Review of

COMMENTS ON THE REVIEW BY MARTIN LALLY OF "THE VALUE OF IMPUTATION CREDITS FOR REGULATORY PURPOSES"

Martin Lally

Associate Professor

School of Economics and Finance

Victoria University of Wellington

April 22 2006

EXECUTIVE SUMMARY

Envestra has revised their earlier paper concerned with estimating the appropriate value for "gamma", in order to respond to certain criticisms of their earlier work and to present a further argument in support of a gamma value of zero. Accordingly, they have revised their estimate for gamma from 0-.26 to 0-.40, although their favoured estimate remains at zero. This paper reviews Envestra's response to the five principal points of criticism raised earlier, and also reviews the new argument presented by them. The conclusions are as follows.

In respect of the distribution ratio, which is defined as the credits attached to dividends as a proportion of company tax paid, Envestra's preferred estimate is now .60 arising from averaging over estimates from using tax paid (.82) and from using tax expense (.39), with industry-specific data. They present a number of arguments in favour of using tax expense rather than tax paid, and these are shown to be invalid. The appropriate estimate is that based on tax paid and industry-specific data, and therefore should be .82 rather than their preferred estimate of .60.

In respect of the utilisation rate for Australian tax-paying investors, Envestra appears to now accept that there is no legislatively induced lag between the payment of tax and the attachment of credits to dividends, and this leads them to raise their estimate of the utilisation rate for this group from 0.75 to 0.81. However, their continued recognition of delays between the payment of tax and the attachment of imputation credits is inconsistent with the way in which they have defined the distribution ratio, as the ratio of imputation credits within a year to the tax for that year. Furthermore, this point has been raised previously and they have not responded to it. Consistent with the way in which they have defined the distribution rate, the appropriate utilisation rate for Australian tax-paying investors is 1 rather than 0.81.

In respect of the utilisation rate U that should be injected into the Officer model, Envestra continues to argue that foreign investors are the price-setters (marginal investors) in the regulated sector, that they cannot use the imputation credits, and this implies a utilisation rate U of zero; it follows that the appropriate value for gamma is zero. The controversial claim here is that equity prices are fully determined by foreigners, and I have previously challenged this argument on three bases. Firstly, within the Officer (1994) model, *U* is a weighted average over the utilisation rates of all investors in the market rather than only one group, and this remains true even if that one group dominates the ownership of a particular firm or industry. Envestra's response is to argue that both the Officer model and equilibrium price-setting in general prescribe a role for marginal investors. However, both claims are shown to be false. Furthermore, their claim that there is a fundamental distinction between the Officer and the Lally and van Zijl versions of the CAPM, which explains the role of marginal investors in the Officer model, is also shown to be incorrect.

Secondly, recognition of foreign investors is inconsistent with the assumption in the Officer model that national equity markets are segmented, and the effect of recognising foreign investors in estimating *U* but not otherwise in implementing the Officer model is to drive the allowed output price for a firm *further* away rather than closer to the "correct" answer. Envestra's response is to argue that foreign investors influence estimates of betas and the Australian market risk premium, these influences cannot be extracted, and therefore it would be inconsistent to extract their influence upon *U*. However it is shown that foreign investors have no appreciable impact upon betas and their impact upon the estimate of the Australian market risk premium is insufficient to change the fact that recognising their impact upon *U* will drive the allowed output price for a firm *further* away rather than closer to the "correct" answer.

Thirdly, and in response to Envestra's belief that foreign investors must be the price setters in order to justify their Australian presence, I have previously argued that diversification benefits would still justify their presence even in the face of asset prices that reflect the benefits of the imputation credits. Envestra's response to this is to argue that (corporate) investors are motivated by the search for positive NPV projects rather than risk diversification. This new claim is quite uncontroversial and simply reinforces the point made earlier: foreign investment in Australia does not require Australian equity prices to be unaffected by the value of the imputation credits.

In respect of Envestra's estimate for *U* arising from averaging over the utilisation rates of all investors including foreigners and inter-corporate shareholdings, Envestra have raised their earlier estimate of .30 to .56 in response to criticisms relating to the appropriate utilisation rate for superannuation funds and insurance companies. However they do not respond to a further criticism relating to their inclusion of inter-corporate shareholdings. Finally, they reject the criticism of acting inconsistently over their choice of the proxy for equity and, in support of this position, they argue that *U* is not a CAPM parameter. This claim is shown to be false. The practical effect of all of these points is slight because Envestra's preferred estimate for *U* is zero rather than .56.

In respect of Envestra's estimate for *U* of .375 arising from averaging over the utilisation rates of all investors in the regulated sector, I have argued that the weights used in this estimate are flawed in not being market-wide weights as required in the Officer model. Envestra's response is to argue that marginal investors are relevant, and the marginal investors implicit in this estimate are those in the regulated sector. This argument has been addressed and rebutted earlier, i.e., the definition of *U* arising within the Officer model is a weighted average over all investors rather than those in a particular sector, company or domicile. The practical effect of all of these points is slight because Envestra's preferred estimate for *U* is zero rather than .375.

Finally, Envestra argue that a market risk premium of .06 and a gamma at or close to 1 imply a market dividend yield well in excess of that observed, and this implies that gamma cannot be at or close to 1. However, this line of argument also assumes that firms' cash flows are not expected to grow and that taxable income is equal to pre-tax cash flow. Both assumptions are false, and recognition of this undercuts Envestra's argument. In particular, with positive inflation, retention of some cash flow by firms and moderate deviations of taxable income from pre-tax cash flow, a market risk premium of .06 and gamma close to 1 are perfectly consistent with observed levels for the market dividend yield.

Having responded to Envestra's arguments, my view is as follows. In respect of the distribution ratio, the appropriate value for the regulated sector as a whole is about .80 as discussed in this paper. In respect of the utilisation rate, this should be a weighted average over classes of investors, it requires no adjustment for distribution lags, and it should exclude foreigners so as to generate an output price for a regulated firm that lies within the bounds arising from complete segregation and complete integration. The resulting estimate for *U* is close to 1. Coupled with the distribution rate of .80, the resulting estimate for gamma is about .80 for the regulated sector as a whole rather than the estimate of zero favoured by Envestra.

1. Introduction

Envestra (2006) has revised their earlier paper (Envestra, 2005) concerned with estimating the appropriate value for "gamma", in order to respond to certain criticisms of their earlier work and to present a further argument in support of a gamma value of zero. Accordingly, Envestra (2006) revise their estimate for gamma from 0-.26 to 0-.40, although their favoured estimate remains at zero. This paper reviews Envestra's response to the five principal points of criticism raised by Lally (2005), and also reviews the new argument presented by them. Envestra's responses to these five points of criticism are examined in sections 2 to 6, and their new argument is examined in section 7.

2. The Distribution Rate

The parameter "gamma" arises within the Officer (1994) version of the CAPM, and is defined as the product of the utilisation rate for imputation credits and the distribution rate, with the latter defined as the attached imputation credits divided by company tax paid for the firm in question. Envestra (2005) offered two estimates of the distribution rate. The first used market wide data and tax paid, and the result was .70. The second estimate used data for the regulated sector, tax expense rather than tax paid and the result was .39. Lally (2005) noted certain pragmatic difficulties in using firm-specific data, and this points to the use of an industry-wide measure. Consequently, Envestra's first estimate is deficient in using market-wide data and their second is deficient in using tax expense rather than tax paid. Envestra (2006) seem to acknowledge the first criticism by abandoning reference to the earlier estimate of .70. They also seem to at least partly acknowledge the second criticism in re-estimating the ratio using tax paid and then averaging over the resulting estimate of .82 and the earlier estimate of .39, to yield a preferred estimate of .60.

Since only one of the two estimates (.39 and .82) can be appropriate, Envestra's averaging behaviour is strange. Furthermore, they raise four arguments in support of using tax expense rather than tax paid, as follows. Firstly, Envestra argue that the two phenomena should be similar over a long period of time. Such an argument ignores the time value of money: $1 now is not the same as $1 received in ten years. Timing issues are important. Secondly, Envestra argue that the difference between tax paid and tax expense is narrowing. Again, this is irrelevant if the difference is currently substantial, and it is substantial; as shown in Table 1 of their own report (Envestra, 2006), tax paid is less than half of tax expense.

Thirdly, Envestra argue that regulators set output prices on a basis of benchmark costs inclusive of taxation, actual taxes paid will be less than this in so far as a firm can manage its taxes (i.e., engage in tax avoidance), tax expense will not reflect this tax management, tax expense will therefore be closer to the tax benchmark, and is therefore more appropriate. This argument is not correct. The difference between tax expense and tax paid reflects only timing differences, due principally to tax depreciation differing from that used for financial accounting purposes. So, tax expense will not tend to be closer to benchmark tax on account of tax management. However, even if it were, the fact would remain that the Officer (1994) model is being used and that model defines the distribution ratio using tax paid rather than tax expense.

Lastly, Envestra argue that the data invoked by them for firms includes that for non-regulated activities, and therefore "it is not as obvious as it first appears that tax paid is the appropriate variable to use in this case" (ibid, page 8). Having spent the previous paragraphs arguing that tax expense is in fact the appropriate variable, they then appear to contradict themselves in suggesting that tax paid is conceptually correct (but cannot be observed for the regulated part of a firm's activities). Furthermore, the inability to observe tax paid for the regulated activities of a firm cannot induce a preference for tax expense, because tax expense suffers from the same difficulty (it cannot be observed for the regulated part of the firm's activities). To illustrate this point, suppose a firm's imputation credits attached to its dividends are \$10, tax expense is \$50 and tax paid is \$25. The ratio of imputation credits to tax expense is then .20, and the ratio of imputation credits to tax paid is .40. We seek the latter ratio, but for only the regulated part of the firm's business. In the absence of any further information, the best proxy for this must be the ratio for the firm as a whole (i.e., .40) because this proxy converges on the correct ratio as the regulated part of the firm's business converges on the entire business. Using the ratio of imputation credits to tax expense for the firm as a whole cannot be a better proxy, because it fails this basic convergence test.

In summary, Envestra's four arguments in favour of using tax expense rather than tax paid in defining the distribution ratio are invalid, and they undercut their position by averaging over the estimates of the distribution ratio arising from tax paid and tax expense. The appropriate estimate is that based on tax paid and industry-specific data, and therefore should be .82 rather than their preferred estimate of .60.

3. Timing Corrections to the Utilisation Rate for Australian Investors

Although Envestra's (2005) preferred estimate for the utilisation rate *U* within the Officer model was (and still is) zero, they did estimate the utilisation rate for Australian tax-paying investors; the resulting estimate was 0.75 rather than 1, due to legislative and other explanations for lags between the payment of tax and the attachment of credits to dividends. Lally (2005) argues that Envestra's recognition of legislatively induced delays is inconsistent with Australian tax law, which allows immediate attachment of credits. In addition Lally (2005) argues that *any* lags in this area are inconsistent with the way in which Envestra has defined the distribution ratio, as the ratio of imputation credits within a year to the tax for that year.

Envestra (2006) appears to have accepted the first criticism and raised their estimate from .075 to 0.81 to reflect this. However, their new estimate is still subject to the second (and primary) problem; it is inconsistent with the way in which Envestra has defined the distribution rate. Furthermore, Envestra (2006) makes no attempt to rebut this "inconsistency" argument.

In summary, Envestra's response has failed to address the primary criticism in Lally (2005). Consistent with the way in which they have defined the distribution rate, the appropriate estimate for the utilisation rate for Australian tax-paying investors is 1 rather than the 0.81 advanced by Envestra.

4. Foreign Investors and the Utilisation Rate

Envestra (2005) argue that the appropriate utilisation rate *U* for injection into the Officer (1994) model is zero because foreign investors are the price-setters in the regulated sector ("marginal investors") and they cannot use the imputation credits. The controversial claim here is that foreign investors are the price-setters, and Lally (2005) challenges this claim on three bases. Firstly, within the Officer (1994) model, *U* is a weighted average over the utilisation rates of all investors in the market rather than only one group, and this remains true even if that one group dominates the ownership of a particular firm or industry. Secondly, recognition of foreign investors is inconsistent with the assumption in the Officer model that national equity markets are segmented, and the effect of recognising foreign investors in estimating *U* but not otherwise in implementing the Officer model is to drive the allowed output price for a firm *further* away rather than closer to the "correct" answer. Thirdly, Envestra's belief that foreign investors must be the price setters in order to justify their Australian presence fails to recognise diversification benefits that could justify their presence even in the face of asset prices that reflect the benefits of the imputation credits.

4.1 The Issue of Marginal Investors

Envestra respond to each of these points. In respect of the first argument, concerned with price-setting by a subset of investors ("marginal" investors) and possible inconsistency with the Officer CAPM, Envestra argues that recourse to "marginal" investors is consistent with use of the Officer version of the CAPM. In support of this, they assert the absence of any reference to *U* as an average in Officer (1994) and also note Officer's (1994, footnote 5) reference to marginal investors. Both comments are correct and simply reflect Officer's recourse to intuition rather than formal analysis in the derivation of his model. Lally and van Zijl (2003) present a formal derivation of this model, and the definition of *U* arising from that is a weighted average over all investors.

Envestra's response to this is to argue that the Lally and van Zijl model is a "post-personal tax model", and is fundamentally different to the Officer model which is a "pre-personal tax model" (ibid, page 4). This statement is not correct. The Lally and van Zijl model simply generalises the Officer model to allow for differing tax rates on capital gains and ordinary income, and is *identical* to the Officer model if these tax rates are equal (ibid, section 3). Consequently, the parameter *U* within the Lally and van Zijl model is *identical* to that within the Officer model. If Envestra believes that the Officer model is consistent with *U* being defined as the rate for the "marginal" investor, then it needs to present a *formal* derivation that is consistent with their claim. Envestra (2006) also refer to the analysis in Lally (2004, Appendix), which considers market prices rather than discount rates and shows that assets with differing tax advantages across investors will be priced to reflect an average of the differing tax positions rather than the tax position of only one group of investors. Again Envestra attributes this result to the "post-personal tax" nature of the CAPM used and asserts (incorrectly) that the Officer version of the CAPM would produce a different set of asset prices (ibid, page 5); they offer no numerical analysis in support of their claim. Finally, Envestra (ibid, page 6) examine empirical evidence concerned with whether dividends affect expected returns. This evidence is concerned with whether capital gains and interest are differently taxed, and has no relevance to the definition of *U*.

In respect of "marginal" investors, Envestra also argue that prices are "set by the intersection of the demand and supply curves leading to a price at the margin rather than one that reflects some average of demand and/or supply" (ibid, page 4). The claim that prices arise from the intersection of demand and supply is uncontroversial, and it does not imply that some subset of investors determine asset prices. To illustrate this point at the most general level, suppose the supply of some asset is Q_s = 100 units. In addition, there are two investors (1, 2) whose quantity demanded for the asset (Q_1 and Q_2) is decreasing in price (P) as shown in Table 1 below.

Table 1: Equilibrium Price Setting

P	Q_1	Q_2	Q_d	Q_s
$1	100	150	250	100
$2	70	120	190	100
$3	50	90	140	100
$4	30	70	100	100
$5	10	50	60	100

For each price level, aggregate quantity demanded (Q_d) equals the sum of Q_1 and Q_2. The equilibrium price is then $4, at the point where aggregate quantity demanded equals aggregate supply of 100. Consequently, neither of the two investors "determines" the equilibrium price. Instead, the price reflects the demand functions of both investors. Similarly, if investors have differing abilities to utilise imputation credits and this affects their demand for an asset, the equilibrium price of the asset will reflect the capacity to utilise the credits on the part of all investors.

In summary, and contrary to Envestra's claims, there is no role for "marginal" investors in either the Officer model or equilibrium models in general. Furthermore, their claim that there is a fundamental distinction between the Officer and the Lally and van Zijl versions of the CAPM, which explains the role of marginal investors in the Officer model, is also shown to be incorrect.

4.2 The Impact of Foreign Investors on Betas and the Australian MRP

Envestra's (2006) second argument is that foreign investors affect Australian market returns (and therefore betas and the market risk premium). Since these influences cannot be extracted, they argue that it would be inconsistent to extract their influence upon *U*.

To assess this argument, it is useful to recite a regulatory example noted in Lally (2004, page 40), in which the effect of gamma and therefore *U* is captured in the cost of capital (thereby simplifying presentation of the point). The ACCC (2001, pp. 53-54) develops the pre-tax WACC for the Moomba-Adelaide pipeline using the following model

$$k = \left[\frac{R_f + MRP\beta_e}{1 - T_e(1-\gamma)} \right](1-L) + k_d L$$

where *MRP* is the market risk premium for Australia in the Officer (1994) model, T_e is the effective company tax rate, *L* is leverage and k_d is the cost of debt.[1] Inserting

[1] The model here corresponds to equation (7) in Officer (1994) subject to exclusion of the multiplier (1-T_e), so as to generate a pre-tax WACC. The effective tax rate T_e is the statutory rate adjusted for timing differences between tax and economic depreciation (as discussed in ACCC, 2001).

parameter values that are not the subject of controversy here, this pre-tax WACC is as follows.

$$k = \left[\frac{.0561 + MRP\beta_e}{1 - .113(1-\gamma)}\right](.40) + .0681(.60) \qquad (1)$$

Substituting the ACCC's parameter estimates of MRP = .06, β_e = 1.16, and γ = .50 into equation (1), the result is k = .094. Lally (2004, page 40) compares this result with those arising under complete segmentation and complete integration. Under complete segmentation, U is close to 1 (see Lally, 2004) and the ACCC's estimate for the distribution rate is .80.[2] It then follows that γ = 0.80 and therefore k = .092. By contrast, under complete integration, U = 0 and therefore γ = 0. In addition, under complete integration, the terms MRP and β_e are displaced by their counterparts in an international version of the CAPM, and these counterpart values (MRP_w and β_{ew}) are lower for reasons discussed in Lally (2004, section 4.4). Substituting Lally's (2004) estimates of MRP_w = .040 and β_{ew} = .70β_e, along with γ = 0, into equation (1), the result is k = .081. Since the true situation lies between complete segmentation and complete integration, then the appropriate value of k should lie between .081 and .092. So, the effect of recognising the role of foreign investors solely in respect of the parameter γ is to generate an estimate of k = .094 that lies outside the feasible range. Using Envestra's preferred estimate for γ of 0, the resulting estimate of k is .098 and is therefore even further outside the feasible range than the ACCC's estimate.

With this background, we can now return to Envestra's argument. This can be expressed as saying that an estimate of k under complete segmentation must invoke estimates of MRP and β_e under complete segmentation, and these estimates may differ from the ones actually used (.06 and 1.16) because these estimates are affected by the presence of foreign investors. Since these effects cannot be determined then one should consistently employ an estimate of γ that reflects the presence of foreign investors.

[2] This ACCC's estimate for γ of .50 comprises a utilisation rate of U = .625 and a distribution rate of .80. We invoke the ACCC's estimate for the latter parameter because it is not the controversial issue here. Nevertheless, the ACCC's estimate closely matches that arising from section 2 above.

I disagree with this argument in principle, i.e., “consistency” of this form is less important than the need to obtain an estimate of k that lies between the values arising from complete segmentation and complete integration. Thus, even if one cannot estimate the effect of foreign investors upon *MRP* and β_e, one should at least consider the range of plausible values, and from this determine whether $\gamma = 0$ or $\gamma = .80$ generates a more appropriate estimate for k.

I also disagree with Envestra’s claim that the effect of foreign investors upon *MRP* and β_e cannot be estimated. In respect of β_e, this is the sensitivity coefficient of the firm’s equity returns to Australian market shocks. It would therefore be remarkable if it was materially affected by the presence of foreign investors. Nevertheless, this issue is examined in detail in Appendix 1. The analysis recognises two Australian assets, and commences by considering a situation involving complete segmentation. In this situation, the betas of the two assets against the Australian market portfolio are 0.768 and 1.224. The analysis then goes on to consider the consequences of complete integration. Integration leads to both the Australian and foreign investors holding more diversified portfolios, the values of all assets rising, and expected returns falling significantly (especially on the Australian assets). However, there is virtually no effect upon the betas of the Australian assets defined against the Australian market portfolio, with post-integration values of 0.777 and 1.226.

This leaves the Australian market risk premium (*MRP*) to consider. As shown in the Appendix, integration raises risky asset prices and therefore lowers their expected returns. So, *MRP* declines. However, the significant issue is how integration would affect the *estimated* value for *MRP*. The premium has been estimated in a number of ways, and we consider the two approaches that have been most widely used. One such method (following Ibbotson and Sinquefield, 1976) is to average over a long time series of actual returns net of the risk free rate. Since some degree of integration has prevailed since the 1970s, and the data used in this averaging process extends back to 1900 (Dimson et al, 2002), one might expect integration to have reduced the estimate. However, integration raises asset prices and thereby lowers expected returns. The first of these two effects raises the estimate for *MRP* arising from the Ibbotson approach and the second lowers it. So, it is unclear whether integration would have raised or lowered the estimate of *MRP* arising from the Ibbotson approach. However, it is clear that any impact would be slight. To illustrate this, suppose that segmentation prevails, the level of dividends paid on the Australian market portfolio is *DIV*, the expected growth rate in these dividends is .06 and the cost of equity is .12 (comprising a risk free rate of .05 and *MRP* = .07). The value of the market portfolio will then be as follows.

$$V = \frac{DIV(1.06)}{1.12} + \frac{DIV(1.06)^2}{(1.12)^2} + ... = \frac{DIV(1.06)}{.12 - .06} = 17.66DIV$$

Suppose some degree of integration now arises and raises *V* by 20% to 21.2*DIV*. This implies a cost of equity falling from .12 to .11, and therefore *MRP* falling from .07 to .06. Thus, *MRP* is .07 prior to this event, .06 after it and the event induces a one-off increment to actual returns on equity of 20%. If the Ibbotson-type estimate of *MRP* invokes 100 years of data, and the integration event occurs 10 years before the end of this period, then the expected impact of the event upon the Ibbotson-type estimate of *MRP* is as follows.

$$\frac{.20 - 10(.01)}{100} = .001$$

By contrast, if the integration event occurs 30 years before the end of the Ibbotson estimation period, then the impact of the event is to lower the estimate of *MRP* by .001. These effects are small and suggest that the impact of integration upon the Ibbotson-type estimate of *MRP* can be ignored.

The second approach to estimating *MRP* that has been widely used is the forward-looking approach, in which an estimate for *MRP* is chosen that is consistent with the current value of the market portfolio, the current risk-free rate and expected future dividends (Cornell, 1999). Such an approach should generate an estimate of *MRP* that reflects its current value, and therefore impounds whatever degree of integration with other markets that Australia has achieved. Furthermore, estimates arising from this approach tend to be less than those arising from the Ibbotson approach; Lally (2004, section 6.3) estimates the Australian market risk premium at .040-.057 using the forward-looking approach whilst Dimson et al (2002) estimate it at .075 using the Ibbotson approach. In addition, the estimate generally employed by regulators is .06.

All of this suggests that integration has lowered the estimate of *MRP*. The extent to which it has done so is less clear. Lally (2004, section 4.4) estimates the reduction in shifting from complete segmentation to complete integration at about .03 (.06 to .028). As evidenced by continued home country bias, complete integration has not been achieved. Accordingly, the reduction in *MRP* arising from the degree of integration that has been achieved should be much less than .03. This suggests a reduction in *MRP* of no more than .02. Furthermore, the reduction in the *estimate* of *MRP* must be even less than this because conventional estimates of *MRP* tend to place at least as much weight on Ibbotson estimates as forward-looking ones, and the Ibbotson estimates (as shown above) will have responded only marginally to whatever reduction in *MRP* has actually occurred. All of this suggests that the reduction in the estimate of *MRP* induced by integration should be no more than .01. Accordingly, a plausible estimate for *MRP* in the absence of foreign investors would be .06 to .07.

Returning to equation (1), complete segmentation then implies β_e = 1.16, γ = 0.80 (comprising U = 1 and a distribution ratio of .80), and *MRP* in the range of .06-.07. Substitution into equation (1) then implies k = .092-.097. As noted above, complete integration implies k = .081, and the appropriate value should then lie at or between these extremes. Envestra favours an estimate for U and therefore γ of zero; in conjunction with the estimates for β_e and *MRP* that also reflect the presence of foreign investors (1.16 and .060 respectively), the result is k = .098. This value fails to satisfy the bounds. By contrast, using γ= 0.80 along with β_e = 1.16 and *MRP* = .06, the result is k = .092, and this value does satisfy the bounds. If the effective tax rate rose from .113 to .20, the bounds on k would be .076 to .093/.098, Envestra’s approach (using γ= 0) would yield .104 and the approach favoured here (using γ= 0.80) would yield .093. Envestra’s approach would then induce an estimate for WACC that failed to satisfy these bounds even more clearly. By contrast, the approach favoured here will always yield a WACC value that satisfies the bounds because the only variation from the WACC value appropriate under completely segmented markets is to use an estimate of *MRP* that is likely to be too low and this slightly lowers the WACC value.

In summary, the presence of foreign investors may have induced a reduction in the estimate of *MRP*. However, this will not be sufficient to alter the fact that an estimate for *U*, and hence γ, of zero will induce a WACC estimate that lies outside the bounds arising from complete segmentation and complete integration. By contrast, using an estimate for *U* of 1 will give rise to a WACC estimate that satisfies these bounds.

4.3 Expected Returns and Required Returns

In respect of the third argument, Envestra (2005) have argued that foreign investors must be determining prices in the regulated sector because determination of prices by local investors (who benefit from imputation credits) would induce higher prices, foreign investors would then fail to cover their "required return" and this is inconsistent with their significant ownership stakes in this sector. Lally (2005) argues that the implied comparison of expected with required returns is inconsistent with how investors choose portfolios in all versions of the CAPM. In particular, they trade off expected returns on assets against their contribution to portfolio risk. Thus, even if the prices of Australian assets largely reflect the benefits of imputation credits, foreign investors will still be induced to buy Australian assets because of their low contribution to the portfolio risk of these foreign investors. Accordingly, there is no inconsistency between prices at least partly reflecting the benefits of imputation credits and foreign holdings of these assets.

Envestra's (2006) response to this is to argue that investors, particularly those seeking controlling stakes, are motivated by the search for positive NPV projects rather than risk diversification. Implicitly, Envestra are referring to corporate investors here. The claim that corporate investors are motivated by the search for positive NPV projects is uncontroversial, and simply mirrors the desires of their shareholder owners, i.e., the search for NPV positive projects by foreign companies reflects the desire by their owners for portfolios with a superior trade-off between expected return and risk. So, Envestra's (uncontroversial) claim not only fails to address the critique in Lally (2005) but it reinforces the point that foreigners will buy some Australian assets even if the prices of these assets largely reflect the benefits of imputation credits.

In summary, Envestra's response not only fails to rebut the earlier criticism but it reinforces the point that foreigners will invest in Australia even if the prices of Australian assets largely reflect the benefits of imputation credits.

5. Market Weights

Although Envestra (2005) consider that the relevant investors for determining the utilisation rate *U* are foreigners, and therefore the appropriate value for *U* is zero, they also generate an estimate of $U = .30$ by averaging over the utilisation rates of all major holders of Australian equities including foreigners and inter-corporate shareholdings (ibid, Table 7); this induces an estimate for gamma of 0.21. Lally (2005) argues that, although the use of market-wide weights is appropriate, the resulting estimate is flawed by including unlisted equity holdings to estimate the market weights of these groups, by including inter-corporate and foreign shareholdings, and by ascribing a utilisation rate of .50 rather than 1 to superannuation funds and insurance companies.

Envestra (2006, page 17) appear to accept the latter criticism, and to have revised their estimate for *U* accordingly (from .30 to .56). However, it is impossible to be sure on this matter because their paper contains no counterpart to the earlier Table 7 in which this detail was shown. In respect of inter-corporate and foreign shareholdings, Envestra (2006) do not respond on this point and it is unclear from their new estimate whether they agree with this point. Envestra (2006) do reject the criticism relating to the inclusion of unlisted equity holdings in determining these market weights. In particular, they argue that use of only listed equity for estimating the market risk premium and betas (on the grounds that returns data for unlisted equity is unavailable) should not preclude use of all equity for the purpose of assessing market weights, i.e., one should at each point use the best available data and not be constrained by "consistency" concerns (ibid, page 12). In support of this position, they argue that *U* is not a CAPM parameter. By implication, they would exclude unlisted equity in estimating *U* if it was a CAPM parameter. However, the parameter *U* arises within the market risk premium of the Officer (1994) model and is therefore a CAPM parameter.

The practical effect of all of these points is slight because Envestra (2006) favours an estimate for U of zero rather than 0.56.

6. Market Weights for the Regulated Sector

Although Envestra (2005) consider that the relevant investors for determining the utilisation rate U are foreigners, and therefore the appropriate value for U is zero, they also generate an estimate of $U = .375$ using the market weights for all investors in the regulated sector, and this leads to an estimate for gamma of 0.26. Lally (2005) argues that, quite apart from the estimates for the utilisation rates of the individual investor types, this estimate is flawed in failing to use market-wide weights as required in the Officer (1994) model.

Envestra's (2006) response is to argue that marginal investors are relevant, and the marginal investors implicit in this estimate are those in the regulated sector. This point has been addressed in section 4.1, i.e., the definition of U arising within the Officer (1994) model is a weighted average over all investors rather than those in a particular sector, company or domicile.

The practical effect of all of these points is slight because Envestra (2006) favours an estimate for U of zero rather than 0.375.

7. Consistent Estimates of Gamma and the Market Dividend Yield

Envestra (2006) finally presents a new argument in favour of a gamma value of zero, derived from SFG (2005) as follows. Firstly, letting T denote the statutory corporate tax rate, the following proportion of the cost of equity is attributable to imputation credits.

$$\frac{\gamma T}{1-T(1-\gamma)} \qquad (2)$$

With $T = .30$, and $\gamma = 1$, this proportion is .30. Secondly, in conjunction with a risk free rate of .06 and the generally employed estimate for MRP of .06, the cost of equity for the market portfolio is .12. Application of the above proportion to this cost of equity yields .036 attributable to imputation credits. Thirdly, the latter figure is related to the market dividend yield D_m as follows.

$$\frac{TD_m}{1-T} = .036$$

With T = .30, the implied market dividend yield is D_m = .084. This figure is far removed from observed values for D_m of .028-.044 in the period 1990-2005. Consequently, a gamma value of 1 is implausible, and so U = 1 is also implausible[3]. By contrast, if gamma is set to zero (i.e., U = 0), then the inconsistency disappears. Unstated, but implied here, is that even gamma values that are close to 1 (such as .80) would imply values for D_m that are far too large.

The impression given by SFG is that only two assumptions are made: the value of gamma is close to 1 and *MRP* is .06. If that was the case, the argument would be persuasive. However, the argument rests upon two further assumptions. Firstly, SFG assume that the market portfolio is a "level perpetuity" and that[4]. Secondly, they assume that taxable income is equal to pre-tax cash flow[5]. To see this, let X denote a

[3] Since gamma is the product of the utilisation rate on imputation credits and the proportion of company tax that is passed through to equity holders in the form of imputation credits, and neither component can exceed 1, then a gamma of 1 implies that each of these components must also be 1.

[4] SFG develop their claim that equation (2) describes the proportion of the cost of equity attributable to imputation credits in the context of the WACC formulations in both equations (1) and (3) of their paper. These WACC formulations correspond to the first and third WACC formulations in Officer (1994). The first of them assumes a level perpetuity, and therefore it is Officer rather than SFG who is the source of the level perpetuity assumption here. However, the Officer version of the CAPM (Officer, 1994, equation 18) does not itself rest upon a level perpetuity assumption. Furthermore, the WACC formulation in SFG's equation (3) does not rest upon a level perpetuity assumption, although Officer chooses to invoke such a scenario in developing it. In developing their claim that equation (2) above describes the proportion of the cost of equity attributable to imputation credits in the context of the WACC formulation in their equation (3), SFG's proof assumes a level perpetuity, through equating the cash flow from operations net of tax and interest with the payoff to equityholders, and thereby ruling out capital gains (SFG, 2005, page 9). The WACC formulation employed by the QCA and generally by Australian regulators is Officer's third WACC formulation (Officer, 1994, page 7), corresponding to SFG's equation (3), and this does not require a level perpetuity scenario to prevail. So, in summary, SFG are invoking a level perpetuity assumption rather than merely reflecting an assumption in the underlying Officer model.

[5] This assumption is reflected in the cash flow formulations associated with all three of Officer's WACC formulations (Officer, 1994). However, this assumption does not underlie the Officer version of the CAPM. Furthermore, the cash flow formulation employed by the QCA, and generally by Australian regulators, does not invoke this assumption although they do invoke Officer's third WACC formulation. There is no inconsistency between such a cash flow formulation and the use of Officer's third WACC formulation.

firm's current annualised pre-tax cash flow to equity holders. With pre-tax cash flows equal to taxable income, the taxation paid is then .30*X*. With gamma equal to 1, all imputation credits must be distributed and therefore the cash dividend must be equal to .70*X*. The gross dividend (inclusive of the imputation effects) is *X*. Assuming a level perpetuity, the value of this firm is then as follows.

$$V = \frac{X}{1+\hat{k}_e} + \frac{X}{(1+\hat{k}_e)^2} + ... = \frac{X}{\hat{k}_e} \tag{3}$$

where $\hat{k}_e$ is the cost of equity inclusive of imputation credits. With the latter value set at .12, the value of the firm is then $V = 8.33X$ and the current cash dividend yield is

$$\frac{DIV}{V} = \frac{.70X}{8.33X} = .084$$

This accords with the figure claimed by SFG. As they rightly observe, this is well in excess of observed levels.

We now consider the implications of relaxing their two implicit assumptions whilst retaining their explicit assumption that *MRP* is .06. We also assume that $U = 1$ and leave the distribution rate to be determined endogenously. In respect of expected growth in the firm's cash flows, this arises from inflation and also from retention and investment of some internally generated cash flow. Suppose there is no retention but the inflation rate *i* is positive. Equation (3) is then transformed as follows.

$$V = \frac{X(1+i)}{1+\hat{k}_e} + \frac{X(1+i)^2}{(1+\hat{k}_e)^2} + ... = \frac{X(1+i)}{\hat{k}_e - i}$$

With $i = .03$, along with $\hat{k}_e = .12$ as before, the value of the firm rises to $V = 11.44X$ and the cash dividend yield then falls to

$$\frac{DIV}{V} = \frac{.70X}{11.44X} = .061$$

This dividend yield is below the figure of .084 claimed by SFG but still in excess of observed levels for the market portfolio. Also, with U = 1 and all tax payments imputed (distribution rate = 1), gamma is equal to 1. So, a gamma of 1 and *MRP* of .06 is consistent with a market dividend yield of much less than .084 merely by acknowledging inflation of .03.

Now suppose that the firm retains 35% of its post-tax cash flow, and reinvests it at a *real* expected post-tax return of .10.[6] In particular, assume that all new investment is expected to generate a *real* expected post-tax cash flow of $0.10 forever per $1 invested. We also relax SFG's second implicit assumption, i.e., that pre-tax cash flow is equal to taxable income. In particular, we assume that taxable income is 60% of pre-tax cash flow; this difference could arise from tax avoidance strategies, past tax losses, and/or depreciation deductions that are not offset by replacement expenditures[7]. Letting Y_t denote the post-tax cash flow from operations in year t prior to any deductions for retention, it follows that

$$E(Y_{t+1}) = \left[E(Y_t) + .35E(Y_t)(.10)\right](1.03)$$
$$= E(Y_t)(1.066)$$

So, post-tax cash flows are expected to grow at .066 per year due to both retention and inflation.[8] The current cash dividend would be

$$DIV = [X - .30(.60X)].65 = .533X \qquad (4)$$

and the tax payments of .30(.60X) = .18X are within the maximum attachment rate of .43. Thus, all tax payments can be imputed, and the gross dividend is therefore equal

6 This implies a nominal post-tax expected rate of return of .13. To this must be added the imputation credit benefits, and the resulting rate will therefore exceed the cost of equity capital of .12. So, the investment is NPV positive.

7 Envestra (2006, Table 1) report tax payments for the regulated sector that are less than half of tax expense, with the difference due to timing issues. This is consistent with taxable income being less than pre-tax cash flow.

8 The analysis here follows Gordon and Shapiro (1956) and Lally (1988).

to the cash dividend of .533*X* plus the tax payments of .18*X*, i.e., .713*X*. With an expected growth rate of .066 and a cost of equity of .12, the value of the firm is then as follows.

$$V = \frac{.713X(1.066)}{1.12} + \frac{.713X(1.066)^2}{1.12^2} + ... = \frac{.713X(1.066)}{.12 - .066} = 14.08X$$

Invoking the last two equations, the current cash dividend yield is then as follows.

$$\frac{DIV}{V} = \frac{.533X}{14.08X} = .038$$

This dividend yield is entirely compatible with the values cited in SFG (2006). In addition, with $U = 1$ and all tax payments imputed, then gamma is 1.

Even if taxable income is 80% rather than 60% of pre-tax cash flow, the implications are not dramatic. Returning to equation (4), the cash dividend is then .494*X* whilst the tax payments are .24*X*. With a maximum attachment rate of .43, the maximum attachment of credits is only .212*X*. Consequently, the current gross dividend yield is the cash dividend of .494*X* plus the imputation credits of .212*X*, i.e., .706*X*. The value of the firm is then

$$V = \frac{.706X(1.066)}{1.12} + \frac{.706X(1.066)^2}{1.12^2} + ... = \frac{.706X(1.066)}{.12 - .066} = 13.94X$$

The current cash dividend yield is then as follows.

$$\frac{DIV}{V} = \frac{.494X}{13.94X} = .035$$

In addition, the distribution rate for tax payments is .212*X*/.24*X* = 0.88. With $U = 1$, gamma is therefore 0.88, i.e., still close to 1.

In summary, a market risk premium of .06 and gamma at or close to 1 are perfectly consistent with a cash dividend yield of .03-.04, providing one recognises that firms' cash flows are expected to grow and taxable income diverges from pre-tax cash flow. SFG's erroneous conclusion that a gamma of close to 1 and a market risk premium of .06 cannot be reconciled with a cash dividend yield of .03-.04 springs from failing to recognise that cash flows are expected to grow and taxable income diverges from pre-tax cash flow.

8. Conclusions

Envestra has revised their earlier paper on the appropriate value for gamma, in order to respond to certain criticisms of their earlier work and to present a further argument in support of a gamma value of zero. My responses to these points are as follows.

In respect of the distribution ratio, which is defined as the credits attached to dividends as a proportion of company tax paid, Envestra's preferred estimate is now .60 arising from averaging over estimates from using tax paid (.82) and from using tax expense (.39), with industry-specific data. They present a number of arguments in favour of using tax expense rather than tax paid, and these are shown to be invalid. The appropriate estimate is that based on tax paid and industry-specific data, and therefore should be .82 rather than their preferred estimate of .60.

In respect of the utilisation rate for Australian tax-paying investors, Envestra appears to now accept that there is no legislatively induced lag between the payment of tax and the attachment of credits to dividends, and this leads them to raise their estimate of the utilisation rate for this group from 0.75 to 0.81. However, their continued recognition of delays between the payment of tax and the attachment of imputation credits is inconsistent with the way in which they have defined the distribution ratio, as the ratio of imputation credits within a year to the tax for that year. Furthermore, this point has been raised previously and they have not responded to it. Consistent with the way in which they have defined the distribution rate, the appropriate utilisation rate for Australian tax-paying investors is 1 rather than 0.81.

In respect of the utilisation rate *U* that should be injected into the Officer model, Envestra continues to argue that foreign investors are the price-setters (marginal investors) in the regulated sector, that they cannot use the imputation credits, and this implies a utilisation rate *U* of zero; it follows that the appropriate value for gamma is zero. The controversial claim here is that equity prices are fully determined by foreigners, and I have previously challenged this argument on three bases. Firstly, within the Officer (1994) model, *U* is a weighted average over the utilisation rates of all investors in the market rather than only one group, and this remains true even if that one group dominates the ownership of a particular firm or industry. Envestra's response is to argue that both the Officer model and equilibrium price-setting in general prescribe a role for marginal investors. However, both claims are shown to be false. Furthermore, their claim that there is a fundamental distinction between the Officer and the Lally and van Zijl versions of the CAPM, which explains the role of marginal investors in the Officer model, is also shown to be incorrect.

Secondly, recognition of foreign investors is inconsistent with the assumption in the Officer model that national equity markets are segmented, and the effect of recognising foreign investors in estimating *U* but not otherwise in implementing the Officer model is to drive the allowed output price for a firm *further* away rather than closer to the "correct" answer. Envestra's response is to argue that foreign investors influence estimates of betas and the Australian market risk premium, these influences cannot be extracted, and therefore it would be inconsistent to extract their influence upon *U*. However it is shown that foreign investors have no appreciable impact upon betas and their impact upon the estimate of the Australian market risk premium is insufficient to change the fact that recognising their impact upon *U* will drive the allowed output price for a firm *further* away rather than closer to the "correct" answer.

Thirdly, and in response to Envestra's belief that foreign investors must be the price setters in order to justify their Australian presence, I have previously argued that diversification benefits would still justify their presence even in the face of asset prices that reflect the benefits of the imputation credits. Envestra's response to this is to argue that (corporate) investors are motivated by the search for positive NPV projects rather than risk diversification. This new claim is quite uncontroversial and simply reinforces the point made earlier: foreign investment in Australia does not require Australian equity prices to be unaffected by the value of the imputation credits.

In respect of Envestra's estimate for *U* arising from averaging over the utilisation rates of all investors including foreigners and inter-corporate shareholdings, Envestra have raised their earlier estimate of .30 to .56 in response to criticisms relating to the appropriate utilisation rate for superannuation funds and insurance companies. However they do not respond to a further criticism relating to their inclusion of inter-corporate shareholdings. Finally, they reject the criticism of acting inconsistently over their choice of the proxy for equity and, in support of this position, they argue that *U* is not a CAPM parameter. This claim is shown to be false. The practical effect of all of these points is slight because Envestra's preferred estimate for *U* is zero rather than .56.

In respect of Envestra's estimate for *U* of .375 arising from averaging over the utilisation rates of all investors in the regulated sector, I have argued that the weights used in this estimate are flawed in not being market-wide weights as required in the Officer model. Envestra's response is to argue that marginal investors are relevant, and the marginal investors implicit in this estimate are those in the regulated sector. This argument has been addressed and rebutted earlier, i.e., the definition of *U* arising within the Officer model is a weighted average over all investors rather than those in a particular sector, company or domicile. The practical effect of all of these points is slight because Envestra's preferred estimate for *U* is zero rather than .375.

Finally, Envestra argue that a market risk premium of .06 and a gamma at or close to 1 imply a market dividend yield well in excess of that observed, and this implies that gamma cannot be at or close to 1. However, this line of argument also assumes that firms' cash flows are not expected to grow and that taxable income is equal to pre-tax cash flow. Both assumptions are clearly false, and recognition of this undercuts Envestra's argument. In particular, with positive inflation, retention of some cash flow by firms and moderate deviations of taxable income from pre-tax cash flow, a market risk premium of .06 and gamma close to 1 are perfectly consistent with observed levels for the market dividend yield.

Having responded to Envestra's arguments, my view is as follows. In respect of the distribution ratio, the appropriate value for the regulated sector as a whole is about .80 as indicated above. In respect of the utilisation rate, this should be a weighted average over classes of investors, it requires no adjustment for distribution lags, and it should exclude foreigners so as to generate an output price for a regulated firm that lies within the bounds arising from complete segregation and complete integration. The resulting estimate for U is close to 1. Coupled with the distribution rate of .80, the resulting estimate for gamma is about .80 for the regulated sector as a whole rather than the estimate of zero favoured by Envestra.

APPENDIX 1

This appendix seeks to determine whether the presence of foreign investors in a market materially affects the betas of the local assets against the local market portfolio. To do so, a one-period model is invoked, i.e., assets generate a single future payoff.

Suppose Australia is a segregated market with a risk free asset (asset 1), two risky assets (2 and 3), and one (representative) investor denoted *A*.[9] Letting $E(X_j)$ denote the expected payoff on risky asset j at the end of the period, $Cov(X_2, X_3)$ the covariance between the payoffs on risky assets 2 and 3, R_f the risk free rate, λ_A denote a measure of risk aversion for investor A, and N_{jA} denote the units of asset j desired by investor *A*, Hirshleifer (1970, Ch. 12) shows that the prices for the two risky assets (P_2, P_3) are as follows.

$$P_2 = \frac{E(X_2) - \lambda_A [N_{2A} Var(X_2) + N_{3A} Cov(X_2, X_3)]}{1 + R_f} \qquad \text{(A1)}$$

$$P_3 = \frac{E(X_3) - \lambda_A [N_{2A} Cov(X_2, X_3) + N_{3A} Var(X_3)]}{1 + R_f} \qquad \text{(A2)}$$

Suppose the expected payoff on each risky asset is \$1, $R_f = .05$, $Var(X_2) = .0625$, $Var(X_3) = .1225$, $Cov(X_2, X_3) = .044$ and $\lambda_A = .05$. In addition, there are 10 units of each risky asset, and this supply must correspond to the representative investor's desired holding, i.e., $N_{2A} = 10 = N_{3A}$. Substitution of these values into equations (A1) and (A2) yields prices for the two risky assets of P_2 = \$0.902 and P_3 = \$0.873. In turn this implies market weights on the two assets of .508 and .492, expected returns of .109 and .145, an expected return on the Australian market portfolio of .127, and therefore a market risk premium of .077. The variance of returns on each of the risky assets, and the covariance between their returns, are then as follows.

[9] To investigate the issue of interest here, it is necessary to formally acknowledge at least two risky assets in the Australian market. However it is not necessary to formally acknowledge multiple investors, and doing so simply complicates the analysis.

$$Var(R_2) = \frac{Var(X_2)}{P_2^2} = \frac{.0625}{(0.902)^2} = .0769$$

$$Var(R_3) = \frac{Var(X_3)}{P_3^2} = \frac{.1225}{(0.873)^2} = .1607$$

$$Cov(R_2, R_3) = \frac{Cov(X_2, X_3)}{P_2 P_3} = \frac{.044}{(0.902)(0.873)} = .0559$$

Coupled with the market weights of the two assets, the variance of the Australian market portfolio's return is then .0867 and the betas of the two assets against the market portfolio are then as follows.

$$\beta_{2m} = \frac{Cov(R_2, R_m)}{.0867} = \frac{Cov(R_2, .508R_2 + .492R_3)}{.0867} = \frac{.508Var(R_2) + .492Cov(R_2, R_3)}{.0867} = .768$$

$$\beta_{3m} = \frac{Cov(R_3, R_m)}{.0867} = \frac{Cov(R_3, .508R_2 + .492R_3)}{.0867} = \frac{.508Cov(R_2, R_3) + .492Var(R_3)}{.0867} = 1.240$$

We now suppose that the Australian market is integrated with the rest of the world, which is represented by one further risky asset (asset 4) and one further investor (*F*). There are 40 units of this additional asset, it has expected payoff of $E(X_4)$ = \$1, $Var(X_4)$ = .055, and it is uncorrelated with each of the two Australian risky assets.[10] In respect of the additional investor, their risk aversion parameter is λ_F = .025.[11] Both the Australian and foreign investors now have a choice of three risky assets and the risk free asset, which is assumed to still yield .05 for both investors. In equilibrium, the prices of the three risky assets (P_2, P_3, P_4) and the numbers of units of these assets held by each of the two investors (N_{2A}, N_{3A}, N_{4A}, N_{2F}, N_{3F} and N_{4F}) must satisfy the following nine equations, of which the first six follow (A1) and (A2) and the remaining three are equilibrium conditions.[12]

[10] A zero correlation is in recognition of the fact that foreign assets are less highly correlated with local assets than local assets are with other local assets.

[11] Under segregation of markets, with a risk free rate of .05 in the foreign market, these parameter values for the foreign asset and the foreign investor induce an expected return on the foreign risky asset of .111, and therefore a market risk premium of .061.

[12] There are a further two equations, which involve the budget constraints for each of the two investors. These equations yield each investor's holdings of the risk free asset, and are not needed to solve the above set of nine equations.

$$P_2 = \frac{\$1 - .05[N_{2A}(.0625) + N_{3A}(.044)]}{1.05}$$

$$P_3 = \frac{\$1 - .05[N_{2A}(.044) + N_{3A}(.1225)]}{1.05}$$

$$P_4 = \frac{\$1 - .05[N_{4A}(.055)]}{1.05}$$

$$P_2 = \frac{\$1 - .025[N_{2F}(.0625) + N_{3F}(.044)]}{1.05}$$

$$P_3 = \frac{\$1 - .025[N_{2F}(.044) + N_{3F}(.1225)]}{1.05}$$

$$P_4 = \frac{\$1 - .025[N_{4F}(.055)]}{1.05}$$

$$N_{2A} + N_{2F} = 10$$

$$N_{3A} + N_{3F} = 10$$

$$N_{4A} + N_{4F} = 40$$

The solution to this set of equations is P_2 = \$0.9355, P_3 = \$0.9260, P_4 = \$0.9175, N_{2A} = 3.33, N_{3A} = 3.33, N_{4A} = 13.33, N_{2F} = 6.67, N_{3F} = 6.67 and N_{4F} = 26.67. As one would expect, each of the two investors now holds a more diversified portfolio than before, the values of all three risky assets have risen and their expected returns have fallen (from .109, .145 and .111 to .069, .080 and .090. Focusing upon the two Australian risky assets, their weights in the Australian market portfolio are now slightly different at .503 and .497. The variances for their returns, and the covariance between their returns, are also slightly different. Calculated in the way shown above, they are as follows.

$$Var(R_2) = .0714, \quad Var(R_3) = .1429, \quad Cov(R_2, R_3) = .0508$$

Using these new weights, variances and covariance, the variance of the return on the Australian market is now .0788. Using all of these new results, the betas of these two assets against the Australian market portfolio are then as follows.

$$\beta_{2m} = \frac{Cov(R_2, R_m)}{.0788} = \frac{Cov(R_2, .503R_2 + .497R_3)}{.0788} = \frac{.503Var(R_2) + .497Cov(R_2, R_3)}{.0788} = .777$$

$$\beta_{3m} = \frac{Cov(R_3, R_m)}{.0788} = \frac{Cov(R_3, .503R_2 + .497R_3)}{.0788} = \frac{.503Cov(R_2, R_3) + .497Var(R_3)}{.0788} = 1.226$$

These results are only trivially different to those prevailing under segmentation, of 0.768 and 1.240 respectively. Thus, whilst the integration of the Australian market with the rest of the world has markedly changed the portfolios held by investors and markedly lowered expected returns, there is no material effect upon the betas of the Australian assets defined against the Australian market portfolio.

In summary, and contrary to Envestra's implication, the betas of Australian assets defined against the Australian market portfolio are not materially affected by the presence of foreign investors.

REFERENCES

ACCC, 2001. *Final Decision: Access Arrangement Proposed by Epic Energy South Australia Pty Ltd for the Moomba to Adelaide Pipeline System*.

Cornell, B., 1999. *The Equity Risk Premium*, John Wiley & Sons, New York.

Dimson, E., Marsh, P. and Staunton, M. 2002, *Triumph of the Optimists*, Princeton University Press, Princeton.

Envestra, 2005. *The Value of Imputation Credits for Regulatory Purposes*.

_______ 2006. *Comments on the Review by Martin Lally of "The Value of Imputation Credits for Regulatory Purposes"*.

Gordon, M. and Shapiro, E., 1956. 'Capital Equipment Analysis: The Required Rate of Profit', *Management Science*, vol. 3, pp. 102-10.

Hirshleifer, 1970. *Investment, Interest and Capital*, Prentice-Hall, Englewood Cliffs.

Ibbotson, R. and Sinquefield, R., 1976. 'Stocks, Bonds, Bills and Inflation: Year-by-Year Historical Returns (1926-1974)', *Journal of Business*, pp. 11-47.

Lally, M., 1988. 'The Gordon-Shapiro Dividend Growth Formula and Inflation', *Accounting and Finance*, vol. 28, pp. 45-51.

_______ 2004. *The Cost of Capital for Regulated Entities*, report prepared for the Queensland Competition Authority (www.qca.org.au/ports).

_______ 2005. *Review of "The Value of Imputation Credits for Regulatory Purposes"*.

_______ and van Zijl, T., 2003. 'Capital Gains Tax and the Capital Asset Pricing Model', *Accounting and Finance*, vol. 43 (2), pp. 187-210.

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

SFG Consulting, 2005. *The Relationship Between Franking Credits and the Market Risk Premium: Implications for Regulatory Cost of Capital*.