Issues relating to the estimation of gamma

Report prepared for CitiPower, Jemena Electricity Networks, Powercor, SP-Ausnet and United Energy Distribution.

15 July 2010

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Executive summary and conclusions

Instructions

1. The Strategic Finance Group: SFG Consulting (SFG) has been engaged by CitiPower, Jemena Electricity Networks, Powercor, SP-Ausnet and United Energy Distribution to provide a response to the Australian Energy Regulator's (AER's) *Draft decision: Victorian electricity distribution network service providers distribution determination 2011 to 2015* in relation to the estimation of the gamma parameter.

2. Specifically, we have been engaged to provide a response to:

   a. The AER's Final decision: Queensland distribution determination 2010-11 to 2014-15 (*QLD Final Decision*);

   b. The AER's Final decision: SA distribution determination 2010-11 to 2014-15 (*SA Final Decision*);

   c. The report prepared by Associate Professor Handley, dated 19 March 2010, and titled "On the Estimation of Gamma" (*Handley Report*);

   d. The report prepared by Professor Michael McKenzie and Associate Professor Graham Partington, dated 25 March 2010, and titled "Evidence and Submissions on Gamma" (*McKenzie and Partington Report*); and

   e. The AER's Draft decision: Victorian electricity distribution network service providers distribution determination 2011 to 2015 (*Victorian Draft Decision*);

3. We note that we have previously made a number of submissions in relation to the gamma parameter as part of the AER's WACC Review. We have also made two submissions to the AER since the publication of the AER's Electricity Distribution Draft Decisions for Queensland and South Australia:

   a. A report submitted on behalf of ENERGEX Ltd and Ergon Energy, dated 7 December 2009 and titled "Gamma: Further evidence to support departure from the AER's Statement of Regulatory Intent" (*SFG Queensland Draft Submission*);

   b. A report submitted on behalf of ETSA Utilities, dated 13 January 2010 and titled "Response to AER Draft Determination in relation to gamma" (*SFG SA Draft Submission*);

   c. A report submitted on behalf of ETSA Utilities, dated 4 February 2010 and titled "Further analysis in response to AER Draft Determination in relation to gamma" (*SFG SA Supplementary Submission*).

Conclusions

Distribution rate

4. The AER overrides the empirical estimate of 71% with an assumed value of 100%. Our main conclusions on this point are:

a. The two reasons proposed by the AER[1] in support of its theoretical assumption are inconsistent with one another;

b. The AER suggests that it must impose a distribution rate of 100% to be consistent with the perpetuity assumption of Officer (1994). However, economic models are designed to be calibrated to real-world data, not to have theoretical assumptions imposed on them, and this is exactly what Officer himself shows in the Appendix to his paper;

c. The AER suggests that it must impose a distribution rate of 100% to be consistent with the perpetuities used in the post-tax revenue model (PTRM).[2] However, none of the cash flows in the PTRM *are* perpetuities;

d. The AER suggests that retained credits are just as valuable to shareholders as those that have been distributed. This would require that they are distributed a short time after being retained. But the mechanisms by which the AER suggests this can be accomplished are already includes in the empirical estimate of 71%.[3] Consequently, the distribution of retained credits would require the development of *new* mechanisms and is inconsistent with observed practice. This would also be inconsistent with the fact that the balance of retained credits has already grown to over $150 billion;

e. Submissions before the AER on the logical impossibility of routinely distributing retained credits in a timely manner have not been addressed by the AER. The SFG Report of 7 December 2009 shows that retained credits can only be distributed if Australian firms on average distribute more than 100% of their earnings as dividends, which is not logically possible. The AER has not addressed this point or explained how it maintains its assumption about the routine distribution of retained credits in light of it.[4]

The SFG dividend drop-off study

5. The AER has used Beggs and Skeels (2006) as its only dividend drop-off estimate of theta, placing zero weight on the SFG estimate. During the course of this regulatory process, the AER has raised various concerns with the SFG data. Each time, the concern has been addressed by SFG either by removing any observations in question or by conducting a sensitivity analysis to demonstrate that the results are robust. In reviewing the SFG work, Skeels himself concludes that many of the criticisms raised by the AER were little more than allusions to potential problems with the SFG analysis and that in some cases the allusions were ill-founded and readily dismissed. Skeels then concluded that the SFG estimate is the best that is currently available.

6. In each subsequent determination, the AER has set out a new set of concerns with the SFG study. The QLD and SA Final Decisions now set out two reasons for the AER's rejection of the SFG study:[5]

a. The AER concludes that "within the same sub-sample period of 1 July 2000 to 1 May 2004, the SFG study produces significantly different results to the Beggs and Skeels (2006) study. For this reason the AER considers that either the SFG study's methodology is likely to materially differ substantially from Beggs and Skeels' (2006) methodology." However,

[1] QLD Final Decision, p. 217; SA Final Decision, pp. 149-150; Victorian Draft Decision, p. 535.
[2] QLD Final Decision, p. 217; SA Final Decision, p. 149; Victorian Draft Decision, p. 535, 537.
[3] SA Final Decision, p. 151; Victorian Draft Decision, p. 536.
[4] QLD Final Decision, p. 218; SA Final Decision, pp. 150-151; Victorian Draft Decision, p. 534.
[5] QLD Final Decision, pp. 224-225.

1.

i. The SFG report of 1 February 2009 shows that the SFG estimates of theta and the value of cash dividends are *not* statistically significantly different from the corresponding estimates in Beggs and Skeels (2006)[6];

ii. There is no need for the AER to *infer* anything about the methodology employed in the SFG study. The AER has been supplied with all of the computer code used in the SFG study and has had this reviewed by its consultants. Moreover, Skeels himself has attested to the robustness of the SFG work;

iii. Even if the SFG results *were* different from the Beggs and Skeels results, this does not, in itself, imply that the SFG results should be given no weight. The Beggs and Skeels data and computer code have not been reviewed by anyone (including any journal referee) whereas every data point and all of the computer code for the SFG study has been made available to the AER.

b. The AER cites a new set of empirical issues raised in a new report by McKenzie and Partington.[7] Our conclusions in relation to those issues are:

i. There is no need to make any adjustment to the SFG data set in relation to zero drop-off observations unless those observations are shown to be erroneous;

ii. It would be wrong to make any adjustment in relation to negative drop-off observations as this would introduce a statistical bias;

iii. The AER's interpretation of the audit of the SFG data is wrong;

iv. Mackenzie and Partington draw attention to negative regression intercepts. None of these apply to the post-2000 period and are therefore irrelevant;

v. A joint confidence interval is the appropriate way to deal with possible multicollinearity. This shows all the pairs of the estimate of the value of cash dividends and theta that fit the data equally well. Whichever pair of estimates is selected should be used consistently throughout the determination.

Use of tax statistics

7. The AER has interpreted an estimate of the franking credit redemption rate as an estimate of theta. Our conclusions on this point are:

a. This interpretation goes against the advice of the AER's consultant (Handley) who recommends that the tax statistics estimate be used as an upper bound for gamma rather than as a point estimate of gamma;[8]

b. The AER makes an implicit assumption that investors who redeem franking credits all value them at 100% of face value. This is inconsistent with the fact that the AER estimates the value of cash dividends to be only 80% of face value; and

[6] See Paragraphs 69 to 70 below.

2. [7] SA Final Decision, pp. 152-161; Victorian Draft Decision, pp. 542-550.

[8] SA Final Decision, p. 161; Victorian Draft Decision, p. 538.

c. The AER interprets the average of two upper bound estimates as being a point estimate, which is illogical.

Market practice

8. There is broad agreement that the general market practice is to make no adjustment (to either the discount rate or the cash flows) in relation to franking credits when estimating WACC or valuing companies or assets. The only disagreement is about *why* practitioners make no adjustment.

9. Handley (pp. 3-10) argues that practitioners may be using an approach that differs from that used by the AER and that this practitioner approach bypasses the need to estimate gamma entirely. If such an approach was being commonly used by practitioners, it would be straightforward for the AER to test the reasonableness of its estimate of gamma by comparing *its* estimate of the cost of equity (which is conditional on its estimate of gamma) with the *practitioner* estimate of the cost of equity (which is estimated directly, bypassing the need to estimate gamma). If the AER's estimate (which is conditional on its estimate of gamma) is materially different from the practitioner estimate, it would be apparent that the AER's estimate of gamma must be materially inconsistent with market practice. This would surely be an important consideration, particularly in light of the fact that the AER's estimate of gamma has proven to be the most controversial of all of its WACC parameter estimates.

10. Such a comparison[9] reveals that the AER's estimate of the cost of equity is substantially lower than the practitioner estimate, indicating that the AER's estimate of gamma must be substantially higher than that implied by market practice.

11. It is then a straightforward matter to determine what adjustment in relation to gamma would be consistent with market practice. This would require that gamma be set to 0.09.

Consistency with CAPM

12. The issue here is 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 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.

13. It is clear that both Handley and the AER have accepted that there is such an inconsistency.[10] There remains disagreement about what needs to be done about this.

a. In our view, it is inconsistent and wrong to use different values for the same parameter in two parts of the WACC estimation – to set the value of cash dividends to 100 cents when estimating the required return on equity, but to use an estimate of 80 cents when estimating gamma.

b. The Handley/AER view is that it *is* legitimate for a regulator to have inconsistent estimates of the same parameter in two steps of the same WACC estimation process, so long as the

[9] Set out in Paragraphs 153 to 157 below.
[10] Explanatory Statement, p. 335.

regulator can find a different piece of empirical evidence to support each of the two different estimates.[11]

[11] Set out in Paragraphs 173 to 174 below.

Distribution rate

Points of agreement

14. The distribution rate (F) is the proportion of all franking credits created in a given year that are distributed to shareholders in that year. The AER accepts that the best available estimate of the actual distribution rate is 71%:

> In the WACC Review, the AER considered that a reasonable estimate of the annual payout ratio is the market average of 71 per cent…[12]

and

> In both the draft decision and the WACC review, the AER considered the payout ratio in any one year is approximately 71 per cent…[13]

and

> The AER also notes Handley's advice that the general consensus is the observed payout ratio in any one year is approximately 70 per cent…[14]

AER Decisions

15. In its QLD and SA Final Decisions and the Victorian Draft Decision, the AER has assumed a distribution rate of 100%, overriding the empirical estimate of 71%.

16. The QLD Final Decision (p. 217), the SA Final Decision (pp. 149-150), and the Victorian Draft Decision (p. 535) posit two reasons for assuming a distribution rate other than the best empirical estimate of 71%:

    a. *There are no retained credits*: The AER argues that a 100% distribution rate must be used in order to be consistent with the perpetuity assumptions of the mathematical derivations in Officer (1994) and its Post Tax Revenue Model (PTRM); and

    b. *There are retained credits*: The AER argues that the franking credits that are not distributed to shareholders are just as valuable as those that are, in which case the distribution rate is effectively irrelevant.

Inconsistency in the AER's reasoning

17. These two reasons that are used by the AER to justify its assumed 100% distribution rate are clearly inconsistent with one another.

18. The first reason refers to Officer (1994), which is the academic paper that first derived the WACC equations in a dividend imputation setting. In that paper, Officer assumes perpetual cash flows to simplify the mathematical derivation of the WACC formulas. Under the assumption of perpetual cash flows, a firm's revenues will be the same every year forever, costs will be the same every year forever, and so on. In the argument in Paragraph 16.a above, Handley and the AER

[12] Vic Draft Decision, p. 533.
[13] Qld Final Decision, p. 218.
[14] Qld Final Decision, p. 218.

conclude that if cash flows are going to be the same every year forever, there is no point in retaining franking credits and indeed all earnings and all franking credits must be distributed every year. This is equivalent to assuming that 100% of earnings are paid out as a dividend every year and that there can be no capital gains.

19. This also suggests that the regulatory process must operate within the hypothetical perpetuity world that is used to simplify the mathematical derivations in Officer (1994). It also suggests that in circumstances in which empirical estimates from the real world conflict with the assumptions of the hypothetical world, the hypothetical assumptions must be imposed. This, it is argued, means that we must assume that all credits are distributed to shareholders as soon as they are created and that no credits whatsoever are ever retained.

20. By contrast, the second reason is based on the notion that there *are* in fact retained credits, and that these retained credits are every bit as valuable as those that have been distributed. Handley and the AER note that the existence of retained credits that may be capitalised (to some extent) into stock prices is consistent with the Monkhouse framework, in which the mathematical derivations are based on the assumption that cash flows are *not* perpetuities.

21. That is, the first reason is based around the argument that no franking credits can ever be retained, whereas the second centres around the valuation of retained franking credits. In summary, the first reason requires us to impose the assumption of perpetual cash flows and to estimate parameters as they would be if in fact all cash flows actually were perpetuities – overriding actual empirical estimates if required. The second reason requires the assumption that cash flows are *not* perpetuities, and is centred around the value of retained credits – which cannot even exist under the first reason.

22. Consequently, it is not logically possible for both of these reasons to stand together.

Consistency with Officer (1994)

23. Officer (1994) develops an economic model. Like all economic models, this one begins with a set of unrealistic simplifying assumptions. These assumptions simplify the mathematical derivations in the paper and enable a relatively simple mathematical formula for WACC to be derived. Standard practice would then be to calibrate the parameters in the final WACC formula to real world data and then to use the results in practice.

24. It is certainly not the case that economic models can only be applied in settings that perfectly conform to the assumptions that were used to derive the model. If this were the case, no economic model would have any practical application and the terms "assumptions" and "model" would be misnomers. Rather, in economic models the assumptions are used to simplify the mathematical derivation and the resulting formula is then calibrated to real world data and used in real world applications.

25. This is exactly the approach taken by Officer himself in the very paper that derives the WACC formula. In that paper, Officer sets out an example of how the model should be applied in the real world. In that detailed example, the firm creates 13.58 franking credits and distributes 10.38 of them – a distribution rate of $F = 76\%$. It is clear from Officer (1994) that the model was designed to be applied to real world settings and calibrated to real world data – as is the case for all other economic models.

26. Moreover, this is exactly what the AER itself does. The AER applies the WACC derived from the Officer model in its PTRM. In the PTRM, *no* cash flows are perpetuities, but the AER still

uses the Officer WACC to determine the required return on capital. The AER also recognises the existence of retained credits in its second reason for setting the distribution rate to 100%, which the AER itself says is inconsistent with a perpetuity assumption. Moreover, the AER recognises capital gains when estimating MRP,[15] whereas capital gains cannot exist under the perpetuity assumption used by Officer to simplify his mathematical derivations.

27. The AER also uses an economic model in a real world setting that does not conform to the assumptions that were used to derive the model when it uses the CAPM to estimate the required return on equity. The CAPM is another economic model that is derived in a theoretical world and is based on a number of simplifying assumptions. This enables the CAPM formula to be derived.[16] The AER then applies the resulting CAPM formula to a real world setting using empirical estimates from real world data to calibrate the model parameters. The AER estimates the CAPM parameters as they are in the real world, not as they would be in the hypothetical world of assumptions that was used to simplify the mathematical derivations that lead up to the final CAPM formula.

28. In our view, the WACC formula should be applied in the same way as all other economic models are applied – the parameters should be calibrated to real world data and estimated as they are in the real world, not as they would be in the hypothetical world of assumptions that was used to simplify the mathematical derivations that lead up to the final formula. In particular, the distribution rate should be estimated using empirical data from the real world, rather than assuming a hypothetical value.

Consistency with Post Tax Revenue Model (PTRM)

29. The AER also argues (QLD Final Decision p. 217; SA Final Decision p. 149; Victorian Draft Decision, p. 535, 537) that its assumption of a 100% distribution rate "…is consistent with the PTRM, which assumes cash flows to perpetuity…"

30. In fact, none of the cash flows in the PTRM are perpetuities. On the contrary, all of the cash flows in the PTRM take different values in every year of the regulatory control period.

Value of retained credits

Logically impossible to routinely distribute retained credits

31. In the alternative, the AER argues that retained credits are just as valuable to investors as those that have been distributed. The basis for this conclusion is that those credits that have been retained in one year will be distributed to investors soon after. Consequently, it is argued, the time value loss is negligible and retained credits are approximately as valuable to investors as those that have already been distributed.

32. Handley (p. 37) suggests that "investment bankers and or potential corporate raiders" will come up with some means to unlock the value of these retained credits. The AER (SA Final Decision, p. 151; Victorian Draft Decision, p. 536) has assumed that this could be done via three means:

    a. Off-market buy-backs;

[15] In all of the determinations set out in Paragraph 2, the AER's primary estimate of MRP is based on an historical analysis of stock index returns, which include dividends and capital gains.

[16] The most important assumption underlying the CAPM is that of a single period. The CAPM assumes that investors are endowed with some initial wealth, trade with each other, wait until the end of the single period, receive a payoff from their assets, which they consume and then die. This single period assumption is unrealistic, but it allows the CAPM formula to be derived.

b. Dividend reinvestment plans; and

c. Special dividends.

33. But there are several problems with this view:

a. All three of these mechanisms are *already* included in the 71% distribution rate. The 71% figure is the ratio of (i) the total amount of franking credits distributed via any means including those set out above, to (ii) the total amount of franking credits created;

b. In any event, the mechanisms set out above are small in the overall scheme of things. For example, less than 10 off-market buybacks occur in an average year;

c. The amount of "special" distributions for the average firm would be enormous. For the average Australian firm distributing $71 of franking credits in a given year, an *additional* $58 in special distributions would have to be made every second year just to keep the franking account balance from building up. This is an extraordinarily large amount of special distributions and there is no evidence that *any* firm has ever distributed anything like this amount of special dividends, much less that the *average* firm does this; and

d. The only available evidence on this issue suggests that firms are *not* able to routinely distribute all of their franking credits, but rather that franking account balances are growing to huge amounts over time as more and more credits are retained within the firm. Handley (p. 36) notes that at the end of 2007, no less than $150 billion of unused retained franking credits were locked inside firms and McKenzie and Partington note (p. 27) that "the tendency has been for the total of franking account balances to rise through time." Hathaway (2010, p. 2) reports that the amount of undistributed franking credits had increased to $174 billion by 2009.

34. It appears to be logically impossible for retained franking credits to be routinely distributed soon after their retention. In our view, there is no basis for the conclusion that retained credits are just as valuable as those that have already been distributed.

Time value loss in retained credits

35. To see why retained credits must be routinely distributed in a timely way to have any substantial value, first note that, by way of example, money loses more than half of its value every seven years if the appropriate discount rate is 11% (corresponding approximately to the AER's estimate of the cost of equity). That is:

$$\frac{1}{(1.11)^7} = 0.48\,.$$

36. If the discount rate is 6% (corresponding approximately to the risk free rate), money loses more than a third of its value every seven years.

37. Consequently, retained franking credits would lose a substantial portion of their value if retained for seven or more years. Any assumption of them having a substantial value would, therefore, have to be based on an explanation of the mechanism by which they could be routinely distributed soon after their retention. This in turn requires an explanation of why we should

expect the average firm to be able to do this in the future, when the evidence shows that it has not been able to do this in the past.

No basis for concluding that retained credits are as valuable as distributed credits

38. In the SA Final Decision and Victorian Draft Decision, the AER states that it does not know when retained credits might be distributed:

> The AER notes that it is uncertain exactly how long firms are likely to retain imputation credits.[17]

39. In the QLD Final Decision, however, the AER concludes that retained credits are likely to be distributed five years after their retention:

> …the AER acknowledges that a retention period of five years may be more appropriate (e.g. a retention period consistent with the term of the risk-free rate).[18]

40. First, the retention period has nothing whatsoever to do with the term of the risk-free rate – the retention period depends on the dividend policy of the average firm, which is clearly independent of any assumption the AER might make about the appropriate value of F.

41. Moreover, as set out above, it is logically impossible for the average Australian firm to routinely distribute all retained credits within five years. Further, if the average firm actually did distribute its retained credits five years later, the estimated distribution rate would be 100% – reflecting the distribution of 71% of the credits that were created that year and the distribution of 29% of the credits that were created five years ago.

42. Finally, even if the average firm did distribute the 29% of retained credits five years later, and even if it was appropriate to discount these credits at the risk-free rate (approximately 6%), the retained credits still lose more than 25% of their value. Even on the AER's own analysis, an absolute upper bound for the value of retained credits is 75% of the value of distributed credits. In light of this it is unclear how the AER can persist with its assumption that retained credits are valued at 100% of the value of distributed credits.

Previous submission not addressed by AER

43. The AER recognises the previous SFG submission[19] on the logical impossibility of firms being able to routinely distribute retained credits in a timely manner:

> SFG stated if a payout ratio of 71 per cent is assumed, it is impossible for retained credits to be routinely distributed between one and five years after they are created.[20]

44. The QLD Final Decision makes no further reference to this submission and does not explain if and why the AER considers it to be wrong.

[17] Victorian Draft Decision, p. 537; SA Final Decision, p. 151.
[18] QLD Final Decision, p. 219.
[19] SFG Report of 7 December 2009.
[20] QLD Final Decision, p. 218.

45. The SA Final Decision (pp. 150-151) and Victorian Draft Decision (p. 534) also note the previous SFG submission on the logical impossibility of the routine timely distribution of retained credits. The AER's response is that timely distribution can be achieved via off-market buy backs, dividend reinvestment plans and special dividends. Again, these are already included in the existing 71% distribution rate. If these mechanisms were maintained at the same rate as in the past, 29% of the franking credits created each year would be added to the store of tens of billions of dollars of existing retained credits. This means that the extent to which these mechanisms are used would have to increase dramatically in order to fully distribute the franking credits that are newly created each year. Moreover, these disbursements would fall short of the distribution of even one dollar of historically retained credits. Consequently, there is no basis for the AER's conclusion about mechanisms being available to distribute stored franking credits.

46. If it is logically impossible for the average firm to routinely distribute retained franking credits soon after they are retained (which it is), then it is also logically impossible for retained credits to be valued just as highly as those that have been distributed to shareholders.

Miscellaneous issues

Empirical evidence

47. In the SA Final Decision (p. 151) and Victorian Draft Decision (p. 537), the AER states that it "is not aware of any reliable empirical research on the retention period for retained imputation credits." But this is exactly what the 71% distribution rate is. Year after year after year the average firm pays out only 71% of the franking credits that it creates – even after we account for off market buybacks, dividend reinvestment plans and special dividends. This is why there were $150 billion of retained credits in 2007 and why McKenzie and Partington note (p. 27) that "the tendency has been for the total of franking account balances to rise through time."

Mis-interpretation of advice

48. In the SA Final Decision (p. 151) and Victorian Draft Decision (p. 537), the AER states that "McKenzie and Partington noted that a payout ratio of between 70 per cent and 100 per cent is appropriate." But McKenzie and Partington (p. 27) are quite clear to the extent that retained credits are assumed to have value (i.e., to the extent that a number above 70% is used) the AER must use "a higher cost base [RAB], or a higher cost of capital, for investments financed from retained earnings." That is, the AER has used one half of this piece of advice and ignored the advice about the logical consequences that flow from it. If retained credits do have material value, capital expenditure financed from retained earnings prevents (or at least delays) the distribution of those credits and consequently retained earnings becomes a more expensive source of finance than new equity. McKenzie and Partington suggest that the AER should account for this (to the extent that it decides that retained credits do have value) by adjusting the RAB or using two different costs of equity. The AER has decided that retained credits are just as valuable as those that have been distributed, but it makes no compensating adjustment to the RAB, nor does it apply two different costs of equity.

Studies on the value of retained earnings

49. In the QLD Final Decision (p. 218) the AER "notes McKenzie and Partington's advice that empirical evidence from Hubbard and Kemsley (2001), and Ricketts and Wilkinson (2008) supported the view that retained imputation credits have positive value."

50. The paper cited by McKenzie and Partington is actually Harris, Hubbard and Kemsley (2001), which is one of a group of papers written by these co-authors using a technique that they have developed to estimate whether markets value retained earnings more or less than new equity.

51. This empirical methodology is based on a modification to the Residual Income model of Ohlson (1995) that is developed in a series of papers beginning with Harris and Kemsley (1999) and including Collins and Kemsley (2000) and Harris, Hubbard and Kemsley (2001).

52. This empirical methodology has subsequently been discredited in a series of papers, including Hanlon, Myers, and Shevlin (2003) and Dhaliwal, Erickson, Frank and Banyi (2003), both of which are published in the top-ranked *Journal of Accounting and Economics*.

53. Hanlon et. al. conclude that "the model, tests, and results in Harris and Kemsley are non-diagnostic regarding dividend tax capitalization." That is, the results say nothing at all about the extent to which dividend taxes or tax credits might be capitalised into stock prices. They explain the reason for this as follows:

> …the HK empirical specification examines the relative weights on book value and net income as a function of the ratio of retained earnings to book value (REBV). We analytically examine the use of REBV in the Ohlson (1995) model and find it has no role in the determination of firm value, even in a world where shareholder-level taxes are fully capitalized.[21]

54. That is, even if shareholder level dividend taxes were fully capitalized into prices, the key variable that is the centre of the proposed methodology is irrelevant to firm value. This means that the results which are cited in McKenzie and Partington and relied upon by the AER are meaningless.[22]

55. Hanlon et. al. also note that Dhaliwal et. al. (2003) reach similar conclusions – that the Harris et. al. test is "non-diagnostic with respect to dividend tax capitalization" and that the results reported in the Harris et. al. studies "are not robust to reasonable alternative design choices."[23]

[21] Hanlon, Myers, and Shevlin (2003, p. 121).
[22] QLD Final Decision, p. 218.
[23] p. 121.

Estimation issues in relation to the SFG study

Context and current AER views

56. The first iteration of the SFG study applied a number of variations of the dividend drop-off methodology to data from a number of different time periods. The AER then determined that it preferred the Beggs and Skeels methodology and the post-2000 time period. Consequently, the versions of the SFG study now under consideration apply:

    a. the same methodology as Beggs and Skeels; to

    b. the post-2000 data set;

    c. updated to include more recent data.

57. During the course of this regulatory process, the AER has raised various concerns with the SFG data. Each time, the concern has been addressed by SFG either by removing any observations in question or by conducting a sensitivity analysis to demonstrate that the results are robust. (For example, the AER suggested that special dividends may differ from ordinary dividends, and a sensitivity analysis shows that the results are not materially different whether special dividends are included or excluded).

58. Moreover, some of these concerns have turned out to be unfounded. For example, in the SA Draft Determination the SFG study was criticized for not making an adjustment in relation to the stock market crash that occurred on Friday 24 September 1986. A simple check reveals that 24 September 1986 was a Wednesday, not a Friday, and the market *rose*. It is also a date that is clearly before July 2000, when the SFG data set begins.

59. In this regard, Skeels concludes 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.[24]

60. In each subsequent determination, the AER has set out a new set of concerns with the SFG study. For example, in the SA Final Decision the AER (p. 160) sets out the list of issues that it raised in the SA Draft Decision and notes that SFG have responded to each of these in detail. The AER does *not* say that it has any remaining concerns in relation to any of these issues. Rather, the AER concludes that the additional SFG analysis does not address some *new* concerns that have been identified for the Final Decision.

61. The QLD Final Decision (pp. 224-225) sets out two reasons for the AER's rejection of the SFG study – an alleged inconsistency with one of the results from Beggs and Skeels (2006) and a new

[24] Skeels (2009), p. 5.

set of empirical issues raised in a new report by McKenzie and Partington. Each of these is dealt with in separate sub-sections below.

62. The SA Final Decision (pp. 152-161) and Victorian Draft Decision (pp. 542-550) refer to a series of issues that are raised in the McKenzie and Partington report. The majority of these are issues that one must have regard to whenever analyzing any sort of actual market data. Moreover, these issues all apply equally to any dividend drop-off study – not just to the SFG study. All of these issues are addressed below.

Provision of data

63. We note that every data point and all of the computer code used in the SFG study has been supplied to the AER and has also been examined by the AER's consultants. The AER has confirmed that the computer code, when applied to the data supplied, produces the results that are set out in the SFG study.

64. By contrast, the AER has not been provided with any data or any computer code for either of the studies on which it relies and none of this information has been provided to any of the businesses that are regulated by the AER. The QLD Final Determination states that:

> The AER notes that Energex requested the underlying data from the Handley and Maheswaran (2008) tax statistics study. Ideally, the AER would prefer that the underlying data be made public. However, due to the proprietary nature of the data used by Handley and Maheswaran, the AER has been unable to obtain the underlying data. The AER also notes that it has been unable to obtain the underlying data from the Beggs and Skeels (2006) dividend drop-off study for similar reasons.[25]

65. The Handley and Maheswaran data is not proprietary – it has been obtained from a publicly available web site provided by the Australian Taxation Office. Anyone with internet access can obtain this same data. The only thing that is proprietary about the Handley and Maheswaran study is the computer code that applies the various assumptions that they make when processing the data. The intellectual property in that computer code is owned by Handley and Maheswaran, who could make it available to the AER, but who have chosen not to. The fact that the Handley and Maheswaran study has been published does not affect their ownership of this computer code.

66. We are not aware of any legitimate reason why this information should be withheld from the regulated businesses that are materially affected by it.

67. The QLD Final Determination further states that:

> The AER considers that the process of review before an academic journal article can be published is robust and therefore the study can be reasonably relied upon.[26]

68. The academic review process does not involve the referee being provided with any data or any computer code. Consequently, none of the Handley and Maheswaran data and none of their

[25] QLD Final Determination, p. 229.
[26] QLD Final Determination, p. 229.

computer code would have been checked (or even seen) by anyone as part of the journal review process.

Alleged inconsistency with Beggs and Skeels

69. In its QLD Final Determination the AER concludes that the SFG estimate of theta is unreliable because:

> Within the same sub-sample period of 1 July 2000 to 1 May 2004, the SFG study produces significantly different results to the Beggs and Skeels (2006) study. For this reason the AER considers that the SFG study's methodology is likely to materially differ substantially from Beggs and Skeels' (2006) methodology.[27]

70. There are a number of problems with this conclusion:

a. The SFG report of 1 February 2009 shows that the SFG estimates of theta and the value of cash dividends are *not* statistically significantly different from the corresponding estimates in Beggs and Skeels (2006).[28] See Table 1, p. 8;

b. There is no need for the AER to *infer* anything about the methodology employed in the SFG study. The AER has been supplied with all of the computer code used in the SFG study and has had this reviewed by its consultants. Consequently the AER already *knows* exactly what methodology is used in the SFG study and this methodology is identical to that employed by Beggs and Skeels. The SFG computer code has also been reviewed by Skeels, confirming this. For example, Skeels (2009, p.9) notes that "the SFG study follows Beggs and Skeels (2006) using a Feasible Generalised Least Squares (FGLS) estimator to obtain coefficient estimates" for the dividend drop-off regression equation that is further set out in detail in the Skeels Report;

c. Even if the SFG results *were* different from the Beggs and Skeels results, this does not, in itself, imply that the SFG results should be given no weight. The Beggs and Skeels data and computer code have not been reviewed by anyone (including any journal referee) whereas every data point and all of the computer code for the SFG study has been made available to the AER. In this regard, we note that McKenzie and Partington have advised the AER that (p. 4) "we would recommend a broader range of studies to triangulate the evidence considered by the AER" and (p.11) that "It would be unwise, therefore, to rely on one ex-dividend study to determine theta.";

d. Finally, the relevant sample period is to 10 May 2004.

New issues raised in the McKenzie and Partington report

71. The McKenzie and Partington (MP) report sets out a number of issues that one should consider whenever performing an empirical study using financial market data. Many of the points raised by MP apply to *all* empirical work – they are issues that researchers must take into consideration whenever performing any kind of empirical analysis on market data. Some of the points raised by MP apply more specifically to dividend drop-off analysis. These points apply equally to the Beggs and Skeels and SFG studies as both studies employ the same methodology and use the

[27] QLD Final Determination, pp. 222-223.
[28] Applying the standard definition of statistical significance.

same type of data. In addition, Skeels, who has access to the data and computer code for both studies, clearly believes this to be the case.

72. The AER specifically mentions a number of issues raised in the MP report when reaching its conclusion that the Beggs and Skeels results should receive 100% weight and the SFG study should receive zero weight when estimating theta from market data. The remainder of this sub-section examines each of those issues in turn.

Zero drop-offs

73. MP note that the raw data sample used by SFG contains 177 (out of more than 3,000) observations where the price does not change over the ex-dividend date. That is, the last traded price prior to the ex-date and the closing price on the ex-date are the same. MP state (p. 38) that this is "higher than would be expected." The AER states that MP "advised that this is an abnormally high number of zero observations."[29]

74. The first point to note here is that no empirical evidence has been provided to support the contention that this figure is "higher than would be expected" or "abnormally high." Logically, there are two possibilities here:

a. There are errors in the SFG data; or

b. MP's expectation about the likely number of zero drop-offs (the basis for which is never explained) is lower than that which occurs in the actual data.

75. The second point to note is that MP have all of the SFG data. They have a full description of the details of all of the 177 observations in question. It would be a simple task for them to check to determine whether any of these 177 observations are in error. It would have been even simpler for the AER to have asked MP to perform this task. Clearly, MP have the capability of performing this simple task – two pages later in Table 3 of their report they show the results of a much more complicated analysis of the dividend to spread ratio.

Negative drop-offs

76. MP also note (p.38) that the raw data sample used by SFG contains 433 negative drop-offs. This occurs when the stock price increases over the ex-dividend date. On average, one would expect the stock price to decline on the ex-dividend date, as the dividend separates from the share. However, this need not occur in every case – there may be positive news in relation to the stock that more than offsets the decline that would otherwise have occurred in relation to the dividend.

77. MP conclude (p. 38) that "Where the sample accorded to its theoretical ideal, there would be no negative or zero market adjusted price movements in the data" and that "their presence may act to bias the sample estimates downwards." If this is meant to imply that one should remove them from the data set, it is exactly wrong. Removing them will *create* a bias. To see why this is the case, consider a sample of firms that all pay $1 dividends and suppose that the expected drop-off is $1. But also suppose that around this expected drop-off of $1, there is some purely random noise (ε), so that the actual drop-off is:

$$\text{Actual Drop - off} = \text{Expected Drop - off} + \varepsilon .$$

[29] SA Final Decision, p. 151.

Now suppose that ε is equally likely to take the value of -2, -1, 0, 1, or 2, in which case it has an expected value of zero which is consistent with it being purely random noise. In this case, 20% of the sample will have an observed drop-off of -1 (i.e., the expected drop-off of 1 and a random error of -2), 20% of the sample will have an observed drop-off of 0 (i.e., the expected drop-off of 1 and a random error of -1), and so on. The average actual drop-off will be:

$$\text{Average Actual Drop - off} = 0.2\times -1 + 0.2\times 0 + 0.2\times 1 + 0.2\times 2 + 0.2\times 3 = 1,$$

so the average actual drop-off provides an accurate and unbiased estimate of the expected drop-off.

78. Now consider what would happen if zero and negative drop-offs were eliminated from the sample. In the example above, 40% of the sample would be eliminated and the average actual drop-off of the remaining observations will be:

$$\text{Average Actual Drop - off} = 0.33\times 1 + 0.33\times 2 + 0.33\times 3 = 2,$$

and the estimate is biased upward.

79. This might explain why (p. 10) the estimates obtained by Truong and Partington (2006) are "higher than in most ex-dividend studies."

AER conclusions on negative and zero drop-offs

80. In the SA Final Decision, the AER concludes that:

> The AER also notes the combined number of negative and zero observations in SFG's filtered data set is high. McKenzie and Partington advised that almost 20 per cent of SFG's filtered data set comprise zero or negative observations.
>
> These data issues contribute to the AER's concerns about the reliability of the SFG study. Therefore, the AFR confirms the draft decision that the Beggs and Skeels (2006) study provides the most reliable estimate of theta from market prices.[30]

81. As set out above, it would be wrong to routinely omit zero or negative drop-off observations. Such observations should only be omitted if they are erroneous, and there is no evidence of that. Moreover, the AER does not know the extent of negative and zero drop-offs in the Beggs and Skeels study, so there is no basis for preferring the Beggs and Skeels study to the SFG study on this issue.

Data sampling and acceptability rates

82. One of the tasks that was performed in response to the SA Draft Decision was a random audit of a sample of observations. SFG examined a random sample of 150 observations. We cross-referenced every aspect of the data (share prices, dividend amount, ex-dates, etc) to alternate data bases to confirm that the details were correct in all respects. We also examined all company announcements around the ex-date for any hint of a price sensitive announcement that might affect the stock price. In this respect we were deliberately very conservative and included 14

[30] SA Final Determination, p.159.

observations that could even remotely possibly have contained price-sensitive announcements. We then re-computed the results without these observations and the final results were almost identical.

83. The AER describes the 14 observations as being "unreliable."[31] This is a substantial mis-interpretation of the exercise. They are not unreliable, they are the set of observations for which there is even a remote possibility of a price-sensitive announcement anywhere near the ex-date – and their removal makes no difference to the estimate of theta.

84. Moreover, there is no evidence to suggest any bias would be caused by including even observations with a substantial price-sensitive announcement on the ex-date itself. In a large sample, it is likely that the sample will contain some positive and some negative news announcements and these will tend to cancel out. In this regard we note that Beggs and Skeels have not screened out observations on the basis of stock exchange announcements being made around the time of the ex-dividend date.[32]

Intercepts

85. McKenzie and Partington (p. 50) state that "In theory, the regression equation intercept term in a dividend drop off study may be zero or negative…" McKenzie and Partington have been provided with every data item and the full set of computer code that produced the SFG estimates. They state (p. 50) that their replication of the SFG results "provides clear evidence that the intercept coefficients are statistically significant and vary in sign. The presence of positive and significant intercepts is unexpected based on a-priori theory…".

86. The AER then concludes that "MacKenzie and Partington found a statistically significant intercept term which was not reported by SFG. The AER notes that the combined value of cash dividends and imputation credits may therefore be underestimated by the coefficient estimates in the SFG study." [33]

87. The implication that the SFG study had hidden the existence of a positive intercept is odd, given that all of the data and computer code had been supplied to the AER, along with repeated offers to answer any questions or address any concerns that the AER or its consultants might have had. SFG do not report intercept values because Beggs and Skeels do not report intercept values.

88. The "positive intercept term" that "confirms the AER's concerns about the reliability of the SFG study" relates to data from prior to July 2000. All of the intercept terms from the analysis of post 2000 data are negative. The latest estimates that were provided to the AER appeared in the SFG Report of 4 February 2010. That report contained two tables. In each table, the post July 2000 estimates are shaded in grey. The intercept values for each case are set out in the tables below.

[31] SA Final Decision, p. 156; Victorian Draft Decision, p. 547.

[32] Beggs and Skeels Appendix 2 sets out the data screening that is applied to their sample. They screen out observations with incomplete information, small companies, special dividends, capitalization changes and data from October 1987. There is no screen in relation to company announcements around the ex-dividend date.

[33] SA Final Decision, p. 158.

Table 1. No additional observations eliminated because of contemporaneous price-sensitive information

	January 2010 submission (middle column) Intercept (Standard error)	Correction of 1 dividend and addition of 14 missing observations Intercept (Standard error)	Elimination of 130 special dividends Intercept (Standard error)
Panel (i): SIRCA reported A$ dividend estimates			
1 Jul 00 – 30 Sep 06	-0.00759 (0.00229)	-0.00776 (0.00228)	-0.00872 (0.00230)
Panel (ii): A$ dividend estimates derived from RBA reported exchange rates			
1 Jul 00 – 30 Sep 06	-0.00757 (0.00229)	-0.00776 (0.00228)	-0.00868 (0.00230)

Table 2. Additional observations eliminated because of contemporaneous price-sensitive information

	January 2010 submission (middle column) Intercept (Standard error)	Correction of 1 dividend and addition of 14 missing observations Intercept (Standard error)	Elimination of 130 special dividends Intercept (Standard error)
Panel (i): SIRCA reported A$ dividend estimates			
1 Jul 00 – 30 Sep 06	-0.00750 (0.00230)	-0.00746 (0.00228)	-0.00835 (0.00230)
Panel (ii): A$ dividend estimates derived from RBA reported exchange rates			
1 Jul 00 – 30 Sep 06	-0.00748 (0.00230)	-0.00744 (0.00229)	-0.00831 (0.00231)

89. All of the intercepts for the relevant period are negative and statistically significant. This operates to *increase* the combined value of dividends and franking credits.

Filtering of outliers

90. In the Victorian Draft Decision (p. 548) the AER discusses the use of Cook's D statistic to filter out a small number of influential outliers. The AER concludes that "the use of Cook's D statistic is less reliable than the methodology used by Beggs and Skeels" who "filtered data ex ante using economic criteria."

91. Cook's D statistic is one of a number of standard statistical techniques for identifying influential outliers in a data set. It is easy to implement and transparent, but it is not the only possible means of filtering outliers. The AER prefers the "ex ante economic criteria" used by Beggs and Skeels. Appendix 2 of Beggs and Skeels (2006) sets out the criteria that they adopted as follows:

a. Small firms (less than 0.03% of the capitalization of the market index) are filtered out;

b. Observations for which capitalization change occurred within five days of the ex-dividend date are filtered out;

c. Special dividends are filtered out;

d. Ex-dividend dates in October 1987 are filtered out (although this is not relevant as the focus is on post-2000 data in this case).

92. All of the SFG dividend drop-off analyses filter out small firms (using the same definition as used by Beggs and Skeels) and firms for which there was a capitalization change. We have subsequently provided the AER with estimates including and excluding special dividends.

93. We have also provided the AER with estimates that do not filter outliers based on the Cook's D statistic. Rather, we identify influential outliers and then examine each identified point individually. This examination involves manual checking of every identified data point for errors in the dividend record (cross-referencing dividend amounts and ex dates to alternative data sources) and for possible price sensitive announcements close to the ex-dividend date. We then only filtered out observations that were identified as contaminated in some way. This analysis was provided to the AER in our report of 4 February 2010. It confirms the robustness of our theta estimate of 0.23 when special dividends are included. The removal of special dividends from the sample results in a lower estimate of 0.13.

Miscellaneous data issues

94. In the Victorian Draft Decision (pp. 549-50) the AER sets out a number of miscellaneous data issues as follows:

a. Dividend announcements tend to be clustered in time;

b. Thinly traded stocks may not fully reflect market valuation;

c. Bid-ask spreads may affect the measurement of returns; and

d. Price sensitive information may affect returns.

95. Dividend drop-off analysis is based on ex-dividend dates not dividend announcements, but these are also clustered in time. This, of course, is equally an issue for all dividend drop-off studies.

96. The other three issues apply whenever stock market data is used – they apply whenever returns are being measured. Consequently, these issues apply to estimates of beta and market risk premium. One can either recognise the potential for these issues to arise and take actions to mitigate their effect (e.g., by using a large sample to average out or dampen any noise that might arise from these issues) or select parameter values without reference to market data.

Multicollinearity

Issue

97. Multicollinearity can occur in regression analysis when the independent (right-hand side) variables are correlated. In the case at hand, the general form of the regression model is:

$$\Delta P_t = \alpha \times Dividend_t + \theta \times FC_t + \varepsilon_t$$

where ΔP_t represents the stock price change over the ex-dividend day, $Dividend_t$ represents the amount of the dividend, FC_t represents the amount of the franking credit, α represents the

relative amount of the price change that can be attributed to the cash dividend, and θ represents the relative amount of the price change that can be attributed to the franking credit. In the case at hand, the dividend and the franking credit are positively correlated. Indeed, for fully franked dividends the franking credit is a constant multiple (0.43)[34] of the dividend.

98. When multicollinearity occurs, the combined value of the variables in question can be reliably estimated, but it may be difficult to reliably separate this combined value into the component pieces. If multicollinearity occurs in the dividend drop-off setting, one could reliably estimate $\left[\alpha \times Dividend_t + \theta \times FC_t\right]$, but it may be difficult to separately estimate α and θ.

99. There is no formal statistical test that either confirms or rejects the presence of multicollinearity. Rather this is a matter of degree requiring judgment. If there are concerns about the presence of multicollinearity, the combined value of the relevant variables can be reliably estimated but additional analysis (as set out below) should be performed when separately estimating the component pieces.

Relevant results

100. Under a 30% corporate tax rate, a one dollar fully-franked dividend has a 43 cent franking credit attached to it. The previous SFG Reports have made the point that the market values the combined package of a $1.00 dividend and a 43 cent franking credit at $1.00. This result has been consistently reported using various different variations of the drop-off methodology, across different time periods, different company types and sizes, and by different authors including Hathaway and Officer (1997, 2004), Beggs and Skeels (2006) and SFG (2008-10).

101. McKenzie and Partington note (p. 10) that "Much less variability is observed for the combined value of the package of dividends and franking credits," and that "for fully-franked dividends this value [the combined value of the $1.00 dividend and the 43 cent franking credit] tends to cluster around 100% of the face value of the dividends [$1.00]."

102. The question then becomes one of separating this combined value of $1.00 into its component pieces – how much should be attributed to the $1.00 cash dividend and how much should be attributed to the 43 cent franking credit.

Possible solutions

103. One possibility is to use an approach that does not require the combined value to be disaggregated. Such an approach has been developed by Dempsey and Partington (2008). If the combined value is set to $1.00 and undistributed credits are assumed to have negligible value, the Dempsey and Partington approach is equivalent to setting gamma to 0 in the standard approach. If retained franking credits are considered to have significant value the Dempsey and Partington approach requires a different return on retained earnings than on new equity and a revision to the RAB to the extent that any earnings are retained.

104. The alternative approach is to select separate values for α and θ. SFG has provided a joint confidence interval for α and θ showing all of the pairs of these values that fit the data equally well, applying the usual standards of statistical significance. This joint confidence interval is also reliably estimated as it is based on the combined value of the dividend and franking credit.

[34] 0.43 = 0.3/0.7.

105. Statistically speaking, any pair of parameter estimates from within this confidence interval is as good as any other. But there are two additional considerations:

a. The pair of values that is selected must not violate common sense. For example, Handley (p.31) suggests that one might consider an estimate of 0.72 for cash dividends and 0.78 for franking credits. It cannot possibly be the case that franking credits are more valuable than cash dividends for any investor, so this pairing is simply infeasible; and

b. The pair of values that is selected must be used consistently throughout the WACC estimation process. That is, it would be inconsistent and wrong to use one pair of values in one part of the WACC formula and another pair of values in a different place in the same WACC formula.

106. This still leaves a number of viable combinations. In cases such as this, it is common to look for other (exogenous) evidence to guide the choice about which pair of estimates to select. In the case at hand, two proposals have been put forward:

a. SFG suggests that we might fix the value of cash dividends to be 100 cents per dollar on the basis that:

i. This is what is done when using the standard CAPM to estimate r_e in another part of the WACC formula; and

ii. There is some empirical evidence from US drop-off studies (where there are no franking credits, so we have a direct estimate of the value of the cash dividend) that cash dividends are fully valued; and

b. The AER prefers to adopt a value of 80 cents for the value of cash dividends on the basis that:

i. This is the value reported by Beggs and Skeels (albeit potentially affected by multicollinearity); and

ii. There is other evidence from US drop-off studies to suggest that cash dividends are less than fully valued.

107. Either of these approaches is justified given the data that is available. The key point, however, is that whatever pair of parameter values is selected must be applied consistently throughout the WACC estimation process. It would be inconsistent and wrong to use one pair of values in one part of the WACC formula and another pair of values in a different place in the same WACC formula.

Interpretation of results

108. If multicollinearity is a concern for the SFG study it is equally a concern for the Beggs and Skeels study as both use the same econometric procedure applied to the same type of data.

109. The AER concludes that "the only reason perfect multicollinearity does not occur in SFG's dataset is because of changes in corporate tax rates and regimes."[35] This is clearly wrong. There are no changes in tax rates in our data set at all. The AER has previously decided that only post

[35] SA Final Decision, p. 158.

July 2000 data is relevant, so that is what we have used. Over the entire period, the corporate tax rate was 30%.

110. Rather, perfect multicollinearity is broken by the inclusion of partially-franked and unfranked dividends. Consequently it is irrelevant to estimate the correlation between cash dividends and franking credits for the sub-sample of fully-franked dividends, as the AER does to support its conclusion that multicollinearity is a concern.[36] This would be like an anti-discrimination commissioner consciously selecting a sub-sample of male workers in a firm, and then concluding that discrimination is occurring because female workers were under-represented.

[36] SA Final Decision, p. 152.

Use of tax statistics

Approach

111. The tax statistics approach is to estimate the ratio of (a) the total amount of franking credits redeemed in a given year, to (b) the total amount of franking credits that were created in a given year. That is, it is a measure of the extent to which franking credits are redeemed. The AER estimates this to be 0.74, based on a paper by Handley and Maheswaran (2008).

112. We note that in the post-2000 period, Handley and Maheswaran do not *measure* the actual amount of franking credits that are redeemed, but rather *assume* that all franking credits distributed to residents will be redeemed.

Upper bound

Advice from Handley

113. Handley suggests that tax statistics provide an *upper bound* for theta. He does not suggest that this approach provides an *estimate* of theta. Moreover, Handley and Maheswaran (2008) do not claim anywhere in their paper that the tax statistics approach provides an estimate of gamma (or theta) and the title of their paper (and the abstract) make it clear that the paper is about the efficacy of the imputation system (i.e., the extent to which franking credits are *used*) and not about how franking credits might be *valued* or about the impact that imputation might have on the corporate cost of capital.

114. Taking the AER/Handley estimate of 0.74 implies that, on average, 74% of the franking credits that are distributed to shareholders end up being redeemed. But this tells us nothing about the *value* of those franking credits to the shareholders that redeem them.

115. Now suppose, for example, that 74% of all shareholders were residents who valued franking credits at 10 cents per dollar. What proportion of franking credits would we expect to see being redeemed? 74% of course – the resident investors may as well redeem their franking credits, as 10 cents is better than nothing. That is, observing how many franking credits get redeemed tells us nothing about their value to investors and certainly nothing about their effect on the corporate cost of capital.

116. Handley and Maheswaran (2006) and Handley's reports to the AER[37] state that tax statistics do not provide "an estimate of gamma," but rather an "upper bound for gamma." The reason for this is that the tax statistics establish that 26% of shareholders do not value franking credits at all as they allow them to lapse without being redeemed.[38] The remaining 74% of shareholders presumably do value franking credits, but the tax statistics provide no indication of what this value might be. It could be 100 cents or 1 cent. Under the Handley approach, assuming 100 cents provides an upper bound of 0.74 and assuming 1 cent provides a lower bound of essentially zero. That is, the Handley approach simply narrows the range for theta to 0 to 0.74 – it provides no indication of the appropriate value from within that range.

[37] Most recently, for example, Handley's report of 19 March 2010, p. 15.

[38] This point is about the proper *interpretation* of the Handley and Maheswaran estimates, so we take their reported estimates (as adopted by the AER) at face value here.

117. To see this further, note that Handley considers it appropriate to take a weighted average of the value of franking credits to each investor. That is, if 74% of investors value their franking credits at 100% of face value and 26% value them at zero, the weighted average is $0.74 \times 1 + 0.26 \times 0 = 0.74$. But we would also see 74% of franking credits being redeemed if residents only valued them at 10 cents in the dollar, in which case the relevant estimate of theta using this approach would be $0.74 \times 0.1 + 0.26 \times 0 = 0.074$. It is for this reason that Handley is clear about redemption rates providing an *upper bound* and not an *estimate* of theta. The only thing the tax statistics can do is to narrow the range for theta to 0 to 0.74 – they provide no indication of the appropriate value from within that range.

Problems with the AER's conclusion

118. In the SA Final Decision (p. 161) and Victorian Draft Decision (p. 538) the AER is clear that it now rejects Handley's assessment of redemption rates providing an upper bound for theta, and that redemption rates should be treated as an *estimate* of theta. The implicit assumption here is that franking credits distributed to residents are valued at 100 cents in the dollar. There are two problems with this assumption:

a. There is no basis for it (and it is inconsistent with the advice of its consultant); and

b. It is unreasonable in light of the fact that the AER values cash dividends at 80 cents per dollar. It is not possible that any investor would value a dollar of franking credits more than a dollar of cash.

AER confusion

119. It is apparent in the SA Final Decision that the AER has misunderstood the point that is being made about tax credits providing an estimate of the upper bound for theta. The AER says that:

> the AER also noted that the 0.74 estimate of theta by Handley and Maheswaran (2008) was not an upper bound on the reasonable range of estimates for theta, based on tax statistics. As noted in the draft decision, and consistent with the WACC review, the AER considers that a reasonable range of estimates for theta based on tax statistics is 0.67 to 0.81 and a point estimate of 0.74 is a reasonable point estimate for theta based on tax statistics.[39]

120. That is, the AER has examined the estimates from two different sub-periods in the Handley and Maheswaran study:

a. The first sub-period provides an upper bound estimate of 0.67 – thus the possible range for theta is narrowed to between 0 and 0.67;

b. The second sub-period provides an upper bound estimate of 0.81 – thus the possible range for theta is narrowed to between 0 and 0.81.

121. The AER then takes an average of the two upper bounds and interprets this as a point estimate, which is clearly illogical. If someone buys a Gold Lotto ticket, they might win anything from zero to $10 million. If they buy a Powerball ticket, they might win anything from zero to $20

[39] SA Final Decision, p. 161.

million. This does not imply that the person should expect to win $15 million on average when they buy lottery tickets. Upper bounds cannot be averaged to obtain expected outcomes.

McKenzie and Partington views

122. We note that McKenzie and Partington (p. 3) are of the view that "taxation studies present an entirely different set of measurement problems and their indirect approach to estimating gamma makes them intuitively less appealing." McKenzie and Partington go on to conclude that the AER should have some regard to the taxation studies, but they do not indicate whether the AER should consider them to provide an upper bound or a point estimate of theta.

Use of weighted averages

123. The tax statistics approach takes a weighted average over investors, where the weights are set according to the relative wealth of each investor. For example, the AER concludes that 74% of investors value franking credits at 100% of face value and that 26% of investors do not value franking credits at all, and then takes a weighted average as follows:

$$0.74 \times 1 + 0.26 \times 0 = 0.74$$

124. A number of authors have derived models in which required returns depend upon a weighted-average of investors in the market. The SFG Report of 7 December 2009 notes that all of these models requires a closed system:

> Any form of the CAPM requires that:
>
> (a) The *m* investors must, between them, hold 100% of the *n* assets in the economy; and
>
> (b) The *m* investors own nothing other than the *n* assets.
>
> 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.[40]

125. Handley (p. 14) claims that his "conclusions have been based on the standard setup for CAPM based models (as referenced to Brennan (1992) and Brennan (1970))." This is not true. These papers, and indeed *all* papers that derive any sort of CAPM equilibrium, use a standard market clearing condition to derive the equilibrium required return. These derivations require a closed system in which all of the investors own all of the assets.[41] But this is not the case under the Handley approach, wherein investors inside the model have the opportunity of investing outside the model.

126. Handley (p.13) solves this problem by making an "implicit assumption" that "no other assets matter and no other investors matter and so can be ignored." That is, he solves the problem by assuming that it is not a problem. But the whole point of this issue is that other assets and investors clearly *do* matter.

[40] SFG Report of 7 December 2009, p. 3.

[41] The relevant derivations are set out in more detail in the SFG Report of 7 December 2009 at Paragraphs 87-103.

127. For example, the AER has determined that investors require a return of 10.84% before they will supply sufficient equity capital to the benchmark distribution business and that 2.37% of this comes in the form of franking credits. Consequently, non-resident investors will receive a return of only 8.47%. Now consider a non-resident investor who faces the choice between:

a. investing in the benchmark distribution business in Australia for a return of 8.47%; or

b. investing in a comparable business outside Australia for a return of 10.84% (or indeed anything above 8.47%).

128. In practice, the existence of a comparable investment offering a higher return will be an important consideration for this investor and these comparisons across all available assets are included in the market clearing condition in all standard asset pricing models. Under the Handley approach, however, we must assume that investors make no such comparisons, and that these alternative investments are ignored when foreign investors contemplate investing in Australia.

129. If one considers that regulated prices should be set in Australia on the basis that foreign investors will provide equity capital to Australian firms without considering the returns available on comparable investments elsewhere, the Handley approach is appropriate. If, however, one considers that such comparisons would be an important consideration for foreign investors, the Handley approach of assuming this away must be rejected and weighted-average redemption rates cannot be used as an estimate of theta.

Market practice

Points of agreement

130. There appears to be broad agreement that the general market practice is to make no adjustment (to either the discount rate or the cash flows) in relation to franking credits when estimating WACC or valuing companies or assets. The only disagreement is about *why* practitioners make no adjustment.

131. For example, Handley explicitly states:

> …whilst there is no disagreement concerning what experts do, there is disagreement about why they do it.[42]

Hanley/AER view

132. Handley (pp. 3-10) argues that practitioners may be using an approach that differs from that used by the AER and that this practitioner approach bypasses the need to estimate gamma entirely. He concludes that the reason practitioners make no adjustment in relation to gamma is because they may be using an approach that bypasses the need to estimate gamma.

AER approach

133. Handley further explains that the AER's approach is to estimate the cost of equity using the CAPM:

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

where the AER's estimates of β_e and MRP include the impact of imputation.

134. He then notes that when estimating WACC, the effects of imputation must be removed by applying an adjustment factor:[43]

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

135. In this equation, r_e represents the total return required by shareholders and $\left[\frac{1-T}{1-T(1-\gamma)}\right]$ is the proportion of that return that must be provided by the firm, the remainder being assumed to come in the form of franking credits. Using the AER's estimates of $T = 0.30$ and $\gamma = 0.65$, 22% of the return to equity comes in the form of franking credits.

136. In its QLD Final Decision, the AER states (p. 220) that it is required to use the approach set out above. That is, ultimately the AER requires an estimate of r_e^*, which the AER calls (p. 222) the

[42] Handley Report, p. 3.

[43] Handley also notes that this adjustment can be made to the cash flows (via the tax wedge) rather than applied to the discount rate, but the point remains the same and the explanation is easier if applied to the discount rates. We agree that this important issue can be most clearly explained in this way and follow Handley in this regard.

conventional cost of equity. It then uses two steps to compute r_e^*. In the first step it uses the CAPM to estimate r_e, which the AER calls (p. 222) the grossed-up cost of equity. It then applies the adjustment factor of $\left[\frac{1-T}{1-T(1-\gamma)}\right]$ as set out on p. 222 of the QLD Final Decision.

Practitioner/conventional approach

137. Handley argues (pp. 8-9) that practitioners may be using what he refers to the *conventional approach*, which is to estimate r_e^* directly, in a way that does not require any estimate of gamma. He concludes that:

> The conventional measure of the cost of equity may be estimated using the Sharpe CAPM in the normal way i.e. using returns based on dividends and capital gains only (and so does not require an estimation of gamma).[44]

138. The implementation of this approach is as follows:

$$r_e^* = r_f + \beta_e^* \times MRP^*$$

where β_e^* and MRP^* are "based on dividends and capital gains only." That is, they are estimates of the equity beta and market risk premium as they would be in the absence of imputation.

139. We agree that practitioners are indeed likely to be using this conventional approach. Handley (pp. 4-10 and 17-18) sets out in some detail the basis for his conclusion that practitioners may be using an approach that differs from the AER approach and which bypasses the need to estimate gamma. This material sets out formal definitions and demonstrates algebraically the basis for what Handley refers to as the conventional approach. We had previously understood this argument to be that practitioners may be using approaches that were completely different from the CAPM-WACC framework, and understand that we have been at cross purposes.

140. In our view, there is now agreement that the conventional approach involves practitioners using the CAPM (with estimates of risk-free rate, beta, and market risk premium) and then making no adjustment at all in relation to gamma or franking credits. We have previously referred to this as practitioners using the same framework as the AER (i.e. CAPM-WACC) and setting gamma to zero (i.e., making no adjustment in relation to it). We now follow the terminology of Handley and the AER in referring to this as the "practitioner" or "conventional" approach for estimating r_e^*.

141. We note that the AER approach for estimating r_e^* may differ from the practitioner approach in two respects:

a. *Grossing-up step*: The AER may use different CAPM parameter estimates to "gross-up" for the effects of franking credits; and

[44] Handley, p. 9.

b. *Adjustment step*: The AER then applies an adjustment factor of $\left[\frac{1-T}{1-T(1-\gamma)}\right]$ to remove the effects of franking credits.

142. Handley (pp. 4-10) demonstrates that if the AER has performed both of these steps properly and consistently, they should cancel out and result in the same estimate of r_e^* as would be obtained more directly under the practitioner approach.

The practitioner/conventional approach implies a unique estimate of theta

143. As set out above, the AER approach uses different CAPM estimates to gross-up for the effects of franking credits and then applies an adjustment factor to remove the effects of this grossing up leaving an estimate of r_e^*, which would be estimated directly under the practitioner approach. It is a straightforward exercise to ensure that the value of gamma that is used in the adjustment factor of $\left[\frac{1-T}{1-T(1-\gamma)}\right]$ is consistent with the grossing-up in the first step of the AER's process.

144. That is, the result would be erroneous if the AER were to gross-up returns by 3% in the first step and then reduce them down by 1% in the second step. This would leave the return over-estimated by 2%. Similarly, it would be erroneous if the AER were to gross-up returns by 0.5% in the first step and then reduce them down by 2.5% in the second step. This would leave the return under-estimated by 2%.

145. There is a single unique value of gamma that properly reverses the grossing up that occurs in the first step of the AER's process, and it is straightforward to compute it.

146. To determine whether the grossing-up and adjustment steps properly offset one another, one can simply compare the AER's estimate of r_e^* with the corresponding (more direct) practitioner estimate of the same r_e^*.

147. That is, it is straightforward for the AER to test the reasonableness of its estimate of gamma by comparing *its* estimate of r_e^* (which is conditional on its estimate of gamma) with the *practitioner* estimate of r_e^* (which is estimated directly, bypassing the need to estimate gamma). If the AER's estimate of r_e^* (which is conditional on its estimate of gamma) is materially different from the practitioner estimate of r_e^*, it would be apparent that the AER's estimate of gamma must be materially inconsistent with market practice. This would surely be an important consideration, particularly in light of the fact that the AER's estimate of gamma has proven to be the most controversial of all of its WACC parameter estimates. Moreover, it is straightforward to perform this reasonableness check, as set out below.

148. By way of analogy, consider one carpenter with a tape measure set in feet and inches among a group of carpenters all with metric measures. This carpenter measures in feet and inches and then converts to metric. The carpenter cannot make up his own estimate of conversion from imperial to metric and ignore what the other carpenters are doing – on the basis that they don't need to do any conversions and so cannot prove our carpenter's adjustment method to be wrong. Rather, the carpenter must test the end result of his adjustment method to ensure consistency of the final outcomes with those of the other carpenters.

Implementation of the practitioner/conventional approach

149. As set out above, the conventional approach used by practitioners is implemented as follows:

$$r_e^* = r_f + \beta_e^* \times MRP^*$$

where β_e^* and MRP^* are "based on dividends and capital gains only."[45] That is, they are estimates of the equity beta and market risk premium as they would be in the absence of imputation.

150. By contrast, the AER approach requires estimates of β_e and MRP, which are "grossed-up" to include any effect of imputation.

Beta

151. The AER's estimate of beta is based on regression analysis of stock returns and market index returns. All returns are based on dividends and capital gains only. There are no adjustments for any assumed value of franking credits, such as the AER applies when estimating MRP. That is, the AER's estimate of beta is already "using returns based on dividends and capital gains only." This implies that the AER has mistakenly estimated β_e^* and used it as though it were an estimate of β_e. For the moment, we set aside this issue and proceed on the basis that imputation has no impact on the estimate of beta, in which case $\beta_e^* = \beta_e$.

MRP

152. The AER's estimate of MRP separately identifies the estimate "using returns based on dividends and capital gains only" and the grossing up for imputation. The AER sets out:

$$MRP = MRP^* + \text{Imputation Adjustment}.$$

For example, the AER uses a grossing up adjustment for imputation of 50 basis points in its 50-year estimate in Table 7.2 of the WACC Review Final Decision (p. 209). Based on an imputation adjustment of 50 basis points, $MRP^* = 6.5\% - 0.5\% = 6\%.$

Using the practitioner/conventional approach to check the reasonableness of the AER's estimate of gamma

153. Using the parameter estimates set out in its QLD Final Decision, the AER approach is as follows:

a. Step 1:

$$\begin{aligned} r_e &= r_f + \beta_e \times MRP \\ &= 5.64\% + 0.8 \times 6.5\% \\ &= 10.84\%. \end{aligned}$$

[45] Handley, p.9.

b. Step 2:

$$r_e^* = r_e\left[\frac{1-T}{1-T(1-\gamma)}\right] = 10.84\%\left[\frac{1-0.3}{1-0.3(1-0.65)}\right] = 8.47\%.$$

154. The practitioner approach is:

$$\begin{aligned} r_e^* &= r_f + \beta_e^* \times MRP^* \\ &= 5.64\% + 0.8 \times 6.0\% \\ &= 10.44\%. \end{aligned}$$

155. This implies that the AER's adjustment in relation to gamma produces results that are materially inconsistent with market practice. It is then a straightforward matter to determine what adjustment in relation to gamma would be consistent with market practice. This would require that gamma be set to 0.09.[46]

156. Another way of looking at this is that the AER has:

a. Made an upward adjustment of 0.4%[47] when grossing-up to include the effects of franking credits; but then

b. Made a downward adjustment of 2.37%[48] when removing the effects of those same franking credits.

157. This leaves the AER estimate of the allowed return on equity (r_e^*) 1.97%[49] below the value that is obtained using the practitioner approach.

McKenzie and Partington approach

158. McKenzie and Partington submit (p. 28) that the approach of Dempsey and Partington (2008) (DP) makes it possible to "undertake valuations which correctly account for franking credits without explicit consideration of their value." This approach estimates the combined value of dividend plus franking credit and seeks to perform valuation exercises without separating the combined value into its component pieces.

159. MP do admit, however, that "we doubt that it had extensive use." Indeed, they submit no evidence of it having any use whatsoever.

160. Moreover, under the DP approach, retained earnings are more valuable than new equity to the extent that undistributed franking credits are assumed to have some value. This means that when

[46] $r_e^* = r_e\left[\frac{1-T}{1-T(1-\gamma)}\right] = 10.84\%\left[\frac{1-0.3}{1-0.3(1-0.09)}\right] = 10.34\%$

[47] 10.84%-10.44%.

[48] 10.84%-8.47%.

[49] 10.44%-8.47%.

a regulated investment is financed by retained earnings "the investment base for price regulation should be adjusted accordingly." [50]

161. DP also note (p. 445) that "in most regulatory hearings, the utilities argue for a zero value for imputation credits … to justify higher prices. Under the proposed system, it is possible that such argument would actually be reversed."

162. DP conclude (p. 454) that "quite different valuations can arise using the [proposed] method relative to either the traditional method or the Officer (1994) method."

163. The QLD and SA Final Decisions are both silent on these recommendations from MP. We agree with the AER that the DP approach has no direct application. However we do agree with one conceptual point made by MP – to the extent that retained credits are assumed to have value, financing investments with retained earnings must be more expensive than new equity and a higher required return would be appropriate. We agree with MP that it would be inconsistent and wrong to assume that retained franking credits have material value, but then to assume that the required return on retained earnings is the same as on new equity.

Survey responses

164. McKenzie and Partington note (pp. 27-28) that the vast majority of respondents to a survey of ASX listed firms report that they make no adjustments at all in relation to franking credits. They also note that relatively few of the respondents report that the reason for this is that they consider franking credits to have no value.

165. First, it is important not to lose sight of the big picture in relation to this issue. There is broad agreement that no adjustments are made in relation to franking credits in practice, yet the AER makes a very big adjustment.

166. Second, it follows (logically) that practitioners must be of the view that making no adjustment in relation to franking credits produces superior results to those that would be obtained if they were to attempt to make some sort of adjustment.

167. Third, the fact that a small number of respondents indicate that "franking credits have no value" is not surprising. Franking credits unambiguously *do* have some value to resident investors. The question is not about whether franking credits have some value to some investors, the question is whether or not it affects the corporate cost of capital – which is a different concept altogether (see separate section on this below).

168. Finally, note that the two leading survey responses are that:

a. Different shareholders value franking credits differently and the net effect of this is that no adjustment should be made in relation to imputation; and

b. Any adjustment for imputation would have a very small impact on the results.[51]

[50] Dempsey and Partington, p. 445.

[51] This is consistent with the view that if the two steps set out in Paragraph 153 are performed properly and consistently, the net effect is immaterial. By contrast, the AER's implementation of these two steps produces a net effect that is highly material.

Fudge factors

169. McKenzie and Partington (p. 28) also suggest that imputation might be allowed for via a "fudge factor" whereby practitioners "add a bit extra" to the discount rate to allow for various contingencies and that these "fudge factors" might be lower post imputation than they were before. McKenzie and Partington conclude that whether or not this has any basis in fact is "unknown." Indeed, they provide no evidence at all to support this proposition.

170. The AER's QLD and SA Final Decisions give no weight at all to this submission. We agree with the AER in this regard.

Consistency with use of CAPM

Summary of issue

171. The issue here is 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 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.

Points of agreement

172. It is clear that both Handley 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.[52]

173. Moreover, Handley (pp. 24-25) reiterates that the AER has:

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 (80 cents per dollar) when estimating gamma.

174. 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.[53]

Remaining point of disagreement

175. In our view, it is inconsistent and wrong to use different values for the same parameter in two parts of the WACC estimation – to set the value of cash dividends to 100 cents when estimating required return on equity, but to use an estimate of 80 cents when estimating gamma.

176. The Handley/AER view is that it *is* legitimate for a regulator to have inconsistent estimates of the same parameter in two steps of the same WACC estimation process, so long as the regulator can find a different piece of empirical evidence to support each of the two different estimates.

[52] Explanatory Statement, p. 335.
[53] Handley (2009, p. 29).

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