REVIEW OF THE AER'S VIEWS ON GEARING AND GAMMA

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EXECUTIVE SUMMARY

This report presents my views on gearing and gamma in a regulatory context, comments on the AER's current approach, and reviews submissions on these two issues.

In respect of gearing, my conclusions are as follows. Firstly, market gearing should be used in the beta gearing formula consistent with the derivation of these formulas, and it should also be used in the WACC definition consistent with the mathematics of the NPV = 0 condition. This precludes the use of the RAB, but book debt is an acceptable proxy for market debt. Secondly, because they are mere delays in payment, accruals should be excluded from debt for valuation and therefore regulatory purposes. The effect of dealing with them by other (conceptually correct) means is probably too small to warrant the effort. Thirdly, in respect of sources of information, the existing set of comparators is very small, which raises concerns about the reliability of their average gearing as an estimate of the efficient level. In addition, since the gearing estimate sought is the best predictor of the average gearing over the next regulatory cycle, some historical averaging is desirable because observed levels fluctuate around desired levels (due to equity value shocks) and desired levels are subject to mean-reversion over time. However the appropriate historical period to use for averaging is unclear. Nevertheless, the effect of any such errors on WACC (when it includes the tax benefit from interest) is sufficiently small that continued use of the gearing estimate of 60% is warranted.

Fourthly, in respect of hybrid securities, stapled loan notes must be classified as equity in order to measure the value of equity, whilst subordinated debt should be classified as debt because doing otherwise would not affect WACC. Accordingly, the regulator should assess the leverage of the comparator businesses themselves rather than rely upon data providers who may not treat hybrid securities in the same way. Fifthly, double leverage should be recognized in measuring gearing where this is feasible and material. The effect of not doing so would be to underestimate leverage and therefore overestimate WACC, but the effect is not substantial unless the underestimate of leverage is large. Since double leverage should be recognized where feasible and material, the regulator should assess the leverage of the comparator businesses themselves rather than rely upon data providers who may not treat double leverage in the same way. Sixthly, in respect of the choice between gross or net debt, the choice is only significant if a firm holds super normal cash levels. If these have arisen

from unexpectedly favourable operations, they might be used to repay debt (in which case net debt would be warranted) or pay dividends (in which case net debt would not be warranted) but perfect foresight on this matter is unattainable. By contrast, if they have arisen from raising capital for undertaking investment in either regulated or unregulated assets, the use of gross debt would be warranted in both cases. This favours the use of gross debt in all cases. Accordingly, the regulator should assess the leverage of the comparator businesses themselves rather than rely upon data providers who may not treat this issue in the same way.

In respect of imputation credits, my views are largely in accord with the AER's current views. The points of distinction are as follows. Firstly, the AER seems to believe that the presence of foreign investors is consistent with the Officer model, and appears to rely upon Handley in support of this view. I concur with Handley that the Officer CAPM is a model about a defined set of assets and therefore about a defined set of investors, but the model's assumption that national equity markets are completely segregated implies that the relevant assets are Australian and so too are the investors. Accordingly, there is no place for foreigners in the model, and this remains so even if the *actual* holders of Australian assets include some foreigners simply because the assumption of complete market segmentation is not true. However, it does not follow from this that the AER is 'wrong' to include foreign investors in estimating the utilization rate; this might be done to pragmatically incorporate the empirical reality of foreign investors into a model that implicitly precludes them, in the belief that this produces more realistic results.

Secondly, the AER's belief that there is an inconsistency between market value studies on the utilization rate and the Officer model, because that model provides a cost of equity capital before personal taxes and personal costs, is not correct so long as these market value studies are correctly interpreted. However, there are (other) inconsistencies between the Officer model and market value studies. One of these is that the Officer model assumes that national equity markets are fully segregated, and therefore there could be no foreign investors, whilst market value studies provide estimates of the utilization rate that are clearly affected by the presence of foreign investors. The same inconsistency arises in using ATO data on the redemption rate and ABS data on the proportion of Australian shares held by foreigners, because both of these approaches also generate estimates of the utilization rate that are affected by the presence of foreign investors. An additional inconsistency between market value studies and the Officer model is that the model assumes that investors choose portfolios

now and hold them for some period that is not specified in the model but is treated as equal to the regulatory cycle for purposes of applying the model to regulatory situations. Accordingly, there is no place in the model for tax arbitrageurs. By contrast, the results from market value studies are likely to be significantly affected by the actions of tax arbitrageurs. The same inconsistency would arise in using ATO data on the redemption rate. The only approach that is free of this problem is the use of data on the market weights for different types of investors.

Thirdly, in respect of the AER's updated estimates of gamma, most of these estimates involve an estimate of either the distribution rate or the utilization rate from ATO data coupled with an estimate of the other parameter from other sources, and this suffers from the considerable problem that the ATO data offers two quite different estimates for each of these parameters, which completely undercuts the credibility of such estimates.

In addition, a number of further points have been raised in submissions. Prominent amongst these is Hathaway's argument that a good estimate of gamma can be extracted from ATO data using company tax collected and credits redeemed, because these two figures are "100% reliable", but this suffers from four drawbacks. Firstly, even if gamma were correctly estimated, the Officer model also requires an estimate of the utilization rate in order to estimate the MRP, that estimate would presumably have to use the ATO data if gamma were estimated from the ATO data, and the unreliability of the ATO data in estimating the credits distributed (and hence the utilization rate) would then be problematic. Secondly, the ATO gamma data uses all companies, this implies that the credit distribution rate is estimated for all firms, this is inappropriate for the regulated businesses, and would underestimate their distribution rate. Thirdly, Hathaway's belief that the ATO data used to estimate gamma are "100% reliable" is contradicted by the ATO (as reported by the AER), in claiming that Hathaway has used the wrong figure for company tax. Fourthly, the fact that the ATO data offers two conflicting estimates of the credits distributed and neither Hathaway nor the ATO can reconcile this discrepancy ought to make any observer sceptical about anything drawn from the ATO database.

Further points have been raised in the Expert Evidence sessions. Prominent amongst these is the proposition that, for the purposes of estimating the distribution rate, a BEE should be defined and the distribution rate then estimated from a set of firms that accord or

approximately accord with the definition of the BEE. Furthermore, there was general agreement that the BEE did not have any foreign operations, and therefore firms with substantial foreign operations would be unsuitable for estimating the distribution rate of the BEE. I agree with these views. One possible definition of the BEE is an energy network business, in which case the appropriate comparators would seem to be the five firms examined by the AER for the purposes of estimating gearing. Amongst these firms, it is possible to estimate the distribution rate for three of them and the rate is 1 over the last ten years in all three cases. Alternatively, the BEE might be defined as a listed company with no foreign operations. Accordingly the best comparators would be the 20 firms examined earlier by me subject to deleting those with significant foreign operations. If significant is defined as at least 25%, then the two principal candidates for deletion are BHP and Rio Tinto, and doing so raises the estimated distribution rate from my earlier estimate of 0.83 to 0.92. This limited evidence supports my earlier conclusion that the appropriate estimate for the distribution rate of the BEE is at least 0.83.

1. Introduction

I have been asked by the AER to present my views on gearing and gamma in a regulatory context, to comment on the AER's current approach, and to review submissions on these two issues.

2. Gearing

2.1 Market or Book Value

In the current regulatory context, the parameter called gearing (otherwise called leverage) is relevant at two points: in weighting the costs of debt and equity into the WACC formula, and in the beta gearing formula that is used to ensure that estimates of the equity beta of the regulated businesses are compatible with the gearing value adopted by the AER. The issues requiring discussion are laid out by the AER (2018a), and I consider them in turn. The first of these is whether to use market values or book values, and the AER is equivocal on this matter. In respect of the beta gearing formula, the situation is clear: the formula is mathematically derived from a number of assumptions, and the parameter called gearing arises in the course of that derivation and is defined in market value terms. In respect of the WACC formula, this is not derived but is simply definitional. However, its role within a regulatory context is to implement the NPV = 0 condition: the present value of the future cash flows is equal to the initial investment. If cash flows arise only in one year, comprising an allowance for depreciation, opex and a rate of return on investment, the discount rate is denoted k, the regulatory allowance for the rate of return is denoted d, the expected opex is denoted P and the initial investment is denoted I, then the present value of the future cash flows would be as follows:

$$V_0 = \frac{(I + Id + P) - P}{1 + k} \qquad (1)$$

and the NPV = 0 condition that $V_0 = I$ requires that the allowed rate of return d is equal to the discount rate k. Furthermore, in deriving this expression for V_0, k would be defined as the WACC with market value weights on the costs of equity and debt. It follows that d would be the WACC with market value weights on the costs of equity and debt.

Notwithstanding this, book values of debt are likely to be very good proxies for market values and market values for debt are not typically available. So, pragmatically, one could

use book values of debt. The errors resulting from this arise from current market interest rates differing from those at the time the debt was issued, these are as likely to be too high as too low, and they go to zero for each bond as it approaches its maturity date. The same is not true for book versus market equity.

A further issue concerns the RAB. Suppose that a business is regulated with an RAB of \$90m, a market value of \$100m, and debt of \$60m. Biggar (2018) provides a comprehensive list of the numerous reasons for the market value of a regulated business diverging from that of its RAB. One of these is that the market value of a firm engaged in regulated activities typically also engages in unregulated activities (either current activities or the option to engage in such activities at some future point). In this case, the regulated activities might have a value equal to the RAB of \$90m and the additional \$10m then arises from unregulated activities. This raises the question of whether gearing ought to be measured as debt relative to RAB (67%) rather than debt relative to market value (60%), possibly on the grounds that the gearing is used to determine a WACC that is applied to the RAB to generate the allowed revenues.

To assess this question, consider equation (1) above. The WACC is the parameter k in that equation, it is used to value the future cash flow stream and the derivation of this valuation formula involves market gearing weights in the WACC. Furthermore, to satisfy the NPV = 0 condition, the regulatory cost of capital d in equation (1) must equal k, and therefore d must also use market value weights. However, the market value referred to here is that of the regulatory activities. So, if the observed market value exceeds the RAB (\$90m) due to unregulated activities of \$10m, this observed value is not the market value of the regulated activities and a better estimator of that market value is the RAB of \$90m. This suggests pairing the RAB of \$90m with the debt value of \$60m to yield an observed gearing (for regulatory purposes) of 67% rather than pairing the market value of the business of \$100m with the debt value of \$60m to yield an observed gearing of 60%. However, just as the market value of the firm has been enhanced by the unregulated activities, the debt value of \$60m is very likely to have also been enhanced by the unregulated activities, as noted by the AER (2018a, section 4.1.1). Thus, if one uses the RAB as a proxy for the value of the regulated activities, one must use the debt associated with the regulatory activities. This debt value is not known and the only reasonable course of action is to presume that the leverage

ratio for the regulated activities is the same as that for the entire firm (debt to total business value). This leaves no place for the RAB.

All of this analysis presumes that the firm value exceeds the RAB due to unregulated activities. An alternative scenario is that in which firm value diverges from RAB due to regulatory errors. For example, the regulator allows a WACC of 10% but the true WACC is 9%, because the cost of equity is overestimated, leading to the firm value exceeding the RAB in accordance with equation (1). However, nothing in this scenario warrants regulatory measurement of gearing at debt value relative to RAB. The WACC requires market value weights and the regulator (in attempting to estimate WACC) should do likewise to determine the allowed cost of capital. Having erred in estimating the cost of equity, the regulator should not compound the error by using a gearing ratio that is not a market rate.

In conclusion, market gearing should be used in the beta gearing formula consistent with the derivation of these formulas, and it should also be used in the WACC definition consistent with the mathematics of the NPV = 0 condition. This precludes the use of the RAB, but book debt is an acceptable proxy for market debt.

2.2 The Treatment of Accruals

In defining debt, the question of whether to include accruals (the delayed payments of expenses) arises, and the AER (2018a, section 4.6) excludes them. In legal and accounting terms, these accruals are debt and are reflected in both financial statements and legal obligations. However, in deriving equation (1), any allowance for them would be reflected in the timing of the cash flows that are valued. Consequently, the debt that is reflected in the WACC comprises only interest bearing liabilities. It is implicit in equation (1) that both the revenues and the opex arise in one year. However, to illustrate the issue, suppose that the opex is expected to be paid in 1.25 years. In that case, equation (1) might be adjusted to reflect the later payment of opex and the regulatory allowance for opex would then have to be adjusted (from P to P_a) to reflect the later payment:

$$V_0 = \frac{I + Id + P_a}{1 + k} - \frac{P}{(1 + k)^{1.25}}$$

To satisfy the NPV = 0 condition, the regulatory allowance for the cost of capital *d* must be set to the estimate of the cost *k* as before and P_a would then be the expected opex *P* discounted for three months as follows:

$$P_a = \frac{P}{(1+k)^{0.25}}$$

In practice this is not done because the effects are so small. Nevertheless, these are the mechanics of doing so if it were felt to be warranted.

In conclusion, because they are mere delays in payment, accruals should be excluded from debt for valuation and therefore regulatory purposes. The effect of dealing with them by other (conceptually correct) means is probably too small to warrant the effort.

2.3 Sources of Information

The value for gearing that is sought is the value that would be adopted by the BEE. The AER's definition of the BEE is a pure play regulated energy network business operating in Australia, and I concur with that definition. For the purposes of determining the efficient level of this parameter, the only viable means of doing so is to average over the actual gearing level of firms that are good proxies for the BEE, and these are listed by the AER (2018a, Table 3). This set is now very small, at three firms, and this gives rise to two problems. The first is that using this small set exposes the AER to the possibility of firms manipulating their leverage levels to improve their allowed revenues or prices. For example, if a firm perceives its optimal leverage at 50% but the AER's WACC formula is monotonically increasing in leverage, then the firm has an apparent incentive to raise its leverage in order to increase its allowed prices or revenues. In general, this concern is mitigated by the fact that the firm's actions would raise the allowed leverage by less than one-to-one (because the AER uses the average leverage over a set of firms) and the firm also faces the full effect of adopting a leverage level that it judges to be suboptimal. When there are ten comparators, the first effect (the benefit from manipulation) is dwarfed by the second effect (the use of a suboptimal level of gearing). With three comparators, this protection against manipulation is much weaker but still substantial.

The second and bigger problem with this small set of firms is that the resulting estimate of optimal gearing may be very unreliable in the statistical sense (the sample average may diverge significantly from the population mean). This issue overlaps with the question of which historical period to use for averaging, and I therefore turn to that matter.

Turning to the question of which historical period to conduct the averaging over, the gearing estimate that is sought is the best predictor of averaging gearing over the next regulatory cycle. If observed gearing were indicative of the firm's desired level and was a random walk without drift over time, then the appropriate data to use would be the latest observation for each firm. However, the observed gearing is likely to temporarily diverge from that desired because it is sensitive to random movements in equity values and this cannot be immediately corrected by firms (nor would it be sensible to do so immediately in case the change in equity value was fleeting). This is apparent from the AER (2018a, Table 3), which shows that the average gearing level rose from 61% in 2007 (before the GFC) to 73% in 2009 and then reverted to 60% in 2012. At least part of the explanation for this is likely to be the decline in equity values in the 2007-2009 period and their increase in the 2009-2012 period.[1] Accordingly, it would be desirable to average over some past period.

In addition, even if observed levels did reflect desired levels of gearing at each point in time, it is possible that the desired (and therefore observed) level would change over time. For example, in examining the AER (2018a, Table 3) data, the fact that the average observed level in 2016 (52%) is below that in 2007 (61%) may be due to heightened fears of bankruptcy resulting from the GFC. If such changes do occur, it is likely that the desired level follows a mean-reverting process. Furthermore, if desired levels do change, the value of interest for regulatory purposes would be the average over the next regulatory cycle, and hence the best prediction of it. If mean-reversion operates, the best predictor of the average desired level over the next regulatory cycle would involve some degree of historical averaging.

Thus, there are two good reasons to engage in some degree of historical averaging. If observed leverage values always matched those desired, the best historical period would then be the one that produced the best predictor of the average leverage over the next regulatory

[1] The rate of return over the 2008 year for Australia was -40.4% (Dimson et al, 2018, Table 15).

cycle, and this would imply some degree of historical averaging in the face of mean reversion in the observed gearing. However, as noted above, observed values are likely to diverge from the desired values and therefore the required data (desired gearing) would not be available. Accordingly, it is not clear how much historical data should be used in the averaging process. As is apparent in the data (AER, 2018a, Table 3), use of data from the latest year yields 52%, from the previous three years yields 54%, from the last five years yields 57%, and from the last ten years yields 63%. Thus, if the existing value of 60% were used, it follows that the maximum error would seem to be 60% - 52% = 8%. If the regulatory impact of this were sufficiently small, a strong case for continuing to use the figure of 60% would then arise. Accordingly, it would be desirable to assess the implications of a gearing error of 8%.

To do this, it is necessary to incorporate the full tax effects of the cost of debt into the WACC and to distinguish between the average gearing level (L) over the beta estimation period (which is used to delever the estimated equity beta) and the gearing level judged to be optimal (L_o), yielding the following:

$$WACC = k_e(1 - L_o) + k_d[1 - T_c(1 - \gamma)]L_o$$

Substituting for k_e using the CAPM, which incorporates the estimated equity beta adjusted to the gearing level judged to be optimal (β_{eo}), and expressing k_d as the sum of the risk-free rate and the debt risk premium p, yields the following:

$$WACC = \left[R_f + MRP\beta_{eo}\right](1 - L_o) + \left(R_f + p\right)[1 - T_c(1 - \gamma)]L_o$$

Invoking the AER's beta gearing formula, which converts the equity beta estimated using OLS (β_e) to an estimated asset beta using the actual gearing level L and then converts this to β_{eo} using the gearing level judged to be optimal (L_o), then yields the following:

$$WACC = \left[R_f + MRP\frac{\beta_e(1 - L)}{1 - L_o}\right](1 - L_o) + (R_f + p)[1 - T_c(1 - \gamma)]L_o$$

$$= R_f + MRP\beta_e(1 - L) + \left[p - \left(R_f + p\right)T_c(1 - \gamma)\right]L_o \qquad (2)$$

So the effect of changing optimal gearing by 0.08 depends upon the term [ ] in this equation, and therefore on the values of p, R_f, T_c, and γ. The most recent estimates of these by the AER appear in AER (2017, pp. 20-24), of 2.1%, 2.68%, 30% and 0.40 respectively. Substitution into the last equation yields [ ] = .012, and therefore changing the optimal gearing by 0.08 changes the allowed WACC by only 0.1%. This is minor and therefore supports continued use of a gearing estimate of 0.60.[2]

In conclusion, the existing set of comparators is very small, which raises concerns about the reliability of their average gearing as an estimate of the efficient level. In addition, since the gearing estimate sought is the best predictor of the average gearing over the next regulatory cycle, some historical averaging is desirable because observed levels fluctuate around desired levels (due to equity value shocks) and desired levels are subject to mean-reversion over time. However the appropriate historical period to use for averaging is unclear. Nevertheless, the effect of any such errors on WACC (when it includes the tax benefit from interest) is sufficiently small that continued use of the gearing estimate of 60% is warranted.

2.4 Hybrid Securities

The AER (2018a, section 4.5) notes only two such types of securities issued by regulated businesses. The first of these is loan notes, which are stapled to the equity of shares and for which interest is not payable if the firm has insufficient cash to do so. Since the notes are stapled to equity, the only possible means of determining the value of equity would be to use the combined security as a proxy for equity and therefore to exclude the notes from debt. This would remain true even if the loan notes were considered to be more of a debt than equity security. This matches the AER's view and rationale for it.

The second form of hybrid security is subordinated notes. The AER treats these as debt but considers that they have some characteristics of equity due to the higher default risk and seems to be ambivalent on the question. It is true that a subordination feature of debt raises its default risk (via the lower expected payoff in the event of default) and this this raises its promised yield but it does not follow that this is relevant to the classification of securities into debt and equity for regulatory purposes. For regulatory purposes, the classification matters

[2] This analysis presumes that the debt risk premium p is invariant to leverage, which is not the case. Since p is positively related to leverage, the impact on WACC would be larger than estimated above but the effect would still be very small.

only to the extent that it affects the allowed WACC. As revealed by equation (2), reclassifying a security from debt to equity only potentially affects WACC because of the tax deduction on debt (which may be incorrectly ignored if this reclassification were done) and the presence of a debt risk premium (which would be replaced by a lower risk premium if this reclassification led to the risk premium being determined from the CAPM, which reflects only systematic risk). The tax deduction issue will be irrelevant because the AER accounts for this in the cash flows rather than in WACC, so long as this part of the allowed revenue calculation recognizes that the subordinated debt gives rise to a corporate tax deduction. The risk premium issue would also evaporate if the cost of capital for the instrument were still determined in the usual way for debt instruments, and it is hard to imagine it being addressed in any other way. So, under these two reasonable conditions, the issue of whether subordinated debt is treated as debt or equity would be irrelevant for regulatory purposes.

To illustrate this point, suppose that a firm's capital comprises equity, with an expected rate of return of 8%, senior debt with a promised yield of 4%, and subordinated debt with a promised yield of 6%. In addition, the weights are 50%, 25%, and 25% respectively. If the subordinated debt is classed as debt, the average cost of debt would be 5% (by equally weighting the two debt classes) and the WACC (excluding the tax deduction on interest) would equally weight equity at 8% and debt at 5%, yielding a WACC of 6.5% as follows:

$$WACC = .08\left(\frac{1}{2}\right) + \left[.04\left(\frac{1}{2}\right) + .06\left(\frac{1}{2}\right)\right]\left(\frac{1}{2}\right) = .065$$

Alternatively, if the subordinated debt were classed as equity with a cost of equity equal to its assessed cost of debt, the average cost of equity would be 7.33% (with 67% weight to traditional equity and 33% to the subordinated debt), the cost of debt would be 4%, and the WACC (with weights of 75% and 25%) would be 6.5% as before.

$$WACC = \left[.08\left(\frac{2}{3}\right) + .06\left(\frac{1}{3}\right)\right]\left(\frac{3}{4}\right) + .04\left(\frac{1}{4}\right) = .065$$

In conclusion, stapled loan notes must be classified as equity in order to measure the value of equity, whilst subordinated debt should be classified as debt because doing otherwise would not affect WACC. Accordingly, the regulator should assess the leverage of the comparator

businesses themselves rather than rely upon data providers who may not treat hybrid securities in the same way.

2.5 Double Leverage

Double leverage arises when a business is partly debt financed whilst its equity is held by another firm, which is also partly debt financed. The AER (2018a, section 4.3) is ambivalent on the question of whether to account for this.

To illustrate the issue here, suppose that one company (A) has assets of $400m financed from $300m debt and $100m in equity, with the equity owned in the usual way by individuals or funds. Suppose a second company (B) also has assets of $400m, financed by debt of $200m and equity of $200m, and the equity is held by another company (B's Holding company) financed from debt of $100m and equity of $100m (owned in the usual way by individuals or funds).

Company A			
Equity	100	Assets	400
Debt	300		

B's Holding Company					Company B			
Equity	100	Assets	200	→	Equity	200	Assets	400
Debt	100				Debt	200		

The financial substance is virtually identical in the two cases, with assets of $400m financed by debt of $300m and equity of $100m, and with the interest on the $300m of debt generating corporate tax savings.[3] For regulatory (and any other) purposes, the leverage of business A is 75%. Accordingly, the same approach should be adopted for business B, and therefore double leverage should be recognized.

Incorporating the effect of double leverage may not always be feasible because it requires knowledge of the ownership of the equity in a regulated business. In this event, the effective leverage of a business would be underestimated, leading to an underestimate of the optimal leverage level for regulated businesses. The distinction in equation (2) between the observed

[3] The only real point of distinction is that the debt in B's holding company is necessarily subordinated to that in company B, whereas all of company A's debt may be equally ranking.

gearing L used in the degearing process and the gearing judged to be optimal (L_0) is no longer important, as both would be affected by the observational error. So, equation (2) becomes

$$WACC = R_f + MRP\beta_e + \left[p - \left(R_f + p\right)T_c(1-\gamma) - MRP\beta_e\right] L$$

So the effect of observational error in L depends upon the term [ ] in this equation, and therefore on the values of p, R_f, T_c, γ, MRP, and β_e. The most recent estimates of these by the AER appear in AER (2017, pp. 20-24), of 2.1%, 2.68%, 30%, 0.40, 6.5% and 0.70 respectively. Substitution into the last equation yields [ ] = -0.033, and therefore underestimating L by 0.1 induces an overestimation in the allowed WACC by 0.33%. This is moderately significant but the L value in the last equation is the average over a set of regulated businesses and an average error of .10 in estimating gearing is likely to be at the outer limits. So, failure to recognize double leverage will not materially overestimate WACC unless the underestimate of (average) leverage is large.

In conclusion, double leverage should be recognized in measuring gearing where this is feasible and material. The effect of not doing so is to underestimate leverage and therefore overestimate WACC, but the effect is not substantial unless the underestimate of leverage is large. Since double leverage should be recognized where feasible, the regulator should assess the leverage of the comparator businesses themselves rather than rely upon data providers who may not treat double leverage in the same way.

2.6 Gross or Net Debt

The issue here concerns whether or not to deduct a firm's cash holdings from its debt when measuring its gearing, and the AER (2018a, section 4.4) favours the use of Gross Debt. Naturally, this only matters if the cash holdings are substantial (i.e., super normal), otherwise net and gross debt would be similar. There are clearly situations in which the use of net debt would be warranted, such as in assessing the risk of bankruptcy because super normal cash holdings would be used to reduce debt if bankruptcy were imminent. However, it does not follow that such a practice would be valid for regulatory purposes. In this context, what can be said is that super normal cash holdings would not be a regulatory asset. So, these assets would warrant exclusion from the regulatory exercise and therefore any impact on the gearing calculation would also warrant removing. However, for the purpose of measuring

gearing, one acts as if non-regulatory assets are regulatory assets and therefore use the gross debt approach, because non-regulatory assets can reasonably be presumed to be financed in much the same way as regulatory assets. Super normal cash holdings are an exception to this general principle, because they are only temporary, for one of two possible reasons.

The first possibility is that they arose from unexpectedly favourable operations. If so, they might in due course be used to repay debt, in which case deducting them from debt would be appropriate if one had that perfect foresight. However, they might instead be used for the payment of dividends or a mixture of dividends and debt reduction, in which case the use of net debt would not be appropriate. Since perfect foresight is not available there is no case here for the use of net debt. The second possibility is that the super normal cash holdings arose from raising capital (debt or equity or some mixture) for the purposes of undertaking an investment. If they are to be invested in regulated assets, the use of gross debt would be warranted. If they are to be invested in unregulated assets, then they ought to be treated in the same way as other unregulated assets, which is to use the gross debt approach as described above. So, there is no scenario justifying the use of net debt whilst there are two scenarios in which the use of gross debt is warranted as described above. So, gross debt is favoured.

In conclusion, the choice of gross or net debt is only significant if a firm holds super normal cash levels. If these have arisen from unexpectedly favourable operations, they might be used to repay debt (in which case net debt would be warranted) or pay dividends (in which case net debt would not be warranted) but perfect foresight on this matter is unattainable. By contrast, if they have arisen from raising capital for undertaking investment in either regulated or unregulated assets, the use of gross debt would be warranted in both cases. This favours the use of gross debt in all cases. Accordingly, the regulator should assess the leverage of the comparator businesses themselves rather than rely upon data providers who may not treat this issue in the same way.

3. Gamma

3.1 My Previously Expressed Views

My views on gamma have been expressed previously to the AER (Lally, 2013, 2016, 2017), and are as follows. In respect of the utilization rate U, this must be defined in accordance with a rigorous derivation of the Officer model that the AER uses, and this definition is a

weighted average over the utilization rates of all investors in the Australian market. Since the Officer model assumes that national equity markets are fully segregated then the only investors in the model would be local investors. Since all of these can fully utilize the credits, *U* is then 1. However, since the AER prefers to recognize the existence of foreign investors, the natural course of action would be to define *U* as a weighted average over the utilization rates of all investors in the Australian market, both foreign and local investors, which involves only a subtle change in the interpretation of the definition. Since local investors can use the credits and foreigners cannot, this implies that *U* is equal to the proportion of Australian equities owned by local investors. Accordingly, one should use ABS information to estimate this proportion. Furthermore, since some regulated businesses are unlisted (in Australia), the CAPM should be interpreted as applying to all Australian equity rather than just listed equity, and therefore ABS data on all Australian equity should be used, leading to an estimate of at least 0.60. This is consistent with the AER's (2018b, Table 2) estimate using ABS data from all equity, yielding a range from 0.61 to 0.70.

Alternative approaches to estimating *U* include the redemption rate for credits (from ATO data) and market-based studies on the market value of the credits, typically yielding lower estimates. However these alternative approaches warrant much lesser weight. A correctly measured redemption rate for credits is an upwardly biased estimator for the average utilization rate because local investors would tilt towards stocks with high imputation credit yields, and the ATO data from which the redemption rate is estimated contains significant unexplained discrepancies that give rise to two significantly different estimates of the redemption rate. In addition, market based estimates are unreliable estimates of the average utilization rate because they are affected by the actions of tax arbitrageurs, there are a very wide range of such results, they are very sensitive to a number of methodological choices, and data around ex-dividend dates are known to be afflicted by anomalous behaviour. Accordingly, I favour an estimate for the utilization rate of about 0.60.

In respect of the distribution rate, this is a firm rather than a market-wide parameter and therefore could be estimated using firm, industry, or sector-wide data according to which was judged to provide the best estimate for this firm-specific parameter. The use of firm specific data is ruled out by the likelihood that the firm could manipulate (raise) its price or revenue cap by reducing its dividends (so as to reduce its distributed credits, which lowers its distribution rate and therefore raises its cost of capital estimated from the Officer model used

by regulators). The use of industry data is subject to the problem that the set of firms is not large; the choice of whether or not to include certain marginal cases is then likely to materially affect the resulting estimate, and there are too few firms to assess the question of whether the distribution rate is positively or negatively related to the proportion of foreign income. This points to the use of sector-wide data of some sort. Since the distribution rates for listed and unlisted businesses are significantly different and (private) regulated businesses are listed or owned by listed parents (even if foreign), the distribution rate for regulated businesses should be estimated from that of listed equity.

The choices here are ATO data on all listed equity or financial statement data on a subset of high value firms constituting a majority of the value of listed equity. Since ATO data on the distribution rate contains significant unresolved discrepancies (Hathaway, 2013, 2014, 2017), this favours the use of financial statements and an estimate of this type is 0.83 for the top 20 such firms (Lally, 2015). Many such firms have foreign operations, which are irrelevant to a regulated business and these foreign operations could affect their distribution rate. Amongst the sample of 20 firms referred to, the effect of including firms with foreign operations is to underestimate the distribution rate for the benchmark firm. Thus, the appropriate estimate for the distribution rate of the benchmark firm (which has no foreign operations) is at least 0.83.

Since I favour a utilization rate of 1 and a distribution rate of at least 0.83, I favour a gamma estimate of at least 0.83. In addition, if foreign investors are to be recognized, then I favour a utilization rate of about 0.60; coupled with a distribution rate of at least 0.83, the resulting gamma estimate is at least 0.50.

Since the production of these reports (Lally, 2013, 2016, 2017), I have examined the distribution rates of firms within the industry in the last 10 years. The natural candidates are the five firms examined by the AER (2018a, Table 3): APA Group, Ausnet Services, DUET Group, Envestra (now Australian Gas Networks), and Spark Infrastructure. In respect of the APA Group, the distribution rate was 0.84 over the 2007-2017 period[4]. However APA's Franking Account Balance is always positive and yet most of its distributions are unfranked. Prima facie, this is inefficient behavior and therefore its distribution rate should be treated as

[4] The Franking Account balances at 30 June 2007 and 30 June 2017 were \$0.1m and \$4.4m respectively, and the only franked dividends paid in that intervening period were \$52m in the 2016-2017 year. These dividends involve distributed credits of \$22.3m and therefore the company tax payments over this ten-year period must have been \$26.6m (\$22.3m + \$4.4m - \$0.1m). The distribution rate is then \$22.3m/\$26.6m = 0.84.

1. In respect of Ausnet Services, the Franking Account Balance was smaller in 2017 than in 2007, which implies a distribution rate of 1 for all credits created in that ten-year period. In respect of DUET, the Franking Account Balance for the latest available financial statements (2016) is not disclosed but the dividends paid shortly after balance date were unfranked, implying a zero Franking Account Balance at that time. Accordingly, the distribution rate for all earlier credits generated from company tax payments must be 1. In respect of Envestra, I am unable to locate recent financial statements. Finally, in respect of Spark, recent financial statements do not record either the Franking Account Balance or whether dividends are franked, and therefore the distribution rate cannot be estimated.

So, of the three firms for which the distribution rate can be estimated, the rate is 1 for two of those firms and should be 1 for the third (all over at least the last ten years). This limited evidence supports my earlier conclusion that the appropriate estimate for the distribution rate of the benchmark firm (which has no foreign operations) is at least 0.83.

3.2 Comments on the AER's Views

My views on gamma are largely in accord with the AER's (2018b) current views. The points of distinction are as follows. Firstly, the AER (2018b, section 2.1.2) seems to believe that the presence of foreign investors is consistent with the Officer (1994) model, and appears to rely upon Handley (2014, 2015) in support of this view. In particular, Handley (2014, pp. 22-23) argues that in applying the CAPM one chooses a proxy for the market portfolio (which is some portfolio of listed equities such as the ASX200). Having chosen that proxy, and therefore the investors who hold those assets, Handley argues that:

"It is then assumed that this set of investors will then trade this set of assets among themselves in order to form their optimal portfolios – with the decision criteria of each investor being to maximize his utility of end-of-period wealth, which in turn is defined over the set of *n* assets." Furthermore, the CAPM makes no explicit assumption about any other assets or any other investors but if there are other assets or investors then it is implicitly assumed that these do not matter for the purposes of determining the prices of the *n* assets under consideration (otherwise they should be in the model). This means that other assets held by other investors do not matter. It also means that other assets held by the *m* investors do not matter. For this purpose, investors in the domestic market consistent of domestic investors to the extent that they hold domestic assets and foreign investors to the extent that

they hold domestic assets – this is the set of *n* assets and the set of *m* investors who hold these *n* assets. Foreign assets held by the domestic investors, foreign assets held by these foreign investors and foreign assets held by other foreign investors are outside the model."

Clearly, the CAPM is a model about a defined set of assets and therefore about a defined set of investors. To understand which assets and which investors, it is necessary to review the history of the model. The CAPM was developed by Sharpe (1964), Lintner (1965) and Mossin (1966). None of these authors imposes any restrictions on the assets examined, and it is abundantly clear that the model was intended to apply to all capital assets and all investors in such assets. For example, Sharpe (1964, page 429) states that "The model of investor behavior considers the investor as choosing from a set of investment opportunities that one which maximizes his utility….The investor will choose from among all possible plans the one placing him on the indifference curve representing the highest level of utility." Similarly, Lintner (1965, page 15) states that "..each individual investor …can invest any fraction of his capital in any or all of a given finite set of risky securities which are traded in a single purely competitive market…". Similarly, Mossin (1966, pp. 771-772) states that "..we postulate for each individual a preference ordering…over all possible portfolios.". So, at this point, the *n* assets are all capital assets and the *m* investors are those who hold them.

However, in applications of the model, two limiting steps have been taken. The first of these has been to assume that the assets available to any investor are only local assets, consistent with the low level of international diversification and significant restrictions on the purchase of foreign assets being commonplace at the time the model was developed (the 1960s). Subject to this restriction, each investor then chooses their optimal portfolio amongst local assets. This is called market segmentation. It follows that in each market the *n* assets are all local assets and the *m* investors are all local investors. So, there is no place for foreigners in the model, and this remains so even if the actual holders of Australian assets include some foreigners simply because the assumption of market segmentation is not perfectly true. Thus, whilst the *m* investors in the model are the actual holders of the assets in the original developments of the model, this feature is lost once market segmentation is assumed because the segmentation assumption is not perfectly realistic. This is simply one (of many) examples where the assumptions of the model are not perfectly realistic. Similarly, whilst the model assumes that all investors are risk averse, should one observe that some investors are not risk averse, it does not change the assumption made in the model about investors.

The second limiting step in the model has been to treat a portfolio comprising only equities as the local market portfolio, because equity is the only asset class for which adequate market data are available. One could view this equity portfolio as a proxy for all local assets, or one could treat the *n* assets to be only Australian equities. In either case, the *m* investors would still be only local investors rather than the investors who actually hold the *n* assets, because market segmentation is still assumed. So, Handley's view that the *m* investors includes foreigners involves unjustifiably extrapolating a feature of the original development of the CAPM to all subsequent developments.

Handley's belief that the *m* investors in the model includes foreigners is also inconsistent with a fundamental assumption concerning the model: that investors agree on the probability distribution for future returns on each asset (Sharpe, 1964, pp. 433-434), and the same assumption applies to the Officer (1994) model because it differs only in recognizing the existence of imputation credits. So long as all investors are Australians, such an assumption is at least imaginable. However, if some investors are foreigners, such an assumption is not possible unless assumptions are made about foreign exchange rates. Since no such assumptions are made in these models, it follows from this fact that foreign investors are precluded.[5]

To illustrate the point that asset returns in general depend upon the currency in which they are determined, suppose the current price of an asset is $1AUD and the current exchange rate between AUD and US dollars is 1:1. Suppose all investors agree that this asset price in AUD (inclusive of any dividends) will rise by 30% or fall by 10% with equal probability. In addition, they all believe that the exchange rate between AUD and USD will change to 0.95:1 or 1:1.05 (US per AUD) with equal probability, and this exchange rate is uncorrelated with the AUD price of the asset. Accordingly, Australian investors will all agree that the asset will deliver a return of either 30% or -10% with equal probability. By contrast, US investors will all agree that the returns will be 36.5%, 23.5%, -5.5% and -14.5% with equal probability. So, all investors will not agree on the probability distribution for an asset's future rate of return.

[5] Versions of the CAPM that do allow foreign investment necessarily adopt assumptions about foreign exchange rates. For example, Stulz (1995) assumes that investors are concerned with real returns and that foreign exchange rates conform to PPP. This ensures that asset returns are identical regardless of the currency in which they are determined, thereby preserving the assumption that all investors agree on the probability distributions for all asset returns.

Handley's belief that the *m* investors in the model includes foreigners is also inconsistent with a fundamental consequence of the model: that every investor holds a combination of only the Australian risk-free asset and the Australian market portfolio, so that investors differ only in their relative holdings of these components (Separation Theorem). This result follows from the fact that there is an Australian risk-free asset available to all investors. However, for foreign investors in the Australian market, the Australian risk-free rate (generally proxied by Australian government bonds) would be a risky asset due to exchange rate risk. Thus, if the model did include foreign investors, the Separation Theorem would not hold. It follows that the model does not include foreign investors.

All of this demonstrates that Handley's belief (that the investors to which the standard and Officer versions of the CAPM relate include foreigners) is inconsistent with these models. However, it does not follow from this that the AER is 'wrong' to include foreign investors in estimating the utilization rate; this might be done to pragmatically incorporate the empirical reality of foreign investors into a model that implicitly precludes them, in the belief that this produces more realistic results. Similarly, empirical estimates of the MRP used in the Officer model will also reflect the existence of foreign investors.

Secondly, the AER (2018b, section 2.1.2) argues that market value studies on the utilization rate are inconsistent with their use of the Officer (1994) model, because that model of the cost of equity capital is before personal taxes and personal costs. In respect of personal taxes, I do not agree; properly interpreted, the results from market value studies are not inconsistent with the before personal tax nature of the Officer model.

To illustrate this point, using DDO studies, suppose that capital gains are taxed at the same rate as dividends. Thus, the expected price change around ex-day net of capital gains tax (at rate *T*) would be equal to the cash dividend *D*, plus imputation credits *I* multiplied by the utilization rate *U*, all net of dividend tax (at rate *T*):

$$E(\Delta P)(1-T) = [D + IU](1-T)$$

Removing the expectation, and therefore recognizing a noise term (*e*), followed by dividing through by (1 –*T*) yields the following regression model:

$$\Delta P = D + IU + e \qquad (3)$$

This is a regression of ΔP on D and I, which is one form of a DDO study (the others are variants of this). Since the coefficient on I is U, then DDO studies provide an unbiased estimate of U, and are therefore consistent with the pre-investor tax nature of the Officer model used to estimate the cost of equity.

Now suppose that capital gains are taxed at rate T_g whilst dividends are taxed at rate T_d. Equation (3) then becomes

$$\Delta P = D\left(\frac{1-T_d}{1-T_g}\right) + IU\left(\frac{1-T_d}{1-T_g}\right) + e$$

The coefficient on I then differs from U, to the extent that dividends and capital gains are taxed at different rates, and therefore it might appear that a DDO will provide a biased estimate of U. However, this would be a naïve interpretation of a DDO. The proper course of action would be to undertake the DDO, thereby generating estimated coefficients on the cash dividends D and the imputation credits I, followed by dividing the estimated coefficient on the credits by the estimated coefficient on the cash dividends, to yield an unbiased estimate of the utilization rate U. This point has been made earlier by Lally (2013, pp. 20-21).

The same point applies to personal costs other than taxes. To illustrate it, suppose that capital gains are taxed at the same rate as dividends, and the transactions costs associated with the credits are proportion k of the credits. The same or similar proportion is likely to apply to the cash dividends. Equation (3) would then be as follows:

$$\Delta P = D(1-k) + IU(1-k) + e$$

The coefficient on I then differs from U, and therefore it might appear that a DDO will provide a biased estimate of U. However, as before, upon undertaking the DDO and thereby generating estimated coefficients on the cash dividends D and the imputation credits I, the proper course is to divide the estimated coefficient on the credits I by the estimated

coefficient on the cash dividends *D*, to yield an unbiased estimate of the utilization rate *U*. A potentially more important issue is transactions costs on the purchase and sale of shares. If these are proportion k_s of the price change, the last equation becomes

$$\Delta P(1 - k_S) = D(1 - k) + IU(1 - k) + e$$

and so

$$\Delta P = D\left(\frac{1 - k}{1 - k_S}\right) + IU\left(\frac{1 - k}{1 - k_S}\right) + e$$

Again, conducting the regression and then dividing the estimated coefficient on the credits *I* by that on the cash dividends *D* produces an unbiased estimate of the utilization rate *U*.

In summary, the AER's belief that there is an inconsistency between market value studies on the utilization rate and the Officer model, because that model provides a cost of equity capital before personal taxes and personal costs, is not correct so long as these market value studies are correctly interpreted. However, there are (other) inconsistencies between the Officer model and market value studies. One of these is that the Officer model assumes that national equity markets are fully segregated, and therefore there could be no foreign investors, whilst market value studies provide estimates of the utilization rate that are clearly affected by the presence of foreign investors. Furthermore, the same inconsistency arises in using ATO data on the redemption rate and ABS data on the proportion of Australian shares held by foreigners, because both of these approaches also generate estimates of the utilization rate that are affected by the presence of foreign investors. The only approach to estimating the utilization rate that is free of this problem is to act as if all investors in the Australian market are Australian, leading to an estimate for the utilization rate of 1.

An additional inconsistency between market value studies and the Officer model is that the model assumes that investors choose portfolios now and hold them for some period that is not specified in the model but is treated as equal to the regulatory cycle for purposes of applying the model to regulatory situations. Accordingly, there is no place in the model for tax arbitrageurs. By contrast, the results from market value studies are likely to be significantly affected by the actions of tax arbitrageurs. The same inconsistency would arise in using ATO

data on the redemption rate. The only approach that is free of this problem is the use of data on the weights for different types of investors.

Thirdly, the AER (2018b, section 3.1) provides updated estimates of gamma. The first of these estimates (ibid, Table 2) provide evidence from "all equity". However, there are a number of problems here. In particular, the distribution rate of 0.70 appearing in the first two rows of that table is drawn from ATO FAB data, Hathaway (2013, 2014) has demonstrated that ATO data provides two quite different estimates of the distribution rate (arising from FAB or dividend data), and Hathaway (2017, page 2) is unsure as to which figure is correct. So, this figure of 0.70 has no credibility. In addition, the utilization rate of 0.50 appearing in the last row of the table is (like the distribution rate of 0.70 in the first two rows) drawn from ATO FAB data, Hathaway (2013, 2014) has demonstrated that ATO data provides two quite different estimates of the utilization rate (arising from FAB or dividend data), and Hathaway (2017, page 2) is unsure as to which figure is correct. So, this figure of 0.50 has no credibility. The estimate of gamma of 0.35 in the penultimate row of the table is free of these problems because the problems with the utilization and distribution rates just described net out. However, even this estimate of gamma suffers from significant problems, as discussed in the next section. The only figures in this table that are free of these problems are those in the third and fourth rows, involving an estimate for the distribution rate from Lally (2015) and estimates of the utilization rate from ABS data. The distribution rate here is from only listed equity whilst the utilization rate is based on all firms; this is consistent with my view that the two parameters need not use the same type of data, the utilization rate should be estimated for all firms, and the distribution rate for only a subset of all firms.

The second set of estimates from the AER (2018, Table 3) provide evidence from "listed equity". However, all of these estimates couple an estimate of the distribution rate from ATO FAB data with an estimate of the utilization rate from other sources, and this is totally unsatisfactory because Hathaway (2013, 2014) has demonstrated that ATO data provides two quite different estimates of the distribution rate (arising from FAB or dividend data), and Hathaway (2017, page 2) is unsure as to which figure is correct. Note (a) to that table also refers to a further estimate of gamma, involving Lally's (2015) estimate of the distribution rate combined with ABS data on the utilization rate. However, the data used to estimate the utilization rate is ABS data for only listed equity, and I do not concur with using only listed equity to estimate the utilization rate for reasons given in section 3.1.

3.3 Submissions

Hathaway (2017) argues that a good estimate of gamma can be extracted from ATO data using company tax collected and credits redeemed, because these two figures are "100% reliable", and this yields an estimate for gamma of 0.30 using data from 2004-2011. Using Hathaway's (2014, page 5) data from 2004-2012, the result is marginally higher at 31%. There are four difficulties with this argument. Firstly, in addition to the estimate of gamma appearing within the cash flows, the Officer model requires an estimate of the utilization rate in order to estimate the MRP, that estimate would presumably have to use the ATO data if gamma were estimated from the ATO data, and the unreliability of the ATO data in estimating the credits distributed (and hence the utilization rate) would then be problematic. On this point, Hathaway (2017, page 2) accepts that the ATO data on credits distributed are problematic: "I have trouble deciding which one of these two items is the culprit for this lack of reconciliation". Furthermore, the AER sought clarification from the ATO on this matter, and in a note summarizing the information it received from the ATO (AER, 2018c) the AER identified a number of points at which Hathaway's FAB data are wrong, but they did not conclusively determine that the problem lay there and concluded that "there are certain limitations in relying on taxation data as an analytical tool in the calculation of imputation credits."

Secondly, such an approach necessarily uses the same set of companies for estimating both the utilization and distribution rates, there is no necessity to do so, and good reason for not doing so (because one would not want to use unlisted firms for estimating the distribution rate, which is firm-specific, whilst one would want to use all firms to estimate the utilization rate because it is a market-wide parameter). Furthermore, the ATO can only supply data on credits redeemed for all companies (Handley, 2014, pp. 38-39). So, in using ATO data, one is bound to use all companies, this would involve estimating the credit distribution rate for all firms, this is inappropriate for the regulated businesses as discussed in section 3.1, and would underestimate their distribution rate.

Thirdly, Hathaway's (2017, page 1) claim that the ATO data used to estimate gamma are "100% reliable as they are figures that relate directly to ATO tax collections" is contradicted by the ATO (as reported by the AER, 2018c, page 2). In particular, it is claimed that the company tax figure used by Hathaway includes payments by non-resident companies that do

not generate franking credits, and therefore should have been excluded by Hathaway. If so, Hathaway's figure for company tax may be right in the sense that such a figure was collected by the ATO but is not relevant for the present purposes because it includes payments that did not generate imputation credits. Ironically, in the very note in which he asserts that the company tax and credits redeemed figures are "100% reliable", Hathaway (2017, page 3) acknowledges that the apparent problem in the ATO data "could very well be within my logic for analyzing the ATO data."

Fourthly, even if the ATO (as reported by the AER) had not suggested that Hathaway was using the wrong figure for company tax, the fact that the ATO data offers two conflicting estimates of the credits distributed and neither Hathaway nor the ATO can reconcile this discrepancy (as noted in the first paragraph of this section) ought to make any observer sceptical about anything drawn from the ATO database. Had the ATO data offered only one estimate of the credits distributed, observers would presumably have judged it to be reliable. It has been judged unreliable simply because the ATO data permitted two approaches to be adopted. If the ATO data permitted two approaches to estimating the company tax payments or to the credits redeemed, they too might be in conflict.

The APGA (2017, page 10) observes that the 20 firms used by Lally (2015) are mostly banks or multinationals, and therefore are unsuitable for estimating the distribution rate of the BEE. Unstated but implied is that the best firms to use would be energy network businesses. However, as noted in section 3.1, amongst the five energy network businesses that the AER uses for estimating gearing, data is available for only three of these firms. This is a very small sample and too few to assess the question of whether the distribution rate is positively or negatively related to the proportion of foreign income. As also discussed in section 3.1, this suggests using data for listed firms in aggregate, and the sample of firms from that population should be concentrated amongst the highest value firms. This yields an estimate of at least 0.83. Furthermore, as discussed in section 3.1, the three energy network businesses for which the relevant data is available reveals distribution rates of 1 for all three firms over the last ten years, which is consistent with the estimate from listed firms in general.

SA Power Networks et al (2017, page 5) argues that equity ownership estimates of the utilization rate do not account for the fact that some investors who receive imputation credits

do not redeem them. Such matters are only significant to the extent that such non redemptions are significant, and SA Power Networks offer no evidence on this matter.

SA Power Networks et al (2017, page 6) also argues that equity ownership estimates of the utilization rate based on ABS data require filtering and adjustment, and may be subject to sampling error. Such a point would only be significant if alternative approaches were available that were free of these problems or were much less afflicted by them, and this is not the case. Estimates of the redemption rate based on ATO data are afflicted by large unexplained discrepancies in the data that give rise to significantly different estimates, whilst market-based estimates are significantly affected by the actions of tax arbitrageurs, a very wide range of such results, significant sensitivity to a number of methodological choices, and data around ex-dividend dates that are known to be afflicted by anomalous behavior. Relative to such problems, the concerns expressed about the ABS data are almost inconsequential.

SA Power Networks et al (2017, page 6) also argues that the use of financial statement data from listed firms for estimating the distribution rate for the BEE (presumably the 20 examined by Lally, 2015) is unsatisfactory because most such firms have material foreign income that can increase the distribution of imputation credits whilst the BEE necessarily has no foreign income. However, SA Power Networks provides no evidence in support of these claims about the 20 such firms. By contrast, in respect of these 20 firms, Lally (2016, pp. 27-28) examines the seven with the largest company tax payments, and finds that the proportion of profit from foreign operations is monotonically decreasing in the distribution rate, which is in the opposite direction to that claimed by SA Power Networks. Furthermore, SA Power Networks fail to present any alternative to the use of these 20 firms, let alone assess whether that set was also afflicted by the same problem.

Major Energy Users (2017, page 17) argues that the company tax payments made by firms are less than assumed by the AER. Prima facie, this is relevant to the regulatory allowance for company tax rather than gamma. However, if the firms used to assess gamma pay less tax than envisaged by the AER's model, their distribution rate for credits is presumably enlarged. To appreciate this point, the distribution rate F calculated from a set of n companies is as follows:

$$F = \frac{\sum_{j=1}^{n} DIST_j}{\sum_{j=1}^{n} TAX_j} = \frac{\sum min\left[TAX_j, \frac{3}{7} DIV_j\right]}{\sum TAX_j}$$

For some firms, the dividend payments are the binding constraint (insufficient to distribute all credits). So, if the tax payments for these firms rise and assuming that their dividends will not rise (but may fall), the distribution rate *F* will fall. Accordingly, if the AER's model assumes higher tax payments than these firms actually make, a consistent estimate of *F* will be smaller than that observed. By contrast, for other firms, the dividends are not the binding constraint (the dividends are large enough to distribute all credits). Accordingly, if the AER's model assumes higher tax payments than these firms actually make, a consistent estimate of *F* will be larger than that observed. The overall impact will depend upon the mix of these firms and the extent to which their actual tax payments are less than those implied by the AER's model.

To illustrate this point, suppose that two firms are used in this analysis: firm 1, with actual tax payments of $100m and dividends of $200m, and firm 2, with actual tax payments of $100m and dividends of $300m. The conventional estimate of *F* would then be

$$F = \frac{\frac{3}{7}\$200m + \$100m}{\$100m + \$100m} = \frac{\$186m}{\$200m} = 0.93$$

Suppose firm 1 pays the appropriate amount of tax whilst firm2 pays $20m less than implied by the AER's model (and therefore the amount implied by the AER's model is $120m). So, to obtain an estimate of *F* that is consistent with the AER's model for tax, the tax payment by firm 2 must be raised by $20m to $120m, thereby raising *F* to 0.94. If additionally firm 1 pays $40m less than that implied by the AER's model, a consistent estimate of *F* requires raising the tax payment of firm 1 by $40m to $140m, thereby lowering *F* to 0.79 if firm 1's dividend did not fall.

Clearly, there would be considerable difficulties in assessing the extent to which tax payments made by each of the firms used to assess *F* are less than that assumed by the AER's model, and therefore by how much the observed value for *F* should be reduced. Furthermore, the possibility remains that any increase in taxes paid would lead to an increase in that firm's

dividend in order to ensure that the additional credits thereby created were distributed. In view of these difficulties, no such adjustment to the estimate of *F* is offered.

3.4 Further Issues

Further issues have been raised at the second Expert Evidence Session. Professor Gray argued that estimating the distribution rate from FAB data from financial statements is subject to various difficulties requiring adjustment, and therefore should not be done (AER, 2018d, pp. 103-104). One example involves BHP, which constitutes two firms (BHP Billiton Ltd and BHP Billiton PLC) and the credits distributed to the latter's shareholders are essentially wasted. However, this issue involves the utilization rate rather than the distribution rate. A second example presented by him relates to AGL, which received from the ATO a substantial refund of an earlier unwarranted payment; this refund would affect the estimated distribution rate if the period used to calculate it included the refund but not the original tax payments. However, the same issue would affect the ATO data. So, the problem here is not one of using financial statement data but using a small set of firms, and this reinforces the case for estimating the distribution rate for the BEE from data for all listed firms rather than a small set of comparable firms.

Professor Gray also argued that, in view of these problems and the difficulties in dealing with them, the distribution rate for the BEE should instead be estimated from data on target dividend payout rates from the firms considered to be suitable comparators for the BEE (AER, 2018d, pp. 112-114). However this presumes that the dividend payout rate is equal to the distribution rate for credits, and this is only true if the denominator in the dividend payout rate is the taxable income for which tax payments are made to the ATO less the tax payment (rather than accounting profit or net cash flow after tax). To see this, consider the case where the distribution of credits is constrained by the dividends, and letting *Y* denote the taxable income for which tax payments are made to the ATO:

$$\frac{DIST}{TAX} = \frac{\frac{3}{7}DIV}{TAX} = \frac{\frac{3}{7}DIV}{.3Y} = \frac{\frac{3}{7}DIV}{\frac{.30}{.70}Y(1-.30)} = \frac{DIV}{Y(1-.30)}$$

So, even if all firms announced a dividend payout rate (an unlikely scenario), that dividend rate would not be defined as shown in the preceding equation, and no simple way of

translating the announced payout rate into that appearing in the preceding equation is apparent. So, to estimate the distribution rate for credits, one is therefore bound to use data on the FAB and franked dividends, as described in section 3.1.

Professor Gray also argued that the AER's practice of coupling the Officer model (which assumes that national equity markets are completely segregated) with a definition of the utilization rate that includes foreign investors does not correspond to any equilibrium model (AER, 2018d, page 108). I agree, and have made the same point in more detail section 3.2 in the course of critiquing Handley's views in this area. However, it does not follow from this that the AER is necessarily 'wrong' to do so. The Officer model assumes complete segregation whilst the empirical reality is otherwise but there is no suitable model for addressing partial integration. So, there is no easy solution to this problem. The usual approach has been to use the Officer model combined with parameter estimates for the utilization rate (and the MRP) that reflect the fact of partial integration. This is done not only by the AER in defining the utilization rate to incorporate foreigners but also by anyone who favours the use of ATO data or DDO studies to estimate the utilization rate (as Prof Gray does), because both ATO data on the utilization rate and DDO studies reflect the presence of foreign investors. Alternatively, one could estimate the cost of equity using a model that assumes complete segregation and also from one that assumes complete integration, and then exercise judgement in choosing between these two boundary points. Alternatively, one could use the Officer model along with an estimate of the utilization rate that ensured that the resulting estimate of the cost of equity was within the two boundary points. Lally (2013, section 3.9) shows that the required estimate of the utilization rate would have to be close to 1 to satisfy this test. So, the usual approach fails this test and is therefore very unsatisfactory. Furthermore, the third approach described here would then have to engineer an estimate of the utilization rate to ensure that the test just described was not failed. This is a minimalist position. I therefore favour the second of these possibilities, involving estimates of the cost of equity under both complete segregation and complete integration.

Professor Gray also argued that, having departed from a model that assumes complete segregation of national equity markets by recognizing foreign investors, one cannot then use the definition of the utilization rate in a model assuming complete segregation to guide one in estimating that parameter (AER, 2018d, page 109). I do not agree. The Officer model contains a parameter U defined as the weighted average over the utilization rates of all

investors in the Australian market. Since the model assumes complete segregation, those investors are only Australian investors and therefore the appropriate estimate of *U* would be 1. However, since markets are partially integrated and therefore the model is defective in not recognizing this fact, one might seek to address this problem. As discussed in the previous paragraph, the best means of doing so would be to estimate the cost of equity under both complete segregation and complete integration. If this is not done, and instead the estimate of *U* is simply modified in some way to reflect the degree of partial integration (in accordance with existing practices), the *natural* choice would be to treat the parameter *U* as a weighted average over the utilization rates of *all* investors present in the Australian market, including foreigners, and this leads to estimating *U* as the proportion of Australian risky assets held by Australians. This involves only subtly changing the interpretation of the definition of *U*. By contrast, alternative approaches, such as using the redemption rate for the credits or the market value per $1 of credits distributed (estimated from a DDO, for example) involve completely jettisoning the definition of *U* in the Officer model, and therefore are intuitively much less satisfactory. More importantly, reinterpreting the definition of *U* as described here provides an estimator that can at least be fairly reliably estimated. By contrast, the redemption rate cannot be reliably estimated (because the ATO data is defective) and market value approaches are afflicted by a host of problems including the wide range in results, tax arbitrage, microstructure effects, and anomalies around ex-dividend days.

Dr Wheatley argued that one of the apparent pitfalls from using ATO data on all firms to estimate gamma (that this approach necessarily uses all firms to estimate the distribution rate and this is a poor proxy for the distribution rate for the BEE) can be overcome, by adjusting this gamma estimate from ATO data on all firms in accordance with the extent to which an appropriate estimate of the distribution rate for the BEE differs from the ATO's estimate for all firms (AER, 2018d, pp. 116-117). The AER's (2018b, Table 2) most recent estimate of gamma using ATO data is 0.35. Using FAB data, the estimate for the distribution rate inherent in this is 0.70, which is for all firms. If the estimate for the BEE is at least 0.83, as discussed earlier, then the estimate for gamma should be raised from 0.35 to at least 0.35*(.83/0.70) = 0.42. However, if dividend data is used, the estimate for the distribution rate inherent in this gamma estimate of 0.35 is instead 0.50 (Hathaway, 2014, page 5), and therefore the estimate for gamma should be raised to at least 0.35*(0.83/0.50) = 0.58. In the face of this uncertainty about whether FAB or dividend data are correct, Dr Wheatley proposed averaging over them. However, since one of these estimates for the distribution

rate is wrong, it is entirely possible that both are wrong and this possibility undercuts the use of any such adjustment to the gamma estimate of 0.35 to reflect the distribution rate for the BEE.

There was also general agreement amongst the participants in the second Expert Evidence Session that, for the purposes of estimating the distribution rate, a BEE should be defined and the distribution rate then estimated from a set of firms that accord or approximately accord with the definition of the BEE. Furthermore, there was general agreement that the BEE did not have any foreign operations, and therefore firms with substantial foreign operations would be unsuitable for estimating the distribution rate of the BEE. I agree with these views. One possible definition of the BEE is an energy network business with no foreign operations, in which case the appropriate comparators would seem to be the five firms examined in section 3.1. Amongst these, the distribution rate is 1. Alternatively, the BEE might be defined as a listed company with no foreign operations. Accordingly the best comparators would be the 20 firms examined by Lally (2015, Table 1) subject to deleting those with significant foreign operations. If significant is defined as at least 25%, then the two principal candidates for deletion are BHP and Rio Tinto (ibid, Table 4), and doing so raises the estimated distribution rate from 0.83 (ibid, Table 1) to 0.92.

4. Conclusions

This report has reviewed the latest evidence on the appropriate estimates for gearing and gamma. In respect of gearing, my conclusions are as follows. Firstly, market gearing should be used in the beta gearing formula consistent with the derivation of these formulas, and it should also be used in the WACC definition consistent with the mathematics of the NPV = 0 condition. This precludes the use of the RAB, but book debt is an acceptable proxy for market debt. Secondly, because they are mere delays in payment, accruals should be excluded from debt for valuation and therefore regulatory purposes. The effect of dealing with them by other (conceptually correct) means is probably too small to warrant the effort. Thirdly, in respect of sources of information, the existing set of comparators is very small, which raises concerns about the reliability of their average gearing as an estimate of the efficient level. In addition, since the gearing estimate sought is the best predictor of the average gearing over the next regulatory cycle, some historical averaging is desirable because observed levels fluctuate around desired levels (due to equity value shocks) and desired

levels are subject to mean-reversion over time. However the appropriate historical period to use for averaging is unclear. Nevertheless, the effect of any such errors on WACC (when it includes the tax benefit from interest) is sufficiently small that continued use of the gearing estimate of 60% is warranted.

Fourthly, in respect of hybrid securities, stapled loan notes must be classified as equity in order to measure the value of equity, whilst subordinated debt should be classified as debt because doing otherwise would not affect WACC. Accordingly, the regulator should assess the leverage of the comparator businesses themselves rather than rely upon data providers who may not treat hybrid securities in the same way. Fifthly, double leverage should be recognized in measuring gearing where this is feasible and material. The effect of not doing so would be to underestimate leverage and therefore overestimate WACC, but the effect is not substantial unless the underestimate of leverage is large. Since double leverage should be recognized where feasible and material, the regulator should assess the leverage of the comparator businesses themselves rather than rely upon data providers who may not treat double leverage in the same way. Sixthly, in respect of the choice between gross or net debt, the choice is only significant if a firm holds super normal cash levels. If these have arisen from unexpectedly favourable operations, they might be used to repay debt (in which case net debt would be warranted) or pay dividends (in which case net debt would not be warranted) but perfect foresight on this matter is unattainable. By contrast, if they have arisen from raising capital for undertaking investment in either regulated or unregulated assets, the use of gross debt would be warranted in both cases. This favours the use of gross debt in all cases. Accordingly, the regulator should assess the leverage of the comparator businesses themselves rather than rely upon data providers who may not treat this issue in the same way.

In respect of imputation credits, my views are largely in accord with the AER's current views. The points of distinction are as follows. Firstly, the AER seems to believe that the presence of foreign investors is consistent with the Officer model, and appears to rely upon Handley in support of this view. I concur with Handley that the Officer CAPM is a model about a defined set of assets and therefore about a defined set of investors, but the model's assumption that national equity markets are completely segregated implies that the relevant assets are Australian and so too are the investors. Accordingly, there is no place for foreigners in the model, and this remains so even if the *actual* holders of Australian assets include some foreigners simply because the assumption of complete market segmentation is

not true. However, it does not follow from this that the AER is 'wrong' to include foreign investors in estimating the utilization rate; this might be done to pragmatically incorporate the empirical reality of foreign investors into a model that implicitly precludes them, in the belief that this produces more realistic results.

Secondly, the AER's belief that there is an inconsistency between market value studies on the utilization rate and the Officer model, because that model provides a cost of equity capital before personal taxes and personal costs, is not correct so long as these market value studies are correctly interpreted. However, there are (other) inconsistencies between the Officer model and market value studies. One of these is that the Officer model assumes that national equity markets are fully segregated, and therefore there could be no foreign investors, whilst market value studies provide estimates of the utilization rate that are clearly affected by the presence of foreign investors. The same inconsistency arises in using ATO data on the redemption rate and ABS data on the proportion of Australian shares held by foreigners, because both of these approaches also generate estimates of the utilization rate that are affected by the presence of foreign investors. An additional inconsistency between market value studies and the Officer model is that the model assumes that investors choose portfolios now and hold them for some period that is not specified in the model but is treated as equal to the regulatory cycle for purposes of applying the model to regulatory situations. Accordingly, there is no place in the model for tax arbitrageurs. By contrast, the results from market value studies are likely to be significantly affected by the actions of tax arbitrageurs. The same inconsistency would arise in using ATO data on the redemption rate. The only approach that is free of this problem is the use of data on the market weights for different types of investors.

Thirdly, in respect of the AER's updated estimates of gamma, most of these estimates involve an estimate of either the distribution rate or the utilization rate from ATO data coupled with an estimate of the other parameter from other sources, and this suffers from the considerable problem that the ATO data offers two quite different estimates for each of these parameters, which completely undercuts the credibility of such estimates.

In addition, a number of further points have been raised in submissions. Prominent amongst these is Hathaway's argument that a good estimate of gamma can be extracted from ATO data using company tax collected and credits redeemed, because these two figures are "100%

reliable", but this suffers from four drawbacks. Firstly, even if gamma were correctly estimated, the Officer model also requires an estimate of the utilization rate in order to estimate the MRP, that estimate would presumably have to use the ATO data if gamma were estimated from the ATO data, and the unreliability of the ATO data in estimating the credits distributed (and hence the utilization rate) would then be problematic. Secondly, the ATO gamma data uses all companies, this implies that the credit distribution rate is estimated for all firms, this is inappropriate for the regulated businesses, and would underestimate their distribution rate. Thirdly, Hathaway's belief that the ATO data used to estimate gamma are "100% reliable" is contradicted by the ATO (as reported by the AER), in claiming that Hathaway has used the wrong figure for company tax. Fourthly, the fact that the ATO data offers two conflicting estimates of the credits distributed and neither Hathaway nor the ATO can reconcile this discrepancy ought to make any observer sceptical about anything drawn from the ATO database.

Further points have been raised in the Expert Evidence sessions. Prominent amongst these is the proposition that, for the purposes of estimating the distribution rate, a BEE should be defined and the distribution rate then estimated from a set of firms that accord or approximately accord with the definition of the BEE. Furthermore, there was general agreement that the BEE did not have any foreign operations, and therefore firms with substantial foreign operations would be unsuitable for estimating the distribution rate of the BEE. I agree with these views. One possible definition of the BEE is an energy network business, in which case the appropriate comparators would seem to be the five firms examined by the AER for the purposes of estimating gearing. Amongst these firms, it is possible to estimate the distribution rate for three of them and the rate is 1 over the last ten years in all three cases. Alternatively, the BEE might be defined as a listed company with no foreign operations. Accordingly the best comparators would be the 20 firms examined earlier by me subject to deleting those with significant foreign operations. If significant is defined as at least 25%, then the two principal candidates for deletion are BHP and Rio Tinto, and doing so raises the estimated distribution rate from my earlier estimate of 0.83 to 0.92. This limited evidence supports my earlier conclusion that the appropriate estimate for the distribution rate of the BEE is at least 0.83.

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