b. Handley and Maheswaran (2007) *assume* a redemption rate for resident investors for the period after 2000.[47]

Dividend drop-off analysis

123. The AER has primarily relied on the results of Beggs and Skeels as the basis for concluding that the 2000 Rebate Provision had the effect of increasing the estimated value of franking credits. This comes from Table 5 of Beggs and Skeels, which is reproduced below.

[44] Final Decision, p. 430.
[45] Final Decision, p. 438.
[46] Hathaway and Officer (2004), p.16.
[47] Handley and Maheswaran (2008), p.86.

Test for change in value of theta – Beggs and Skeels (2006)

TABLE 5
Tests for Structural Breaks in Franking Credit Drop-off Ratios at Tax Regime Changes

Tax regime	Period	Estimated cash drop-off ratio ($\gamma_{1,j}$)	Estimated franking credit drop-off ratio ($\gamma_{2,j}$)	Null hypothesis	*P*-value
1	1986–1988	0.465 (0.040)	0.752 (0.157)	$\gamma_{2,1} = \gamma_{2,2} = \ldots = \gamma_{2,7}$	0.000
2	1989–1990	0.646 (0.064)	0.450 (0.119)	$\gamma_{2,1} = \gamma_{2,2}$	0.126
3	1991	0.765 (0.115)	0.376 (0.206)	$\gamma_{2,2} = \gamma_{2,3}$	0.757
4	1992–1997	0.861 (0.059)	0.201 (0.103)	$\gamma_{2,3} = \gamma_{2,4}$	0.447
5	1998–1999	0.795 (0.099)	0.418 (0.186)	$\gamma_{2,4} = \gamma_{2,5}$	0.305
6	2000	1.168 (0.099) C	0.128 (0.204) A	$\gamma_{2,5} = \gamma_{2,6}$	0.047
7	2001–2004	0.800 (0.052)	0.572 (0.121)	$\gamma_{2,6} = \gamma_{2,7}$ B	0.003

The numbers in parentheses are estimated standard errors and the *P*-values are from conventional *F*-tests of the hypotheses.

Source: Beggs and Skeels (2006), Table 5, p. 61.

124. The key result in this table is that the estimated value of franking credits increased from 12.8 cents in the dollar immediately before the Rebate Provision to 57.2 cents in the dollar afterwards (see Point A). This change is also estimated to be statistically significant (see Point B).

125. Recall, however, that the value of franking credits is estimated by taking the combined value of a $1.00 cash dividend plus the attached franking credit and then subtracting the estimated value of the cash dividend. When the estimated value of the cash dividend is high, the estimated value of the franking credit will be low, and vice versa.

126. Beggs and Skeels estimate the value of a $1.00 cash dividend to have decreased from $1.168 immediately before the Rebate Provision to 80 cents afterwards (see Point C). That is, the result here is not so much one of an increase in the value of franking credits, but a decrease in the estimated value of cash dividends from an implausibly high level. Not only is there no explanation for why a $1.00 dividend might be worth $1.168 prior to the Rebate Provision, but there is also no reason why the Rebate Provision would affect the value of cash dividends.

127. When interpreting empirical results, it is important to consider the results in their entirety. In this case, if it is to be accepted that these results establish that the Rebate Provision has increased the value of franking credits, it must also be accepted that:

a. A $1.00 cash dividend was worth $1.16 prior to the Rebate Provision; and

b. The Rebate Provision caused the value of cash dividends to fall by over 30% (from $1.168 to 0.80) even though it has nothing to do with cash dividends.

128. The alternative explanation is simply that estimation error, of the type that is expected from time to time when market data is used (and applied to a small sample such as the observations from the single year of 2000), has resulted in economically implausible estimates in the period immediately prior to the Rebate Provision.

Reason for preferring more data

129. In its Final Decision, the AER notes that:

> sample size is no doubt a relevant factor[48]

but argues that:

> SFG has not presented evidence that the reliability of theta estimates from dividend drop-off studies actually improves with a longer-term data set.[49]

130. The leading paper in relation to the reliability of dividend drop-off estimates is Boyd and Jagannathan (1994) who state that:

> a significant problem confronting researchers in this area – an extremely high noise-to-signal ratio. Dividend yields vary across stocks and across time, but their variability is miniscule compared to that of daily stock returns…To illustrate these issues we estimate price drop equations annually for each of the 25 years in our sample. Simply put, the results vary enormously from year to year. The implication is that inferences based on one or a few years' data will be extremely imprecise. One solution is to examine a very long time period as is done in this study.[50]

131. That is, the leading paper in the area notes that dividend drop-off results "vary enormously from year to year," that inference based on a few years' data will be unreliable, and hence there is a need to "examine a very long time period." We also note that we submitted this passage in full to the AER.[51]

132. Moreover, we note that there are at least two elements to the reliability of statistical estimates: precision and bias. Precision can be estimated via the standard error of the estimate. Bias reflects the extent to which the point estimate properly reflects the quantity being estimated. The difference can be illustrated with reference to recent stock returns. Since April 2009 the stock market has increased strongly every month. When all observations in a sample are similar, the standard error is low and precision is high. But this estimate from a short period would not be considered to be an unbiased estimate of long-run stock returns – the sample is too short to draw that conclusion. A large sample is required to obtain reliable estimates.

Conclusions

133. Our conclusions in relation to the time period that should be used to estimate theta are as follows:

a. In the absence of evidence of a structural break, a long sample of data should be used to estimate theta. This is consistent with the recommendations of Boyd and Jagannathan (1994) and with the most basic statistical principles;

[48] Final Decision, p. 430.
[49] Final Decision, p. 429-430.
[50] Boyd and Jagannathan (1994, p. 715-716).
[51] SFG Consistency Report, p.10.

b. Rather than assume a structural break in July 2000, one should examine the empirical data to determine if a break did occur; and

c. The only evidence of a structural break comes from Beggs and Skeels (2006). However, this conclusion is conditional on nonsensical results (driven by the sort of estimation error that is expected when applying this sort of empirical estimation techniques to a small sample of data) from the short period before 2000. But for a short sub-period of strange results in early 2000, the Beggs and Skeels estimates from post-2000 are not significantly different from those pre-2000.

5. Inferring theta from market prices

Context and AER view

134. In its *Final Decision*, the AER concludes that:

> Despite the advantage of providing more up-to-date estimates (i.e. to 2006), the AER has concerns regarding the reliability of the SFG study, and considers that correction of identified deficiencies would likely have a material impact on the results. Accordingly while the AER has given full consideration to the SFG study, limited weight has been placed upon theta estimates generated by the SFG study for the purposes of this final decision… Based on the empirical evidence available, the AER considers that the 2006 Beggs and Skeels study provides the most comprehensive, reliable and robust estimate of theta inferred from market prices in the post-2000 period. It is also an independent published study that has been through the academic refereeing process. Accordingly the AER has placed significant weight on the 2001-2004 estimate of theta from this study of 0.57.[52]

Subsequent analysis

135. Subsequent to the AER's *Final Decision*, Professor Chris Skeels (one of the authors of Beggs and Skeels, 2006) has been engaged to perform a thorough peer review of the SFG study and of the AER's concerns with and criticisms of it. Skeels (2009) notes that:

> Many of the criticisms raised by the AER were little more than allusions to potential problems with the SFG analysis. In some cases I found that these allusions were ill-founded and readily dismissed. In other instances the appropriate response was to rework the model and to actually establish whether the concern was valid or not. This latter class of concerns was incorporated into the questions posed to SFG. I found their responses to be convincing in as much as the potential problems were demonstrated to have little or no material impact upon the results.[53]

136. Professor Skeels then concludes that:

> I find that the results presented in Appendix I constitute an empirically valid study of the dividend drop-off problem for Australia and that the SFG estimate of theta of 0.23 represents the most accurate estimate currently available.[54]

Estimates are conditional on the value of cash dividends

137. Dividend drop-off analyses regress the stock price change over the ex-dividend day on cash dividends and franking credits. Some of the change in stock price is ascribed to the cash

[52] Final Decision, p. 447-448.
[53] Skeels (2009), p. 5.
[54] Skeels (2009), p. 5.

dividend and whatever is left over is ascribed to the franking credit. Consequently, the estimated effect of franking credits is *conditional* on the value that is ascribed to cash dividends.

Conclusions

138. Our conclusions in relation to the post-2000 dividend drop-off estimates of theta are as follows:

a. If the Beggs and Skeels variation of the methodology is the most appropriate and if only post-2000 data should be used, an estimate using an updated data set should be preferred to that reported by Beggs and Skeels (2006);

b. Professor Skeels states that the best such estimate of theta is currently 0.23; and

c. All dividend drop-off estimates of theta are conditional on the particular value of cash dividends that is adopted.

Subsequent consideration by the AER

139. Subsequent to the Final Decision in its Review of WACC Parameters, the AER has made further pronouncements in relation to gamma in its SA Distribution Draft Determination, where the AER indicates that it prefers to place zero weight on the empirical evidence set out in the SFG dividend drop-off report and to continue to use the Beggs-Skeels estimate for this purpose, notwithstanding the report from Assoc. Prof. Skeels.

140. The SA Distribution Draft Decision sets out a number of reasons for the AER's outright rejection of the SFG study as follows:

a. Incorrect corporate tax rates used;

b. No test or adjustment for multicollinearity;

c. Concerns about the reliability of some data;

d. Filtering, outliers and the stability of estimates;

e. Failure to remove "Black Friday" like observations from the data set.

141. In the remainder of this section of the report, we address the AER's reasons for rejecting the results of the SFG study.

Corporate tax rates

142. The AER concludes in its Draft Determination that:

> contrary to Skeels' claim, there continues to be an issue with the appropriate use of the corporate tax rates as there remains a three-month lag for the adoption of the 34 and 30 per cent tax rates.[55]

143. In the SFG study, franked dividends paid within three months of a tax rate change were assessed using the corporate tax rate that applied before the change. In the post-2000 sample this affects

[55] Draft Determination, p. 269.

only those observations with ex-dividend dates in the September quarter of 2001 – following the change in the corporate tax rate from 34% to 30% on July 1 2001.

144. Under dividend imputation legislation, franking credits are created by the payment of corporate tax. The amount of franking credits created depends on the corporate tax rate that was applicable over the period during which the income was earned. Suppose, for example, that a firm earns $100 profit in the 2001 tax year. It would pay $34 corporate tax and consequently $34 of franking credits would be created. However, if the firm then paid the remaining $66 as a dividend in (say) August 2001, that dividend could only be franked at the rate of 30% (the new corporate tax rate). In this case, the $66 dividend would have $28.29 of franking credits attached to it and the remaining $5.71 of franking credits would have to be stored in the firm's franking account balance.[56]

145. Consequently, we have altered the corporate tax rate from 34% to 30% for those observations in our sample with ex-dividend dates that fall in the September quarter of 2001. This is a relatively small change (from 0.34 to 0.30) for a relatively small proportion of the observations in our sample, and is therefore not expected to have a material impact on the results. Indeed for the post-2000 sample, the point estimate of the value of cash dividends changes from 0.9827 to 0.9822 and the point estimate of the value of franking credits changes from 0.2308 to 0.2340. In all of the further analysis in this report, we use the 30% franking rate for all observations in the September quarter of 2001.

Tests and adjustments for multicollinearity

146. This issue is addressed in considerable detail in Section 7 below.

Reliability of data

"Historically consistent" data series

147. The SA Distribution Draft Determination suggests that the SFG study "appears not to use historically consistent price and dividend data." [57] ETSA Utilities requested further explanation from the AER on this point and the AER has replied with the following response:

> The share price and dividend data are not adjusted to smooth out the effect of bonus issues, right issues, share splits and other events that may change the number of shares on issues. It is desirable to use adjusted series to reflect the same basis of quotation for shares of a company.[58]

148. The AER has apparently used Bloomberg to identify ex-dividend dates, stock prices, capitalisation changes such as stock splits and bonus issues and so on. We note that Bloomberg reports a "total return" or "adjusted" series that makes adjustments for stock splits and bonus issues etc. For example, if a company makes a 2:1 stock split, this series would simply double the stock price after the split. The result is that after several capitalization changes, the reported "stock price" may differ very substantially from the actual traded share price. This would be

[56] Technically, where franking credits arose after 30 June 2001 which related to tax payments based on an underlying rate of 34% (rather than the 30% rate), those franking credits were converted to equivalent credits based on the new rate of 30%. This example is for illustrative purposes only in that, the final income tax liability for the year ended 30 June 2001 would not generally have been paid by August 2001. We also note that the calculations of franking credits in this simple example are based on current law which uses the "tax paid" basis of recording franking credits – this is simply for ease of exposition.

[57] Draft Determination, p. 269.

[58] AER response to ETSA information request.

important if one were calculating the total return or capital gain that had been earned on a stock over a period of some years.

149. However, dividend drop-off analysis examines stock price changes over one day. Our approach is to examine how the *actual* share price changes over the ex-dividend day and to compare this with the *actual* dividend and the *actual* franking credit. In our view, this is clearly the correct approach. If one examined an "adjusted" series, one would also have to adjust the dividend and franking credit by the same ratio. If the adjustments were all performed correctly, the results would be the same as under our approach. But there is no reason to do this as it achieves no benefit, but makes errors more likely.

Special dividends

150. The SA Distribution Draft Determination does not specifically refer to special dividends, but the AER's response to ETSA's information request notes the AER's concern that:

> Observations on special cash dividend payments are not excluded from the sample or properly controlled in the analysis.[59]

151. The AER suggests that special dividends should be excluded or "controlled" but does not set out what type of control it thinks might be required. However, there is no reason at all to exclude special dividends from a dividend drop-off analysis. There is no reason why the stock price change over the ex-dividend date would differ for special dividends relative to ordinary dividends. Special dividends may have a different announcement effect than ordinary dividends (i.e., the stock price reaction may be different at the time of announcement) but this pre-dates the cum-dividend price and is of no relevance to the price change over the ex-dividend date (which is some weeks after the announcement).

152. That is, the dividend process begins with the announcement of the dividend. Many empirical studies show that the stock price changes to reflect the information conveyed to the market by this announcement. In particular, the announcement of dividend increases are (on average) associated with abnormal positive stock returns and the announcement of dividend decreases are (on average) associated with abnormal negative stock returns. Some weeks after this, the dividend separates from the share on the ex-dividend date. The price on the previous day (the cum-dividend day) reflects the entitlement to the dividend, and the price on the ex-day reflects the price of the stock after the dividend has separated from the share.

153. It is possible that the stock price reaction to the announcement may be different for a special dividend than for an ordinary dividend because a special dividend is a one-off payment whereas ordinary dividends are expected to be maintained indefinitely. However, this all happens some weeks before the ex day, which is the data used for a dividend drop-off study. A drop-off study seeks to estimate the value of cash dividends and franking credits by examining the stock price change over the ex-dividend day only. Special dividends should only be omitted from this analysis if there were some reason why the value of franking credits attached to special dividends differed from the value of franking credits attached to ordinary dividends. But since there is no such reason, there is no need to exclude or "control for" special dividends. Excluding special dividends would simply reduce the sample size, which would make the results less reliable.

[59] AER response to ETSA information request.

Announcements "around" the ex-dividend day

154. The AER suggests that the SFG results may be contaminated by company announcements "around" the ex-dividend date. The AER's response to ETSA's information request notes the AER's concern that:

> Company-specific information (including the share split and bonus share issues) is announced around the ex-dividend days, the firm share price changes substantially, reflecting market reaction to both.
> For example, KAZ made several announcements around the ex-dividend day (10/04/2001) when it paid out a dividend of 0.0025, including: an announcement that it had signed a three-year IT outsourcing contract; and an announcement that it has successfully implemented a national contract with Elders.[60]

155. The AER provides another example of what it considers to be a potentially contaminating source of information, as follows:

> Examples of such events include, but are not limited to, ongoing merger speculation (an example of this was Alinta AGL, which went on for a long period of time but did not affect the market), the issuing of new shares, signs of financial stress of a specific business over a period of time (e.g. Envestra, Timbercorp, Babcock and Brown, etc.), and other events which may affect the volatility of a stock's prices over a prolonged period of time but not the entire market.[61]

156. In responding to these claims, the first point to make is that the effect of other announcements is not unique to the SFG study (as the AER implies) but applies equally to all empirical studies in finance that use stock price data. A dividend drop-off analysis seeks to estimate the value of cash dividends and franking credits by observing the stock price change on the ex-dividend day. But stock prices can change for reasons other than the dividend and franking credit separating from the share on the ex-dividend day. Standard empirical finance practice is to seek to employ a large sample so that the effects of these other factors will cancel each other out (i.e., some will have a positive effect on stock prices and others will have a negative effect) in which case the only systematic effect is the ex-dividend event. Standard practice then applies tests of statistical significance to the results obtained from the analysis of the largest possible sample of data.

157. For example, the AER's estimates of beta are also based on stock price data. In that case, the goal is to estimate the relationship between stock returns and market returns. But stock prices can change for reasons other than market movements. Indeed the R-squared statistics in these regressions tend to be very small indeed, indicating that the very great majority of stock price movements are for reasons other than market movements. The AER's approach here was *not* to eliminate observations where the stock price movement may have been caused by something other than the market movement. Rather, the AER's approach was to use all available observations.

158. Second, this potential problem is really a non-issue for dividend drop-off analysis. This technique takes the price change between the cum-dividend date and the ex-dividend date. This is one day (perhaps slightly longer for small stocks that do not trade every single day.) An

[60] AER response to ETSA information request.
[61] AER response to ETSA information request.

announcement made before the cum-dividend day is already incorporated into the cum-dividend stock price. An announcement made after the ex-dividend day is also irrelevant as it affects prices subsequent to the dividend drop-off. That is, the issue is constrained to announcements made on the ex-dividend day itself. These are so rare that it could not possibly have a material effect on the results. Moreover, even if there was an effect, there is no reason to suspect that there would be any bias – positive and negative announcements would be likely to offset one another. Note that in our data checking of 150 randomly-selected observations, discussed in Section 2 we reviewed all company announcements released up to two days before and two days after the ex-dividend date, to account for any residual risk that the market became aware of price-sensitive information on the ex-dividend date.

159. Third, the same reasoning applies to the AER's example about a company that is the subject of merger or acquisition speculation. Unless there is a major development that happens to occur exactly on the ex-dividend date, it is irrelevant to dividend drop-off analysis. By contrast, these issues will potentially seriously affect beta estimates, which rely on every monthly return over a period of at least 4-5 years. Such issues will affect beta estimates if they occur at any time during the 4-5 year or more estimation period. In this regard, the AER gives examples of AGL and Alinta, and that the same arguments apply in relation to financial distress considerations, where they provide the example of Envestra. This is cause for substantial concern about the reliability of beta estimates, but is irrelevant to dividend drop-off analysis.

160. Fourth, the only way announcements "around the time" of the ex-dividend date could affect dividend drop-off estimates is if markets are inefficient and do not properly reflect available information. However, even if the market's reaction to price-sensitive information occurred over more than one day, the issue for dividend drop-off studies is whether the sample is biased in a statistical sense. If there is an equal chance that ex-dividend day prices increase or decrease due to the release of price-sensitive information in the days prior to the ex-dividend date, there is no reason to think that parameter estimates will be affected. Furthermore, for this information to affect the estimated value of cash dividends versus imputation credits, there would need to be a systematic relationship between the level of franking and the release of positive or negative information around the announcement date. There is no reason to suspect that a bias of this type exists in our dividend drop-off study, given the large number of data points used and the detailed analysis of influential observations.

161. In summary, dividend drop-off analysis uses only stock price changes over the ex-dividend day. Unless a value-relevant announcement occurs on this very day, its effect will not be relevant for the dividend drop-off estimates. By contrast, beta estimates require a series of monthly or weekly returns over some years. Any value-relevant announcement that occurs at any point over this period will affect the beta estimate. Moreover, the AER's empirical analysis of beta estimates is based on only a few stocks, so the large sample effect (whereby positive and negative news may tend to cancel out) does not apply. Also, the AER has specifically identified two of those stocks (AGL and Alinta) as being particular examples of such contamination. By contrast, the dividend drop-off analysis uses a sample of hundreds of different stocks.

162. In our view, the only conclusion that can be drawn from this is that the AER's beta estimates are much more likely to be contaminated and unreliable as the result of announcements and takeover speculation than are any dividend drop-off estimates of theta.

Sample of dividend events

163. The AER's response to ETSA's information request also states that:

> not all dividend-paying events for a firm paying regular interim and final dividends during the sample period are included.[62]

164. The data set for the SFG study was compiled from three data sources: SIRCA, FinAnalysis, and ETrade. Data was cross-referenced between databases and any inconsistencies that were identified were examined and reconciled. Under the process that was used to identify and reconcile ex-dividend events, it is possible that a small handful of observations (more likely to pertain to firms that are now de-listed) were omitted from the sample.

165. The AER has not provided information about which or how many such observations it has identified. In any event, any effect on the results will be immaterial for a number of reasons:

a. The number of omitted observations will be tiny as a proportion of the data points included in the sample;

b. There is no reason to suspect that any omitted data points would systematically bias the results – random omission of even a large number of data points would likely see approximately equal numbers having a positive or negative effect on the final results;

c. The sampling analysis set out below shows that the exclusion of a relatively small number of events affects the final estimate of theta in only the third decimal point.

166. For these reasons, it is highly unlikely that any omitted ex-dividend events identified by the AER would have a noticeable effect on the final results of the SFG analysis. If the AER were to provide a list of any such observations it has identified, it would be a straightforward matter to re-compute the results to determine whether those observations did in fact have any material affect on any estimates.

Filtering, outliers, and the stability of estimates

167. In any kind of large-scale empirical analysis there will be outlier data points in the sample. If the analysis is run with the noisy influential outliers included, the results will tend to be unstable (i.e., parameter estimates may change substantially from period to period) and statistically unreliable. Consequently, it is common to apply recognised statistical techniques to remove the effect of a small number of influential outliers to improve the robustness and reliability of the results. The SFG analysis applies such techniques and notes that:

a. Before the removal of a small number of influential outliers the results are unreliable and unstable and have large standard errors and should not be relied upon; but

b. After removal of a very small number of outliers the results are remarkably stable and consistent and economically reasonable.

168. The SFG report therefore concluded that it is the latter set of stable and consistent results that should be relied upon.

169. The SA Distribution Draft Determination criticizes SFG's removal or "filtering" of data points.

[62] AER response to ETSA information request.

> The AER notes that although the results reported by Skeels appear to address a number of the AER's earlier concerns identified in the WACC review, there are still a significant number of issues which demonstrate that estimates provided by SFG are likely to be unreliable. In particular, the AER maintains its concerns regarding the rigour of the filtering technique used by SFG.[63]

170. This seems to imply that the AER prefers to use the entire sample results. But then the SA Distribution Draft Determination criticises the large standard errors that come from a sample that includes outliers[64] (and of course the standard error must be large if outliers are included – by definition). That is, the AER would seem to be satisfied only if the SFG results included all outliers *and* had low standard errors. But this is inconsistent and impossible.

171. On this issue, the key point is that after the removal of outliers, the SFG results are stable and consistent across sub-samples and across variations of the dividend drop-off methodology. It is this more robust and reliable set of results that we believe should be most heavily weighted.

172. Moreover, we have hand-checked every data point that has been removed and believe that there are sound reasons to remove them. It seems that the only possible criticism remaining is that the final data set we use *may* contain some data points that *should* be removed. But neither the Draft Determination nor the AER's response to ETSA's information request identify any specific data points that should be removed, nor the reasons why they should be removed. To place zero weight on a study because of the possibility that there might be some (unspecified) data points that should be removed is quite inconsistent with any recognised standard of evaluating research. Rather, the recognised standard is that the outright rejection of empirical research requires the identification of the specific offending data points, an explanation of the reasons why they must be omitted, and an explanation of why the removal of those data points would materially affect the results.

Failure to remove Black-Friday like observations from the data set

173. The SA Distribution Draft Determination proposes that one of the reasons for rejecting the results of the SFG study is that the SFG results do not account for events such as the severe stock market crash that, according to the AER, occurred on Friday 24 September 1986:

> The AER agrees that events which would affect a cluster of the results are likely to be known to market practitioners. However, the event need not be as extreme as event such as 'Black Friday', it could be an event that affected only part of the stocks or one stock within the sample. Given that the SFG study has not conducted a rigorous interrogation of the data, there may be jointly influential unreliable observations within the data.[65]

and that:

> 'Black Friday' refers to the stock market crash on 24 September 1986.[66]

[63] Draft Determination, p. 272.
[64] Draft Determination, p. 266, 268.
[65] Draft Determination, p. 271.
[66] Draft Determination, Footnote 882, p.271.

174. A simple check reveals that 24 September 1986 was a Wednesday, not a Friday, and the market rose. It is also a date that occurred prior to imputation being introduced.

175. Moreover, even if there were legitimate Black-Friday-like events that occurred during the SFG sample period, they would only affect the results to the extent that they occurred on the ex-dividend day. That is, under the dividend drop-off method, the ex-dividend price change is only potentially contaminated by events that affect the ex-dividend price but not the cum-dividend price. For any particular event, this would pertain to a very small fraction of the total sample. Also, there is no reason to expect that such events (even if they did exist) would have a systematic positive or negative effect on the results).

176. We are unaware of any such events that should cause observations to be removed from the data sample examined in the SFG study. If the AER were to provide a list of any such events it has identified, it would be a straightforward matter to re-compute the results to determine whether the affected observations did in fact have any material affect on any estimates.

Data sampling analysis

177. Subsequent to the SA Distribution Draft Determination, SFG has been engaged to conduct an audit of the data points used in its dividend drop-off analysis. The objective of that audit is to correct any errors that are identified and to examine whether there is any reason to omit or adjust any data points due to company announcements around the time of the ex-dividend date, or for any other reason. A recent report, SFG (2010), sets out this analysis and reports that any impact on estimates of theta is negligible. This applies even when taking a conservative view, whereby an observation is classified as contaminated when there is even the slightest doubt for any reason.

178. The conclusion from the SFG audit is that:

> …there is negligible change to the results. In part, this is due to our previous work in identifying and separately analysing the most influential data points in order to minimise the chance that the results are contaminated by invalid data or the release of contemporaneous price-sensitive information.[67]

[67] SFG (2010), Paragraph 72.

6. Use of tax statistics

Context and AER view

179. In its *Final Decision*, the AER notes that the JIA submission proposed that average redemption rates should not be used to estimate theta. The JIA submitted that:

> Based on the evidence provided from experts to date it is clear that the rate at which imputation credits are redeemed has nothing to do with the market value of theta.[68]

180. This view was further articulated in our *SFG Redemption rate Report* in which we advocated the use of empirical estimates based on observed prices of traded securities:

> …methods that seek to estimate the market value of franking credits rather than counting how many of them are used.[69]

181. The AER concludes that:

> Overall, the AER maintains its view from its explanatory statement that the methodology provided by the Handley and Maheswaran (2008) study provides a relevant and reliable estimate of theta in the post-July 2000 period. Based on Handley's advice, the AER considers that the results of this study provide a reasonable upper-bound estimate of theta.[70]

182. In reaching this conclusion, the AER considers two lines of argument raised by the JIA. A report by NERA sets out a number of conceptual issues that largely overlap with the conceptual issues relating to market definition and the derivation of asset pricing models. Since these issues are already addressed in some detail in Section 3, we do not repeat that analysis here.

183. The second line of argument is that set out in our *SFG Gamma Submission* and the *SFG Redemption Rate Report*, and this is the focus of the remainder of this section.

A voting pattern analogy

184. To understand the irrelevance of these aggregate tax statistics at a simple level, consider an analogy in relation to voting at general elections. In particular, consider countries where voting is not compulsory. Suppose we observe that 60% of citizens choose to cast a vote. Observing how many citizens choose to vote tells us nothing about the market value of the right to vote – it only tells us that a substantial portion of the citizens place no value on the right to vote.

185. Now suppose that the voting authority was able to sell the right to vote – so voters would have to pay a fee if they choose to cast a vote. If the authority *had* to sell a right to vote to *all* citizens and could charge only a single price, that price would have to be zero. We know this must be the outcome because 40% of citizens place no value on the right to vote.

[68] Final Decision, p.450.
[69] Final Decision, p.450.
[70] Final Decision, p.456.

186. Aggregate tax statistics tell us that 60% of the people will choose to vote when given the opportunity. But the WACC requires knowledge of the *price* that could be charged if the voting authority was able to sell the right to vote. Aggregate tax statistics are not relevant to WACC estimation.

187. To complete the analogy, it is clear that the voting authority could set a positive price and sell the right to vote to the 60% of citizens who *do* value it. In the context of dividend imputation this amounts to dividend streaming – channeling franking credits exclusively to domestic residents. But this is not allowed under Australian law – the same right to vote (or franking credit) must be "sold" to all citizens (shareholders) at the same price. All of the votes (franking credits) must be sold – the only question of relevance (to WACC estimation) is whether a positive price can be charged ($\gamma > 0$) or whether they must be given away ($\gamma = 0$) because a substantial portion of citizens (shareholders) do not value them. Observing how many citizens choose to vote (how many franking credits get redeemed) tells us nothing about price and does not answer the relevant question.

Tax statistics are not really needed

188. Before proceeding, it is important to be clear about what the "tax statistics" or "redemption rate" method actually does. This method assumes that franking credits received by non-residents are worthless to them and that franking credits received by residents are worth 100% of face value to them. Consequently, theta is estimated as the proportion of Australian shares that are owned by resident investors. (That is, a weighted-average is taken by applying the weights from the Handley asset pricing model that was criticised in Section 3.) Tax statistics are only used as an indirect way of estimating the relative amounts of resident and foreign investment in Australian shares.

The SFG counterfactual

189. In our *SFG Gamma Submission* we set out a counterfactual example. In that example, we considered what would happen to the estimate of gamma (and consequently the firm's cost of capital) if a law were passed that forcibly reduced the amount of foreign investment allowed in Australia. We noted that redemption rates must increase in this case (since a greater proportion of franking credits must go to resident investors). If redemption rates were used as the basis for estimation, the estimate of theta would increase, the estimated cost of capital would fall, and the estimated value of the firm would rise. We concluded that such an outcome is illogical – Australian firms would not be made better off by constraining the supply of foreign capital.

190. Consistent with the advice from its consultant, Associate Professor Handley, the AER rejected this argument in its *Explanatory Statement*, setting out a number of reasons for doing so. We responded to each of these arguments in our *SFG Redemption Rate Report*, and concluded that none of them were valid.

191. In its *Final Decision*, the AER reiterates its original reasons and concludes that redemption rates can be used to obtain an upper bound for gamma. In affirming its earlier decision on this point, the AER relies heavily on Handley (2009). The basis for the conclusions of Handley (2009), and consequently of the AER, lies on three keystone propositions. In our view, the first two propositions are wrong and the third is an assumption without basis. Our reasons for this view are set out in the remainder of this section.

Keystone 1: AER suggests that gamma does not affect the cost of capital

192. One of the pillars of the AER's conclusion that redemption rates are relevant to the estimation of theta is the contention that an increase in the assumed value of gamma does not result in a decrease in the allowed cost of capital. This is plainly wrong. If different values of gamma had no impact on the cost of capital, (and consequently on the revenue requirement and the value of the firm) we would not need to estimate gamma – because it would be irrelevant. Yet we see substantial resources devoted to the estimation of gamma – because it clearly *does* matter.

193. In our *SFG Redemption Rate Report*, we set out the relevant part of the example from the Appendix to Officer (1994) to show that gamma *is* relevant. Officer (1994) shows how a higher value of gamma reduces the cost of capital and increases the value of the firm.

194. Handley (2009, pp. 23-25) sets out a complicated discussion of what he calls "after-company-before-personal-tax" returns and "after-company-after-some-personal-tax" returns and so on.[71] In our view, this discussion is irrelevant and serves only to obfuscate the clear relationship between gamma, WACC, and the value of the firm.

195. The only issue that is of any consequence here is whether an increase in gamma increases the value of the firm. Clearly it does. There can be no debate about this point. It therefore follows that if gamma is higher, a given cash flow stream must be discounted at a lower rate to produce a higher firm value. That is, the discount rate that is applied to a given cash flow stream *does* unambiguously decrease with an increase in gamma – notwithstanding Associate Professor Handley's discussion about what he calls "after-company-before-personal-tax" returns and "after-company-after-some-personal-tax" returns.

196. The AER notes that "Handley has explored in some detail the impact of gamma in the Officer (1994) framework" [72] and is clearly persuaded by his conclusions:

> Handley argues that the reduction in the cost of equity described by SFG merely reflects a reduction in the cost of equity to the *firm*, while the total return to the *shareholder* remains the same irrespective of the value assumed for gamma. The AER considers that Handley's analysis appropriately captures the impact of gamma in the Officer (1994) WACC framework. On this basis the AER considers that the counterfactual analysis put forward by SFG does not necessarily provide for a reduction in the cost of equity, as it merely describes the return to the firm, rather than the total return to shareholders (which is unchanged). [73]

197. This conclusion relates to our discussion of the detailed example in the appendix of Officer (1994) – where we simply explain the role of gamma as set out in Officer's worked example. We agree entirely that there is "a reduction in the cost of equity to the *firm*, while the total return to the *shareholder* remains the same irrespective of the value assumed for gamma." This is the whole point of our discussion, and of the worked example in Officer (1994). It is precisely the "cost of equity to the *firm*" that is used as the discount rate when converting a given set of cash flows into their present value. When one's estimate of gamma increases, one applies a lower "cost of equity to the *firm*" and obtains a higher firm value. If one were to over-estimate gamma, the result would be a lower estimate of "cost of equity to the *firm*" and a higher estimate of firm value.

[71] We note that this discussion fails to recognise the well-known typographical error in Officer, 1994, Eq. 14, which is repeated as Handley, 2009, Eq. 4, whereby gamma should be replaced by theta – theta is related to "tax credits per share distributed" and gamma is not.
[72] Final Decision, p.455.
[73] Final Decision, p.455.

198. The relevance in the regulatory setting is that the revenue requirement is set according to the "cost of equity to the *firm*." The conclusion that an over-estimate of the gamma "does not necessarily provide for a reduction in the cost of equity" and consequently a reduction in allowed revenues has no basis.

199. In our *SFG Consistency Report*, we commented on the AER's conclusion in its *Explanatory Statement* that:

> Handley demonstrates that the inclusion of imputation credits in the analysis will not affect company values as long as they are consistently recognised in the cash flows as well as the discount rate.[74]

200. Our response to this claim was as follows:

> This is not true. In my view, this paragraph fundamentally misconstrues a key issue in relation to dividend imputation.
>
> Handley (2008) summarises the key results of Officer (2004) in showing that there are several different ways of defining the cash flows and each one has a specific definition of the discount rate that must be applied to it. That is, there must be a consistency between the definitions of the cash flows and the discount rate. Officer shows that the various different definitions produce the same company value so long as (a) the cash flows and discount rate are defined consistently; and (b) the same value of gamma is used in all cases. Handley reiterates this result. I agree with all of this and do not consider any of it to be controversial.
>
> However, it plainly does *not* follow from this that "the inclusion of imputation credits in the analysis will not affect company values as long as they are consistently recognised in the cash flows as well as the discount rate." If we set gamma to 0, the different approaches all produce the same company value as each other. If we set gamma to 0.65, the different approaches all produce the same company value as each other – but it is a different company value from the case where gamma is set to 0.
>
> In summary, the Explanatory Statement's leading point in responding to the inconsistency identified in the JIA submissions is plainly wrong. Changing the estimate of gamma *does* affect company values. The value of the company is increased by the present value of the expected future franking credits.[75]

201. In response, Handley (2009, p.33) claims that there is still some sense in which the statement:

> the inclusion of imputation credits in the analysis will not affect company values as long as they are consistently recognised in the cash flows as well as the discount rate[76]

[74] Explanatory Statement, p. 335.
[75] SFG Consistency Report (2009, p.5).
[76] Handley (2009, p.33).

is true. But it is *not* true. It is demonstrably false – changing the estimate of gamma *does* affect company values and any suggestion to the contrary is simply wrong. See also Paragraph 52 above for a worked example of this point.

Keystone 2: AER suggests that the forcible removal of foreign investment would (in reality) not affect the cost of capital of Australian firms

202. In our counterfactual example we considered what would happen to the estimate of gamma (and consequently the firm's cost of capital) if a law were passed that forcibly reduced the amount of foreign investment allowed in Australia. We noted that simple average redemption rates must increase in this case (since a greater proportion of franking credits must go to resident investors). If simple average redemption rates were used as the basis for estimation, the estimate of theta would increase, the estimated cost of capital would fall, and the estimated value of the firm would rise. We concluded that such an outcome is illogical – Australian firms would not be made better off by constraining the supply of foreign capital.

203. One of the pillars of the AER's conclusion that redemption rates are relevant to the estimation of theta is the contention that the forcible removal of foreign equity from the Australian market may have no impact on the cost of equity of Australian firms:

> …the AER notes Handley's advice that the case being considered is the partial substitution of foreign investment by domestic investment subject to no change in total supply. Given the assumption of no change in the total supply of funds, it is not clear that the counterfactual example put forward by SFG would actually involve an increase in the domestic cost of equity. [77]

204. Our counter-factual example is designed to show that an artificial reduction in the amount of foreign equity would be detrimental to the firm in reality, but would be measured as a *benefit* to the firm if simple average redemption rates were used to estimate theta. The passage from the AER above contends that such an artificial reduction in foreign equity may not, in reality, be detrimental to the firm – that it may have no impact on the cost of equity or consequently on the value of the firm.

205. To examine this claim from the AER, consider what would happen (in reality) if government proposed to ban or substantially limit the amount of foreign capital available. How would Australian firms react? Would they:

a. Have no comment since the restriction of foreign equity has no impact on their cost of equity or on the value of their firm; or

b. Lobby intensely to have such a "wealth destroying" proposal rejected?

206. In our view, the AER's claim that "it is not clear" that a proposal to ban or significantly limit the amount of foreign equity allowed would (in reality) "actually involve an increase in the cost of equity" is without basis. Of course it would increase the cost of equity for Australian firms, would reduce firm values, and would be roundly criticised by firms, superannuation funds, and shareholders.

[77] *Final Decision*, p.454.

Keystone 3: AER suggests that the forcible removal of foreign investment would increase the estimate of theta under *all* methodologies?

207. The AER concludes that:

> …a substitution of foreign for domestic investment in the Australian equity market [presumably the AER means this to be the other way around] should be expected to increase the equilibrium value of imputation credits…This in turn implies that theta would be expected to increase in equilibrium. Importantly, this is true under all methodologies for estimating theta (i.e. including dividend drop off studies). [78]

208. There is general agreement that if the proportion of foreign investment decreases, the simple average redemption rate must mechanically increase in the same proportion. Other things equal, this results in a proportional increase in the value of the firm.

209. But the same does not follow for techniques that use the prices of traded securities. In a traded market, investors with different levels of wealth, different degrees of risk aversion, different tax positions, and different countries of residence all trade with one another. The outcome is a market clearing price that reflects all of these individual differences being traded off against one another. The market-clearing price is the observed equilibrium outcome of all of these interactions.

210. Under the simple average redemption rate approach, we do not use any traded price, nor do we observe any equilibrium outcome. Rather, we must assume a conceptual asset pricing model, from which we seek to infer what the price of franking credits would be if we did observe trading in them. This is discussed in some detail in Section 3 above. The outcome of this approach is that, under the "model" that underlies Associate Professor Handley's work, the forcible removal of foreign investment increases the estimate of theta proportionately.

211. By contrast, under the market evidence approach we can directly observe equilibrium outcomes from trade among all market participants. The AER *assumes* that dividend drop-off estimates of theta will also increase if foreign equity is reduced. But there is no basis for this assumption. The whole point of using observed market prices of traded securities (as we do for all other WACC parameters) is so we don't have to assume – we can *observe* instead. That is, rather than use a conceptual model to apply weights to franking credits distributed to various parties, we can observe a traded market-clearing price.

212. Moreover, in our *Gamma Submission* we noted that the dividend drop-off results have been remarkably stable across different variations of the methodology and across time. The result has consistently been that the package of a dollar dividend and the associated franking credit is valued at close to a dollar. This result has remained consistent over time, even though the degree of foreign investment changes from time to time.

Summary and conclusions

213. The AER concludes that average redemption rates can be used to provide an estimate of the upper bound for theta. Under this approach we must assume a conceptual asset pricing model, from which we seek to infer what the price of franking credits would be if we did observe trading in them. This conceptual model then determines the weights that are to be applied to franking

[78] *Final Decision*, p.454.

credits distributed to various parties. The alternative approach is to observe the market-clearing price of traded securities – an equilibrium price that incorporates the complex interactions between all market participants. The main advantage of using observed market prices of traded securities is that we don't have to assume – we can *observe* instead. For this reason, using market prices of traded securities (as we do for all other WACC parameters) should be preferred to the use of redemption rates weighted according to a conceptual model.

214. The AER has based its support of weighted-average redemption rates on a number of propositions:

a. Gamma does not affect the cost of capital;

b. The forcible removal of foreign investment would (in reality) not affect the cost of capital of Australian firms; and

c. The forcible removal of foreign investment would increase the estimate of theta under *all* methodologies.

215. The first two of these propositions is false and the third is an assumption. Consequently, we conclude that there is no basis for the continued use of weighted-average redemption rates – even as an estimate of the upper bound value of theta.

7. Consistency issues

Inconsistency with MRP

216. In its *Final Decision*, the AER states that

> Consistency between gamma and the MRP is an important consideration.[79]

217. In its *Final Decision*, the AER's estimate of the market risk premium is based primarily on empirical evidence relating to historical excess market returns as set out in a series of tables prepared by Associate Professor Handley.[80] In that analysis, Associate Professor Handley takes the excess return of a stock market index over and above the yield on government bonds each year. He then "grosses up" these estimates for various assumed values of franking credits. This grossing up procedure is based on the *actual* payout ratio of Australian firms.

218. As discussed in Section 2 above, when estimating gamma the AER uses an *assumed* payout ratio of 100%.

219. In our view, consistency demands that the same payout ratio must be used throughout the WACC estimation process. It is inconsistent to use the actual observed payout ratio in one part of the WACC estimation and to use a different assumed value for the same parameter in another part of the same WACC estimation. In our view, the same actual observed empirical estimate should be used throughout the WACC estimation process.

Inconsistency with estimate of required return on equity

220. In our *SFG Consistency Report* we note that inconsistent estimates of the value of cash dividends are used in two places in the AER's reasoning:

a. The AER's empirical estimates of theta (and consequently gamma) are conditional on an estimated value of cash dividends of 75-80 cents per dollar; and

b. The AER's estimate of the required return on equity using the CAPM is conditional on cash dividends being valued at 100 cents per dollar.

AER accepts that the inconsistency exists

221. It is clear that both Handley (2008) and the AER have accepted that there is such an inconsistency:

> Handley agrees with SFG that the empirical evidence from dividend drop-off studies – that cash dividends are less than fully valued – presents an apparent inconsistency with the standard CAPM.[81]

222. Moreover, Handley (2009, p.29) notes that the AER has:

[79] Final Decision, p.456.
[80] Final Decision, p. 209 and Handley (2009), "Further comments on the historical equity risk premium."
[81] Explanatory Statement, p. 335.

a. Relied upon US dividend yield studies to conclude that dividends are valued at 100 cents per dollar in supporting its use of the standard CAPM in one step of the WACC estimation exercise; and

b. Relied upon drop-off studies to conclude that dividends are less than fully valued (75-80 cents per dollar) when estimating gamma.

223. Handley (2009, p.29) also notes that this "at first appears to be an inconsistency." He then notes that the AER is "not concerned with" this inconsistency because it is using different estimates of the value of dividends in the two different steps of its WACC estimation exercise:

> i.e. US dividend yield studies in relation to the CAPM and drop-off studies in relation to gamma.[82]

Relevance of the inconsistency

224. There is a clear inconsistency: The AER has used a different estimate of the value of cash dividends in two steps of its WACC estimation exercise. This gives rise to two questions:

a. Whether the inconsistency needs to be rectified; and

b. If it does need to be rectified, how this should be done.

225. In our view, it is effectively self-evident that such inconsistencies must be rectified. Otherwise it would be open to a regulator to use inconsistent estimates throughout the WACC estimation exercise. For example, it would be inconsistent and wrong:

a. for a regulator to estimate the risk-free rate using the yield on 5-year government bonds, but to use the yield on 10-year government bonds when estimating market risk premium; or

b. to estimate beta relative to a domestic market index, but to use a world market index when estimating market risk premium; or

c. to assume a payout ratio of 100% when estimating theta but a substantially lower payout rate when estimating market risk premium.

226. In our view, it is similarly inconsistent and wrong to set the value of cash dividends to 100 cents when estimating required return on equity, but to use an estimate of 75-80 cents when estimating gamma.

227. If, however, it *is* considered legitimate for a regulator to have inconsistent estimates of the same parameter in two steps of the same WACC estimation process and that there is nothing to constrain the regulator in this regard, then the remainder of this section is irrelevant.

Restoring consistency

228. The AER has used a different estimate of the value of cash dividends in two steps of its WACC estimation exercise. Logically, consistency is restored by using the same estimate in both steps. Logically again, there are two possibilities:

[82] Handley (2009, p. 29).

a. Use an estimate of the value of cash dividends of 100 cents in both steps of the WACC estimation; or

b. Use an estimate of the value of cash dividends of 75-80 cents in both steps of the WACC estimation.

229. If consistency is to be restored, one of these courses of action must be taken. The only question is which one. We favour the use of an estimate of 100 cents in both steps, consistent with the weight of evidence.

Dividend yield studies

230. There is general agreement that the dividend yield studies support an estimate of 100 cents.

Dividend drop-off studies

Boyd and Jagannathan (1994)

231. There is general agreement that Boyd and Jagannathan (1994) supports an estimate of 100 cents. There is also agreement that this is "an important study." [83] There is disagreement about the weight that should be applied to this study.

232. Based on advice from Associate Professor Handley, the AER places little weight on this study as it is "based primarily on an arbitrage framework." [84] The key result of this paper, for present purposes, is as follows:

> In reviewing all the empirical results, we note that marginal ex-dividend price drop is almost always one-for-one with dividends (in the cross-section). This result is obtained with a variety of different specifications and over a period of approximately 25 years.[85]

233. This conclusion is based primarily on the results in their Table 3 (p. 729) which reports results from a perfectly standard dividend drop-off analysis that has nothing whatsoever to do with any arbitrage framework. This reason for rejecting the "important" Boyd and Jagannathan study is consequently unfounded.

234. Based on further advice from Associate Professor Handley, the AER also places limited weight on this important study:

> Given that the methodology used by the authors does not reflect an equilibrium framework. [86]

235. This is also demonstrably untrue. Section 1 of the paper is called "An equilibrium model of ex-dividend share pricing," Section 1.5 is called "Equilibrium" and Figure 2 is also called "Equilibrium." Boyd and Jagganathan (1994) clearly *does* "reflect an equilibrium framework." This reason for rejecting the "important" Boyd and Jagannathan study is also unfounded.

[83] Final Decision, p. 460, 462.
[84] Final Decision, p. 460, 462.
[85] Boyd and Jagannathan (1994, p. 716).
[86] Final Decision, p.463.

236. Consequently, more weight should be applied to this important study and its conclusion that an appropriate estimate of the value of dividends is 100 cents.

Graham, Michaely, and Roberts (2003)

237. In our *SFG Consistency Report*, we noted that Graham, Michaely and Roberts (2003) present results for various dividend yield classes. We noted that one such class was for dividend events where the yield was greater than 2%. For this class, the estimate of the value of dividends is 100 cents as set out in the table below.

Excerpt from Table V of Graham, Michaely and Roberts (2003)

Dividend Yield	Statistic	Sub-period 1 (eighths)	Sub-period 2 (sixteenths)	Sub-period 3 (decimal)
>2%	Mean	0.9984	1.0016	1.0218
>2%	Median	0.9868	0.9838	0.9565

Source: Graham, Michaely and Roberts (2003) Table V p. 2627.

238. We concluded that this set of results was the most consistent with the Australian market – where the dividend yield is about 5% and firms pay dividends twice per year, so the average yield is about 2.5% per dividend payment.[87]

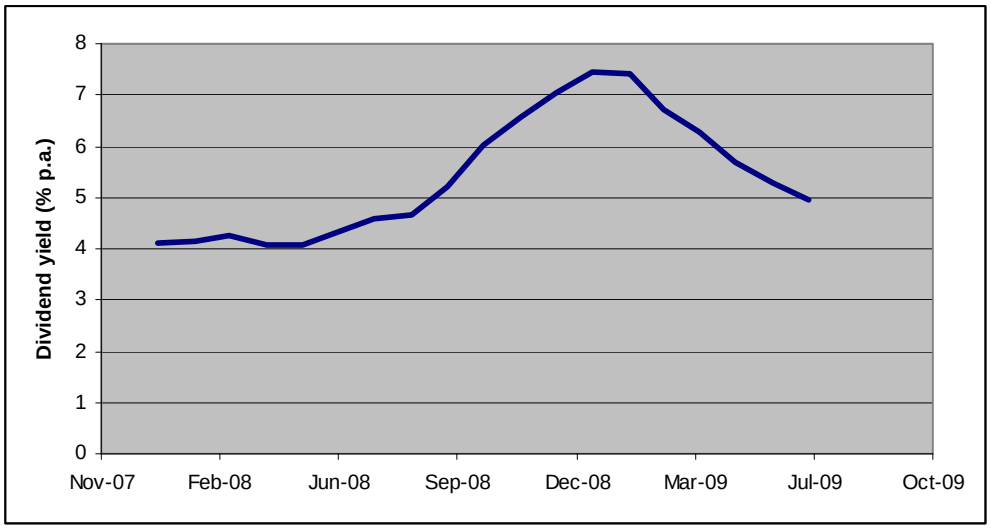
239. The AER rejects this submission for three reasons. First, the AER states that:

> SFG does not present any evidence supporting its claim that the annual dividend yield of Australian firms is 5 per cent as claimed by SFG[88]

240. Rather than reject the submission because it is not sure whether Australian dividend yields are as high as 5%, another approach would have been for the AER to check what the dividend yield on the Australian market actually is. In Figure 1 below, we present a recent time series of dividend yields obtained from the Reserve Bank of Australia. The Reserve Bank reports that as at the end of July 2009, the dividend yield on the ASX 200 index was 4.97%. At the time of writing our *SFG Consistency Report*, the dividend yield was even higher than 5%.

[87] This is somewhat of an under-estimate since some firms pay no dividends at all. That is, of those firms that do pay dividends, the average yield is higher.
[88] Final Decision, p.463.

Figure 1. Dividend yield – ASX 200 Index



Source: Reserve Bank of Australia, www.rba.gov.au.

241. The second basis for the AER dismissing this submission is an alleged inconsistency in *our* work. In this regard, the AER notes that in an earlier paper we used an estimate of 4% in a numerical example. The figure above shows that in earlier times the average dividend yield *was* about 4%. Since that time, dividend yields have increased and we have adopted a correspondingly higher figure.

242. The third basis for the AER dismissing our submission is that Graham, Michaely and Roberts (2003) do not disclose the average yield for stocks in their "greater than 2 per cent" category. We know that the yield for the average Australian firm is above 2%, so it would seem that the above 2% category would be appropriate. Conversely, the AER argues that because we don't know the mean yield of this category, we should instead use the less-than 0.5%, 0.5 to 1.0%, 1.0% to 1.5% and 1.5% to 2.0% categories as the basis for our estimate.

243. In summary, the AER's reasons for rejecting our submission in relation to this paper are curious and unfounded. We know that the yield for the average Australian firm is above 2%, so it would seem that the above 2% category would be appropriate. The results for this category support an estimate of the value of dividends of 100 cents.

A cash estimate of 100 cents

244. In our view, both of the key US dividend drop-off studies support an estimate of the value of dividends of 100 cents. As set out above, our view is that the AER's reasons for rejecting this evidence is unfounded:

a. Boyd and Jagganathan (1994) conclude that the appropriate estimate is 100 cents:

   i. The result comes from standard drop-off analysis that is not at all contaminated by any discussion of arbitrage; and

   ii. The paper is very clearly set within an equilibrium framework.

b. Graham, Michaely and Roberts (2003) conclude that the appropriate estimate is 100 cents for cases where the dividend yield is greater than 2%, which is the case for the average Australian firm:

   i. The annual dividend yield for the average Australian firm *is* around 5%, and this would have been trivial for the AER to confirm if they did not know it;

   ii. The allegation of inconsistency on our part is most odd – we previously used an estimate of about 4% at a time when the average dividend yield *was* about 4%; and

   iii. We know that the yield for the average Australian firm is above 2%, so it would seem that the above 2% category would be appropriate. Conversely, the AER argues that because we don't know the mean yield of this category, we should instead use the less-than 0.5%, 0.5 to 1.0%, 1.0% to 1.5% and 1.5% to 2.0% categories as the basis for our estimate.

245. We also note that an estimate of 100 cents is entirely consistent with the estimate from the dividend yield studies, which is generally accepted and not the subject of debate. If one accepts that the appropriate estimate of the value of cash dividends *is* 100 cents, then that estimate should be used in both steps of the WACC estimation process. This means that:

a. The standard CAPM should be used to estimate the required return on equity since that approach is based on cash dividends being valued at 100 cents; and

b. The estimate of theta (and consequently gamma) should be conditional on cash dividends being valued at 100 cents rather than conditional on them being valued at 75-80 cents. The subsequent section shows how this is easily done.

246. Conversely, if one does *not* accept that the appropriate value of cash dividends is 100 cents, then that alternative estimate should be used consistently across both steps of the WACC estimation process. In our view, it would be inconsistent and wrong to use one estimate in one step of the WACC estimation exercise and a different (inconsistent) estimate of the same parameter in another step on the same WACC estimation exercise.

Consistent implementation of a cash estimate of 100 cents

247. If one accepts that the appropriate estimate of the value of cash dividends *is* 100 cents, then that estimate should be used in both steps of the WACC estimation process. This means that:

a. The standard CAPM should be used to estimate the required return on equity since that approach is based on cash dividends being valued at 100 cents; and

b. The estimate of theta (and consequently gamma) should be conditional on cash dividends being valued at 100 cents rather than conditional on them being valued at 75-80 cents.

248. The Beggs and Skeels (2006) approach for estimating theta (and their 0.57 estimate on which the AER relies) can be summarised as set out below. The left-hand side is the stock price change over the ex-dividend day. Then 80% of the cash dividend amount is set to account for some of the stock price change, and the remainder of it is assumed to be accounted for by franking credits. The current Beggs and Skeels estimate of theta is conditional on cash dividends being valued at 80 cents in the dollar:

$$\Delta P_t = 0.8 \times Dividend_t + \theta \times FC_t .$$

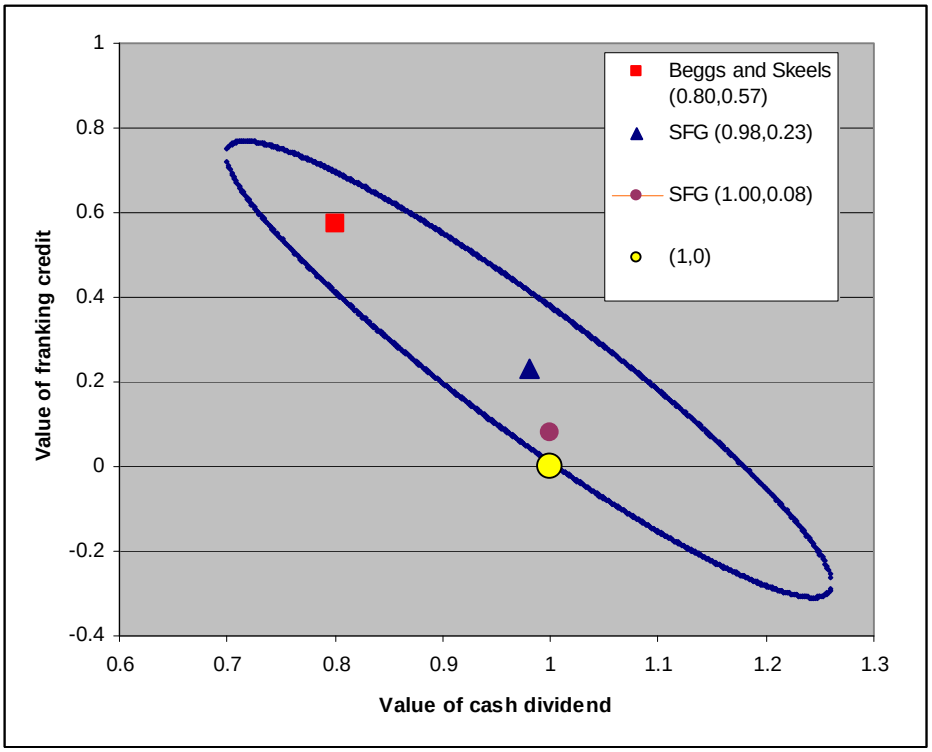
249. Applying an estimate of the value of dividends of 100 cents, consistent with the evidence above and with the other step of the WACC estimation process, is straightforward as set out below. This will, of course, result in a different estimate of theta:

$$\Delta P_t = 1.0 \times Dividend_t + \theta^* \times FC_t .$$

250. We have re-estimated theta conditional on cash dividends being valued at 100 cents in the dollar. This has been done using the same data set, same tax rates, and same methodology that was the subject of the recent review of our work by Professor Skeels. We have simply estimated theta conditional on cash dividends being valued at 100 cents, with the remainder being attributable to franking credits. The resulting estimate of theta is 0.079, with standard error of 0.047. The *t*-statistic is 1.69, indicating that the estimate of theta is not significantly different from zero.

251. Next, we compute a joint confidence region as described in Greene (1993) pp. 190-191.[89] This joint confidence region shows the pairs of parameter estimates (value of cash dividends and value of franking credits) that fit the data equally well. Specifically, any pair of parameter estimates inside the joint confidence region fit the data equally well – there is no statistically significant difference in their ability to fit the data. We plot the joint confidence region in Figure 2 below.

Figure 2. Joint confidence interval



[89] Greene shows that the joint confidence region is that set of values $\beta = (\beta_1, \beta_2)'$ for which $\frac{1}{2}(b-\beta)'\Omega^{-1}(b-\beta)$ is less than the critical value of $F[2, n-K]$, where b represents the parameter estimates, Ω is the estimated covariance matrix of the relevant parameters, n is the number of observations in the sample, and K is the number of parameters being estimated.

252. Figure 2 shows that our estimate of theta that is conditional on cash dividends being valued at 100 cents per dollar fits the data just as well as an "unconstrained" estimate that values cash dividends at less than 100 cents and ascribes positive value to franking credits. Our CAPM-consistent estimate of theta (that is conditional on cash dividends being valued at 100 cents) is 0.079. This estimate has co-ordinates (1.00, 0.08) above.[90] Our "unconstrained" estimate is (0.98, 0.23). The Beggs and Skeels (1996) post-2000 estimate is (0.80, 0.57). All of these points are shown in Figure 2 and all are within the joint confidence region. That is, all of these combinations of (a) the value of cash dividends, and (b) theta fit the data equally well. One can choose any of these combinations and fit the data just as well as any other combination. The usual criterion of statistical significance cannot discriminate between any of these combinations. What can discriminate between them is that some of them are consistent with the standard CAPM and some are not. Those points for which the value of cash dividends is 1.00 are consistent with the CAPM (which is based on this value) and others are not.

253. We also note that an estimate of 100 cents for cash dividends and zero for franking credits fits the data just as well as any of the other combinations in the joint confidence region. That is, the market practice approach adopted by valuation professionals fits the data just as well as the Beggs and Skeels estimate or any other unconstrained estimate. In other words, restricting the value of cash dividends to be 100 cents (to be consistent with the use of the standard CAPM and with the empirical evidence set out above) has an insignificant effect on the ability of the dividend drop-off model to fit the data. This CAPM-consistent estimate fits the data just as well, so nothing is being given up by using it. What is gained by using it is consistency with the use of the standard CAPM.

Summary and conclusions

254. We note that the AER assumes a payout rate of 100% when estimating gamma, but adopts the lower actual payout rate of Australian firms when estimating market risk premium.

255. Inconsistent estimates of the value of cash dividends are used in two places in the AER's reasoning:

a. The AER's empirical estimates of theta (and consequently gamma) are conditional on an estimated value of cash dividends of 75-80 cents per dollar; and

b. The AER's estimate of the required return on equity using the CAPM is conditional on cash dividends being valued at 100 cents per dollar.

256. In our view, the estimate of 100 cents per dollar should be used consistently throughout the WACC estimation process. This is because:

a. Dividend yield studies are consistent with an estimate of 100 cents;

b. The relevant and important dividend drop-off studies are consistent with an estimate of 100 cents; and

c. An estimate of 100 cents (and the corresponding estimate of the value of franking credits) fits the Australian data just as well as the 80 cent estimate (and its corresponding estimate of the value of franking credits) reported by Beggs and Skeels (2006).

[90] We have rounded co-ordinates to two decimal places.

8. General observations

Reasonableness of AER upper bound

257. Associate Professor Handley concludes that

> A reasonable estimate of gamma is within the range 0.3 to 0.7[91]

258. Logically, then, it follows that Associate Professor Handley considers any estimates from outside this range to be unreasonable.

259. The AER's final estimate of 0.65 is obtained by applying 50% weight to its "lower bound estimate" of 0.57 and its "upper bound estimate" of 0.74. That is, 50% of the AER's final conclusion is based on an estimate (0.74) that Associate Professor Handley considers to be unreasonable.

Logical consistency

260. The weighted-average redemption rate estimate of 0.74 has never been proposed as anything other than as "and upper bound estimate" of theta. By contrast the dividend drop-off estimate is a point estimate.[92] The AER then selects its final estimate of theta as the mid-point between an upper bound and a point estimate. Clearly this must result in an upward bias.

Rationality of foreign investors

261. Gamma does affect share prices and the value of the firm. The calculations set out in Paragraph 52 that a positive value of gamma leads to the share price and the value of the firm being higher than it would otherwise be. The increase in the share price is simply the capitalised value of all future franking credits. That is, to the extent that gamma is greater than zero, shareholders are assumed to receive some benefit from franking credits and they are assumed to pay the present value of that benefit in the form of a higher share price.

262. Of course, foreign investors obtain no benefit from franking credits. Yet, to the extent that gamma is greater than zero they are assumed to pay for franking credits. In our view, it is incumbent upon anyone proposing to assume that gamma is greater than zero to explain why foreign investors would pay for franking credits that they cannot use.

[91] Handley (2009, p.41).

[92] As discussed above, it is of course a point estimate *conditional* upon a particular value of cash dividends and there are a range of consistency issues associated with that. We put them aside here, noting that the resulting estimate is a point estimate and not an upper or lower bound.

9. Prevailing conditions in the market for funds

National gas law requirements

263. The National Gas Rule (NGR) 87(1) requires that:

> The rate of return on capital is to be commensurate with prevailing conditions in the market for funds and the risk involved in providing the Reference Service.[93]

264. Consequently, the allowed return must be commensurate with the return that is required to attract funds, given the prevailing conditions in the market. This raises questions about how the terms "funds" and "market" should be interpreted – specifically in relation to the gamma parameter, which is the focus of this report.

265. The first consideration in this regard is that the gamma parameter applies to the cost of equity only and not to the cost of debt. The role of gamma is as an estimate of how franking credits affect the return that equity investors require from the firm. Consequently, when considering the gamma parameter, "funds" must refer to equity capital.

266. Second, the reference to "risk" in r. 87(1) of the NGR is not directly relevant to the consideration of the gamma parameter – risk is more an issue for the estimation of beta. In summary, the assumed value of gamma must simply be commensurate with prevailing conditions in the market for equity capital.

267. Finally, the term "market" could be interpreted in different ways. For example, as

a. the market for equity capital generally; or

b. the market for equity capital available to gas pipeline businesses.

268. The reference to "benchmark levels of efficiency" in the next section of the NGR (r. 87 (2)) indicates that the latter definition of market is intended. This is confirmed by the standard regulatory practice (followed by the AER) of estimating beta, gearing levels, and credit ratings for a standard benchmark firm in the relevant industry.

269. In summary, in relation to the gamma parameter, rule 87(1) of the NGR requires that the assumed value must be commensurate with the prevailing conditions in relation to the provision of equity capital to gas pipeline businesses. This requires the consideration of the extent to which providers of equity capital to gas pipeline businesses (under the prevailing conditions) make an adjustment to the return that they require to reflect an assumed value of franking credits.

The precise role of gamma

270. Under the Officer (1994) CAPM-WACC framework, gamma plays the role of determining how much of the total return required by equity holders (which is estimated using the CAPM) must be provided by the firm, and how much is provided by government (via the tax system) in the form of franking credits.

[93] National Gas Rules Version 2, Rule 87 (1)

271. The required return on equity, r_e, is first estimated using the CAPM. This is the total return that is required to induce equity holders to invest the required amount of equity capital. Officer (1994) has shown that in a dividend imputation tax system, the estimate of the cost of equity must be adjusted as follows:

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

where T is the Australian corporate tax rate and γ is the assumed value of franking credits to the relevant shareholder.

272. The first task is to understand the source and role of this adjustment. This is best done in the context of an example. Consider an Australian company that earns a pre-tax profit of $100, pays $30 corporate tax in Australia, and then pays the remaining $70 to its shareholder.[94] The shareholder will then receive a $70 dividend plus a $30 franking credit. This is because under Australian tax law, every dollar of fully-franked dividends (paid out of profits that have been taxed in Australia) has a franking credit of $\frac{T}{1-T}$ attached to it. In this case we have franking credits of:

$$70\frac{0.3}{1-0.3}=30.$$

273. Further suppose that the shareholder receiving this $30 franking credit values it at $15. This implies a value of gamma of 0.5, which we use only for illustrative purposes. We summarise this information below.

Item	Dollar Value	Symbol
Corporate Level		
Company Profit	100	1
Corporate Tax	(30)	(T)
After Tax Profit	70	$(1-T)$
Shareholder Level		
Dividend Received	70	$(1-T)$
Franking Credit Received	30	T [95]
Value of Franking Credit to Shareholder	15	γT
Total Value of Fully-Franked Dividend	85	$(1-T)+\gamma T$

274. In this case, the shareholder values the fully-franked dividend at $85. $70 of cash is provided by the firm, and $15 of value is provided by the government via the tax system. Using our general

[94] For the moment we will ignore debt and focus only on equity financing to illustrate the point.

[95] $T=(1-T)\times\frac{T}{(1-T)}$. That is, take the dividend of $(1-T)$ and multiply by the amount of franking credits that are attached to each dollar of fully-franked dividends.

symbols, the shareholder receives a package of dividends plus franking credits that has a total value of $(1-T)+\gamma T$. Of this, the firm contributes $(1-T)$ and government contributes the remaining γT. Thus, the proportion of the shareholder's total return that must be generated by the firm is:

$$\frac{1-T}{(1-T)+\gamma T} = \frac{1-T}{1-T(1-\gamma)}.$$

275. This simple example serves to explain the derivation of the adjustment to the estimated required return on equity above. The CAPM provides an estimate of the total required return on equity. The proportion of this total return that is provided by the firm is:

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

with the remainder assumed to come in the form of franking credits.

276. For a corporate tax rate of 30% and gamma of 0.65, the proportion of the total equilibrium return that is assumed to come from the firm is 78%, with the remaining 22% of the total equilibrium required return coming from franking credits.

Prevailing conditions in the market for equity capital

277. Table 1 below shows the substantial individual equity holdings of foreign entities in Australian energy infrastructure firms. From this table, it is clear that under the prevailing conditions in the market for equity capital, a substantial amount of that equity capital is provided by foreign entities. Moreover, additional amounts are provided by foreign institutions and funds, and by foreign individuals via direct investment in Australian shares. The conclusion to be drawn from this is that under the prevailing conditions in the market, a substantial amount of the equity capital for a gas pipeline business will come from offshore.

Table 2. AER assumption about distribution of franking credits

Company	Business description	Foreign Equity Ownership
Jemena	Gas pipelines and gas and electricity distribution	Singapore Power International (100%)
APA Group	Portfolio of major gas pipeline assets including Goldfields, Moomba-Sydney, and Roma-Brisbane pipelines.	Petronas Australia Pty Ltd, wholly-owned subsidiary of Petronas Malaysia (14.06%)
QGC	QGC owns several pipeline assets throughout Australia including the Windibri, Kenya, and Northern Corridor pipelines.	BG Overseas Holdings Limited (9.84%)
Envestra	Extensive gas distribution network.	Cheung Kong Infrastructure Holdings Limited (18.4%)
Energy World Corporation	Energy World Corporation, through one of its wholly owned subsidiaries owns a 9km spur pipeline in the Northern Territory.	Energy World International (26.88%)
Westside Corporation Limited	Westside owns and operates gas pipelines on its tenements in the Bowen Basin and Galilee Basin.	PT Bumi Resources TBK (20.2%)
SP AusNet	Electricity distribution network	Singapore Power International (51%).
CitiPower	Electricity distribution network	Hong Kong Electric (27.93%); Cheung Kong Infrastructure Holdings Limited (23.07%)
Powercor	Electricity distribution network	Hong Kong Electric (27.93%); Cheung Kong Infrastructure Holdings Limited (23.07%)
ETSA Utilities	Electricity distribution network	Hong Kong Electric (27.93%); Cheung Kong Infrastructure Holdings Limited (23.07%)

Effect on non-residents of setting gamma above zero

278. The analysis above establishes that:

a. The CAPM provides an estimate of the total return that is required by equity holders in a market equilibrium;

b. For a corporate tax rate of 30% and gamma of 0.65, 22% of that total return is assumed to come in the form of franking credits; and

c. Since non-residents cannot utilise franking credits, they receive a return on equity that is 22% below the equilibrium required return from the CAPM.

Conclusions

279. Consequently, if gamma is set above zero, it is impossible for non-resident equity holders to be able to obtain the CAPM equilibrium required return on equity from a regulated asset. This raises the question of whether the allowed return can be considered to be commensurate with the prevailing conditions in the market for funds, when a substantial proportion of the providers of those funds are unable to earn the equilibrium required return (as calculated by the regulatory authority itself).

10. Final conclusions and recommendations

280. We conclude that:

a. The prevailing market practice is to set gamma to zero or, equivalently, to make no adjustment to the WACC in relation to any assumed value of franking credits; and

b. The prevailing market evidence supports a value of gamma within the range of 0 to 0.23. In our view the weight of market evidence supports a point estimate of 0 and that there is no market evidence to support any estimate above 0.23.

281. Our conclusions in relation to the empirical market evidence are based on reasons that are set out in the JIA's submissions on this issue (which we believe have been erroneously rejected by the AER) and the reasons set out in the body of this report. The most important of these reasons are:

a. The franking credit distribution rate cannot be 100% as the AER assumes. Moreover, the franking credit distribution rate *is not* 100%, it is 71%. It is the empirical estimate of the distribution rate that should be used to estimate gamma, not an assumed theoretical value that cannot possibly hold true in practice;

b. The CAPM requires that dividends be valued at 100 cents per dollar. When this constraint is imposed on the estimation process, estimates of theta are insignificantly different from zero. That is, CAPM-consistent estimates of theta are insignificantly different from zero;

c. If consistency with the CAPM is not required, the best available unconstrained estimate is 0.23. This estimate uses the Beggs-Skeels methodology applied to an updated data sample that has been "cleaned" of any concerns documented by the AER. It has also been endorsed by Assoc. Prof. Skeels. It is, however, conditional on cash dividends being valued at less than 100 cents per dollar, so is inconsistent with the value of cash dividends that is used in the CAPM;

d. Aggregate tax statistics tell us nothing about the effect that franking credits have on the corporate cost of capital. It is obvious that franking credits that are distributed to residents will be redeemed and those that are distributed to non-residents cannot be redeemed. Tax statistics tells us nothing, other than that a substantial portion of shares in Australian companies are owned by non-resident investors. As explained in this report, this tells us nothing about the market value of franking credits or how they might affect the corporate cost of capital.

e. Consequently, if gamma is set above zero, it is impossible for non-resident equity holders to be able to obtain the CAPM equilibrium required return on equity from a regulated asset. This raises the question of whether the allowed return can be considered to be commensurate with the prevailing conditions in the market for funds, when a substantial proportion of the providers of those funds are unable to earn the equilibrium required return (as calculated by the regulatory authority itself).

282. In summary:

a. The highest currently available empirical estimate of gamma is 0.23. This estimate is obtained by applying the Beggs-Skeels methodology to an updated data set. It is based on:

i. an assumed distribution rate of 100%, whereas the actual distribution rate is 71%; and

ii. a value of cash dividends that is less than 100 cents per dollar and is therefore inconsistent with the use of the CAPM.

b. If the empirical estimate of the distribution rate is used, the estimate of gamma becomes $\gamma = F \times \theta = 0.71 \times 0.23 = 0.16$;

c. If the value of cash dividends is set so as to be consistent with the CAPM, the estimate of gamma is insignificantly different from zero.

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