Report prepared for the

Australian Energy Regulator

Further Comments on the Valuation of Imputation Credits

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1. INTRODUCTION

Pursuant to the National Electricity Rules, the Australian Energy Regulator (AER) is currently undertaking a review of the weighted average cost of capital (WACC) parameters to be adopted in determinations for electricity transmission and distribution network service providers. As part of the process, the AER released an Explanatory Statement[1] in December 2008 setting out its draft position, and in relation to which a number of interested parties have since made submissions. The AER has now sought further advice on the following matters in relation to the valuation of imputation credits[2]:

- Payout ratio: respond to and critique the Joint Industry Association's (JIA) arguments regarding the appropriate payout ratio, including specific discussion on the time value of money, the ability to distribute retained credits and the consistency with the MRP (i.e. the extent to which the value of retained credits is capitalised into share prices).

- Theoretical framework: respond to and critique the JIA's arguments regarding the appropriate theoretical framework for estimating theta, including specific discussion on the market definition and the representative investor, the appropriate weighting to apply to foreign investors and NERA's general equilibrium single period model of two representative investors.

- Use of tax statistics to estimate theta: respond to and critique the JIA's arguments regarding redemption / utilisation rates, including specific discussion on NERA's arguments on the role of the market definition and the costs of accessing credits (i.e. lost diversification) and SFG's counterfactual example regarding foreign ownership restrictions.

- Interpretation of results from dividend drop-off studies: respond to arguments regarding the impact of risk and differential taxes on ex-dividend day pricing.

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1 Australian Energy Regulator (2008).

2 The terms "imputation credit" and "franking credit" are used interchangeably in this report.

- The value of cash dividends and consistency with the CAPM: respond to and critique arguments regarding the evidence from dividend yield and US drop-off studies and the relationship between credit yields and equity returns.

- Market practice: respond to and critique arguments relating to possible inferences from observed market practice, the impact of gamma on company values using the Officer framework and consistency between the cash flows and the discount rate.

Each of these issues is now considered in turn. This report should be read in conjunction with my earlier report to the AER on the valuation of imputation credits.[3] It is noted that much of this discussion is highly technical but this is the nature of the arguments under consideration.

[3] Handley (2008).

2. PAYOUT RATIO

The Key Issue

The first issue concerns the conceptual definition of the value of an imputation credit. The traditional approach of regulators is to define the value of an imputation credit as the product of a credit distribution or payout ratio – representing the proportion of credits generated that are distributed to shareholders, and a credit utilisation or redemption rate – representing the per dollar value of a distributed credit i.e.

$$\gamma = F \times \theta \tag{1}$$

where F is the distribution or payout ratio, θ (theta) is the utilisation rate and γ (gamma) is the value of one dollar of imputation credits.[4]

The AER has concluded that, for the purposes of estimating gamma, it is appropriate to set the distribution ratio equal to one i.e. $F = 1.0$. This is equivalent to assuming that gamma represents the per dollar value of a distributed imputation credit i.e. $\gamma = \theta$.[5]

In contrast, the JIA has expressed the view that, for the purposes of estimating gamma, the traditional approach should continue to be used and further, that it is appropriate to set the distribution ratio equal to the (estimated) market average payout ratio of 0.71 i.e. $F = 0.71$. For example, NERA conclude:

> *"The standard definition of gamma should be retained by the AER, ie, gamma is the product of an expected payout ratio (F) and the market value of imputation credits distributed as a proportion of their face value (θ)."*[6]

[4] As noted in my earlier report, this approach also appears in certain finance literature including Monkhouse (1996), (1997), Hathaway and Officer (2004) and Cannavan, Finn and Gray (2004).
[5] Also see Cannavan, Finn and Gray (2004 p.170).
[6] NERA Economic Consulting (2009 p.8).

"The most appropriate estimate of the payout ratio for both electricity transmission and distribution network service providers is the estimate of the market average payout ratio of 0.71 provided by Hathaway and Officer." [7]

Analysis and discussion

As noted in my earlier report, the traditional approach in equation (1) implicitly assumes that retained imputation credits have zero value.[8] So the point of debate concerns not only the payout ratio but also the value of a retained credit. This is consistent with NERA who argue that: (i) in practice firms do not pay out 100% of their free cash flow and attached imputation credits each period; (ii) time value of money considerations mean that the value of a retained credit is less than the value of a distributed credit:

"Postponing the distribution of free cash flows and the franking credits attached to them will reduce the value of the credits because retained credits cannot be invested by a firm to generate future revenues. Further, using retained earnings to finance new investment can also lead to the build up of unpaid credits" [9]*;*

and (iii) a regulated transmission and distribution business is unlikely to distribute its retained credits in the foreseeable future, including by way of special dividend and share buy back arrangements, and so:

"retained imputation credits have little or no value to investors".[10].

NERA suggests that two factors are relevant to the valuation of a retained imputation credit, the appropriate rate at which to discount retained credits (which they suggest to be the cost of equity) and the period over which the credits are likely to be retained. There is nothing controversial in NERA's illustrative calculations of the time value loss associated with the retention of an imputation credit except to say that it is not obvious that the cost of equity is the appropriate discount rate – for retained credits are available for immediate distribution from a firm's franking account balance whereas (expected)

7 NERA Economic Consulting (2009 p.10).
8 Handley (2008 p.5).
9 NERA Economic Consulting (2009 p.4).
10 NERA Economic Consulting (2009 p.i).

future imputation credits need to be generated from (expected) future profits – and that the estimation of an appropriate retention period is likely to be particularly challenging.[11]

In my earlier report, I argued that the assumption of a 100% payout ratio, for the purposes of estimating gamma, is consistent with the influential WACC framework developed by Officer (1994). Recall, it is Officer (1994) who first suggested that under the Australian imputation system, tax paid at the company level may be viewed as a form of personal withholding tax paid by the company on behalf of its underlying shareholders, and he introduced the now widely adopted notation γ to represent the value of (a dollar of) imputation credits. A key assumption underlying the Officer (1994) framework is that all cash flow streams, including associated imputation credits, are perpetuities which means that 100% of the free cash flow and 100% of the associated imputation credits generated in each period are fully distributed at the end of that period. This assumption is consistent with the standard WACC valuation framework (within a classical tax environment) due to Miller and Modigliani (1961).[12] As a result, the question of whether it is necessary to decompose gamma into F and θ, does not arise in Officer (1994), because all credits created in a period are assumed to be fully distributed at the end of that period (and so no credits are retained).

The traditional approach in (1) appears to have originated with Monkhouse (1996) who relaxes the perpetuity assumption of Officer (1994) to consider the valuation of projects with uneven and or finite cash flows. Of more relevance, Monkhouse (1996) also relaxes the assumption of 100% payout of imputation credits each period. In particular, he allows for less than a 100% payout of credits in a period and the time value loss associated with the retained credits, by (initially) defining gamma as:

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[11] In comparison to NERA's choice of the cost of equity, it is suggested here that the appropriate discount rate would likely be between the risk free rate and the cost of equity. Table 2.3 in NERA (2009) assumes discounting occurs at the cost of equity but the time loss is substantially reduced if discounting is instead done at the risk free rate. For example, using a risk free rate of 5.4% per annum and assuming a retention period of 10 years leads to the value of a retained credit of 59% of face value compared to 38% as shown in the Table 2.3. Similarly, if an imputation credit is retained for 5 years then the value of a retained credit is 77% of face value compared to 62% as shown in the Table 2.3.

[12] Miles and Ezzell (1980) discuss the conditions under which the (classical) WACC framework applies to projects with uneven and or finite cash flows – essentially that the level of business risk and financial risk remain constant over time – and like Miller and Modigliani (1961), assume a 100% payout of free cash flow in each period.

$$\gamma = F \times \theta + (1 - F) \times \psi \qquad (2)$$

where F is the proportion of credits generated in the period that are paid out in the period, θ (theta) is per dollar value of a distributed credit and ψ (psi) is the per dollar value of a retained imputation credit, where $\psi < \theta$ due to time value loss associated with retaining credits.[13] Equation (2) says that gamma should be interpreted as a weighted average of the value of a distributed credit and the value of a retained credit and thereby the time value of money effects (associated with the retention of imputation credits) are taken into account in determining the gamma. It is noted, however, that a more direct approach would be to discount the stream of (the value of) distributed credits over time and thereby avoid the need to estimate the value of a retained credit. Monkhouse (1996) then makes the critical assumption that retained credits have no value:

> *"The question then arises as to the value of retained imputation credits in the last period. While they could be valued, for the sake of simplicity and with little loss of accuracy, it is assumed that retained imputation credits in the last period of a multi-period cash flow will have negligible value. This assumption is also consistent with the fact that imputation credits have no value unless they are distributed to shareholders" (p.198),*

and so substituting $\psi = 0$ into (2) leads to his revised definition of gamma: [14]

$$\gamma = F \times \theta \qquad (1)$$

It is noted that an implication of (1) is that credits retained at the end of each and every period, and not just credits retained at the end of the last period, are never paid out and so have zero value. In my view this is an unreasonable assumption. Not only is it inconsistent with the general valuation principle of full distribution implicit in the Miller

[13] See equations (2.3) and (2.5) in Monkhouse (1996). It is noted that under this definition, gamma need not be less than one.

[14] See equation (4.2) and footnote (17) in Monkhouse (1996). It is noted that in the worked examples in Appendix 1 and 2, Monkhouse (1996) assumes a 100% payout of imputation credits each period.

and Modigliani (1961), Miles and Ezzell (1980) and Officer (1994) frameworks, but it implies that a stock of potentially valuable imputation credits accumulates over time within the firm, never to be released. It is unreasonable to assume that such a build up of credits would not (eventually) attract the attention of investors, investment bankers and or potential corporate raiders. Further, when assessing the likelihood of eventual distribution of retained imputation credits, one should not restrict their thinking to existing mechanisms, schemes, structures and securities, for history has shown that financial markets are highly innovative when the incentives are large.

Although the traditional approach in (1) suggests gamma is a function of only two variables – the payout ratio F and the value of a distributed credit θ – the generalised definition (2) shows that it is also a function of the value of a retained credit ψ. Since the difference between θ and ψ only represents time value loss, which in turn depends on the appropriate discount rate, say δ (delta) and the (expected) retention period, say τ (tau), then the traditional approach effectively assumes that gamma is a function of four parameters: F, θ, δ and τ. In comparison, Officer (1994) assumes a 100% payout of imputation credits and therefore that gamma is a function of one parameter i.e. $\gamma = \theta$. By allowing for less than a full distribution of imputation credits each period, the traditional approach arguably injects more realism into the modelling of imputation credits. But clearly this comes at a substantial cost – the need to estimate a further three parameters: F, δ and τ. In my view, there is sufficient uncertainty surrounding the estimation of these additional parameters to seriously question whether the additional realism, compared to Officer's (1994) simple approach of assuming full payout each period, actually produces a better estimate of gamma.

This highlights an important distinction between the two approaches. It is generally accepted that (most) firms do not in fact payout 100% of their free cash flow and imputation credits each period. Accordingly, assuming all credits are distributed in the period in which they are created will likely overstate the value of gamma. As noted by NERA:

"Handley explicitly acknowledges that retained imputation credits have a lower value than those immediately distributed. It follows that assuming that all imputation credits are distributed when created will lead to the value of gamma being overstated."[15]

On the flip side, the traditional approach, by assuming all credits not distributed (in the period in which they are created) are never paid out, will likely understate the value of gamma. This suggests that if one adopts the (estimated) market average payout ratio of around 0.7, then the value of gamma, as a proportion of the value of a distributed imputation credit θ, is within the range $0.7\theta \le \gamma \le \theta$. As indicated above, the valuation of a retained imputation credit (relative to the value of a distributed credit) is subject to much uncertainty. If one assumes that time value loss reduces the value of a retained credit by say 50%,[16] then substituting this into the general definition (2) gives a value of gamma equal to 85% of the value of a distributed credit i.e. $\gamma = 0.85\theta$. Further, if one assumes the value of theta is say 0.5, then the resultant value of gamma is 0.43. In my view, adjusting gamma to take account of the time loss associated with the retention of imputation credits is likely to be a second order effect and is seeking a level of precision which is just not there.

Conclusion

In my opinion, a reasonable estimate of gamma, as a proportion of the value of a distributed imputation credit θ, is within the range $0.7\theta \le \gamma \le \theta$. However, whilst the traditional approach arguably injects more realism into the modelling of imputation credits, this is accompanied by a non-trivial requirement to estimate a further three parameters – each of which is subject to substantial uncertainty – and the effect of which is likely to be second order. Accordingly, in my view the best approach is to follow the simpler Officer (1994) framework and define gamma as the value of a distributed imputation credit, $\gamma = \theta$.[17]

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15 NERA Economic Consulting (2009 p.5).

16 In relation to Table 2.3 in NERA (2009), a time value loss of 50% of face value corresponds to a retention period of around 7 years assuming a discount rate equal to the cost of equity and a retention period of around 13 years assuming a discount rate equal to the risk free rate

17 In what follows, I use the term gamma to represent the value of a distributed credit. If instead, one wishes to distinguish between the value of a distributed credit and the value of an undistributed credit in the definition of gamma, then my comments should be interpreted as referring to theta.

3. THEORETICAL FRAMEWORK

The Key Issue

The second issue concerns the conceptual characterisation of the representative investor and in particular the relative influence of foreign verses domestic investors in determining the value of gamma. Within the CAPM framework, the equilibrium value of an asset, including the equilibrium value of an imputation credit, is determined collectively by all investors in the market, rather than by any single investor. The influence of all investors is operationalised by taking a complex weighted average of the level of risk aversion of all investors in the market – with weights based on individual levels of wealth.[18] The weighted average investor is often called the representative investor. The AER has adopted a domestic version of the CAPM whereby the "market" is represented by a domestic stock index (the All Ordinaries Accumulation Index).

The AER has concluded that, for the purposes of estimating gamma, foreign investors should be recognised but only to the extent that they invest in the domestic market i.e. the weighting given to foreign investors should be based on their domestic level of wealth.

In contrast, the JIA has expressed the view that, for the purposes of estimating gamma, foreign investors should be fully recognised i.e. the weighting given to foreign investors should be based on their global level of wealth. For example, NERA states:

> *"The representative investor has characteristics that are a wealth weighted average of the characteristics of all investors. A representative investor is most likely to resemble a foreign investor because foreign investors have aggregate wealth that exceeds the aggregate wealth of domestic investors by orders of magnitude."*[19]

[18] See for example Brennan (1992) and sections 4.15-4.16 of Huang and Litzenberger (1988).
[19] NERA Economic Consulting (2009 p.15).

Analysis and discussion

NERA's argument is based on the following assertions: (i) the AER's characterisation of the representative investor implies that domestic and foreign investors face constraints in moving funds into and out of the Australian equities market, when in fact they are largely free to do so; (ii) the AER characterisation of the representative investor contradicts the analysis of Brennan (1970) and Guenther and Sansing (2007) who demonstrate that the representative investor has characteristics that are wealth weighted averages of all investors and not holdings-weighted averages of the characteristics of some investors; and (iii) the influence of foreign investors is not limited by the extent to which they currently invest in the Australian equities market. By way of illustration, NERA present a numerical example based on a simple general equilibrium version of Wood's (1997) model.

In my earlier report I set out the arguments for why foreign investors should be recognised only to the extent that they invest in the domestic market:

> *"The question concerning the value of imputation credits is essentially one of whether or not the Australian equity market is integrated with world equity markets.*[20] *It is important to understand what is meant by "integration" in this context. Specifically, integration does not refer to whether there are capital flows in and out of Australia (which we know there are) or whether the Australian equity market is effected by events on foreign equity markets (which we know it is) but rather whether returns are better explained by an integrated asset pricing model compared to a segmented asset pricing model. In the CAPM framework, this translates to whether domestic assets are priced relative to a domestic benchmark (such as the All Ordinaries Accumulation Index) or are priced relative to an international benchmark (such as the S&P500 or the MSCI World Index).*
>
> *NERA Economic Consulting correctly point out that the equilibrium value of franking credits should reflect a weighted average of the value of franking*

[20] See for example Wood (1997 p.478).

credits across all investors in the market, with weights based on individual levels of wealth. However, the conclusion that the value of credits is close to zero rests on an implicit assumption that the relevant market portfolio for pricing purposes is an international benchmark (which is entirely consistent with their view that markets are integrated). The difficulty here is that this conclusion does not hold if the relevant market portfolio for pricing purposes is instead, a domestic benchmark. In particular, as argued in section 2.2 above, once you choose the market portfolio, you define the set of assets that are relevant for pricing purposes and you define the set of investors that are relevant for pricing purposes. Non market assets, including assets held by any of the investors in other markets are outside the model and therefore play no role in the pricing of domestic assets. So whilst it is true that the aggregate wealth of domestic investors compared to the aggregate wealth of foreign investors is small on a global scale, the choice of a domestic market portfolio means that the weighting should be based only on the wealth invested in the domestic market portfolio i.e. the equilibrium value of franking credits should reflect a weighted average of the value of franking credits across all investors in the domestic market, including foreign investors but only to the extent that they invest domestically. The holdings of foreign assets by foreign investors (and equally the holdings of foreign assets by domestic investors) are outside the model and so should be ignored in determining the weights attributed to each investor."[21]

None of the above three assertions by NERA prompts me to change my view.

In relation to the first assertion, NERA suggests that domestic and foreign investors are largely free to move funds into and out of the Australian equities market. This is not in dispute. However, NERA also suggests that the AER's characterisation of the representative investor is invalid because it implies there are barriers to international capital flows. The problem with this argument is that the whole issue of barriers to investment between markets is irrelevant given that a domestic version of the CAPM is being used under the National Electricity Rules (NER) i.e. domestic assets are priced

[21] Handley (2008 p.20-21).

relative to a domestic stock market index using the Sharpe CAPM.[22] In the current setting, considerations concerning assets in other markets and capital flows between markets are outside the model and therefore play no role. Of course one could take account of such considerations by using an international version of the CAPM for pricing purposes, but this would by definition involve many changes to the current framework including the use of an international risk free rate, an international stock market index (as a proxy for the market portfolio) and stock betas measured relative to this international stock market index.

In relation to the second assertion, NERA suggests that Brennan (1970) and Guenther and Sansing (2007) demonstrate that the representative investor has characteristics that are wealth weighted averages of all investors and not holdings-weighted averages of the characteristics of some investors. This is not in dispute. However, NERA then incorrectly suggests that the AER characterisation of the representative investor contradicts the analysis of Brennan (1970) and Guenther and Sansing (2007). In fact the AER characterization is perfectly consistent with the Brennan (1970) and Guenther and Sansing (2007) analysis. To see this, note that the starting point for the Sharpe CAPM (and a feature of all subsequent extensions to the CAPM) is that we assume there is a given set of assets and a given set of investors. We then seek to determine what is the fair price of each of these assets assuming each investor chooses his/her optimal portfolio and the market is in equilibrium – i.e. demand equals supply for each and every asset. We also seek to determine the composition of each investor's optimal portfolio, whereby an investor's optimal portfolio is defined to be that portfolio which provides him/her with the greatest "utility". For example, Brennan (1992 p.289) describes the setup of the Sharpe CAPM as follows:

> *"Consider a setting in which each investor* $i\left(i=1,...,m\right)$ *is endowed with a fraction* $\overline{z}_{ij}$ *of security* $j\left(j=1,...,n\right)$ *and (a) investor utility is defined over the mean and variance of end of period wealth; (b) securities are traded in a competitive market with no taxes or transactions costs; (c) investors share homogeneous beliefs or assessments of the joint distribution of payoffs on the securities; there are no dividends; (d) there is an exogenously determined*

[22] Australian Energy Regulator (2008 p.41).

interest rate $r = R - 1$ *at which investors may borrow or lend without default; (e) there are no restrictions on short sales. Then define ...* $\bar{W}_i, S_i^2$ *[as the] expectation and variance of end of period wealth of investor* i*;* $V_i\left(\bar{W}_i, S_i^2\right)$ *[as the] utility of investor* i *... The investor's decision problem may be written as* $\max_{z_{ij}} V_i\left(\bar{W}_i, S_i^2\right)$ *[subject to]* $\bar{W}_i = \sum_j z_{ij}\bar{P}_{j1} - R\sum_j\left(z_{ij} - \bar{z}_{ij}\right)P_{j0}$ *[and]* $S_i^2 = \sum_j \sum_k z_{ij} z_{ik} \omega_{jk}$ *."*

The decision problem is interpreted as saying that each investor starts with an initial portfolio (endowment) of securities $\bar{z}_{ij}$ and then enters into trades with the other investors in order to arrive at his/her optimal portfolio of securities z_{ij}. Brennan (1992) then shows that this leads to the familiar Sharpe CAPM pricing equation.

There are three very important items to note. First, the market consists of n risky assets (and an exogenous risk free asset which investors can buy or sell). No other risky assets matter. Second, there are m investors in the market who collectively determine the prices of the n risky assets. No other investors matter. Third, the utility of each investor is based on the expected return and risk of his/her end of period wealth, which in turn, is a function of the n risky assets (and the risk free asset) under consideration.[23] In other words, any assets which may be held by any of the investors in other markets – and the corresponding wealth of those holdings – are not included in the model and therefore play no role in the pricing of the n risky assets in the market. Wealth is by definition based only on the n risky assets (and the risk free asset) included in the model. This is why the most critical choice to be made when using the CAPM in practice concerns the proxy for the market portfolio. Once you choose the market (proxy), you define the set of assets that are relevant for pricing purposes and you define the set of investors that are relevant for pricing purposes. So in the current context, the use of a domestic stock index as the proxy for the market portfolio means that only domestic assets (i.e. supply) and only domestic wealth (i.e. demand) are relevant.

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[23] In Brennan's (1992) definition of the expectation and variance of end of period wealth of investor i, $\bar{P}_{j1}$ is the expected end of period value of security j; ω_{jk} is the covariance between the end of period values of security j and security k; and P_{j0} is the (endogenous) initial value of security j.

Brennan (1970) extends the Sharpe CAPM to allow for heterogeneous and differential personal taxes on dividends and capital gains (under a classical tax system). The setup is the same as the Sharpe CAPM except that, in order to take account of personal taxes, investor utility is defined over the expectation and variance of (after personal tax) end of period wealth:

> *"The basic framework of analysis is the Capital Asset Pricing Model of Lintner, Sharpe and Mossin, generalized to incorporate the effects of the taxes investors must pay on their income from dividends and capital gains. Following the usual assumptions of this model, we take the market for securities to consist of m risk-averse investors who are concerned with selecting portfolios to hold over the same single-period horizon. We assume that the utility functions* $U_i\left(i=1,...,m\right)$ *of the investors may be defined on the mean* V_i*, and variance* S_i^2*, of the after tax returns on the portfolios ... Each investor* $i\left(i=1,...,m\right)$ *comes to the market with an initial endowment of* x_{ji}^0 *units of security* $j\left(i=1,...,n\right)$*, and by trading with other investors achieves an equilibrium asset position* $x_{ji}\left(i=1,...,n\right)$*."*[24]

Again note that the utility function is defined only over the assumed set of assets and so any wealth that investors may have invested in non market assets is not relevant to determining the prices of the assets in the model.

It is worthwhile to identify the conditions under which NERA's conclusions concerning the characterisation of the representative investor would be appropriate. NERA argues that the representative investor will most closely resemble a foreign investor because foreign investors have substantially more wealth. But this assumes that wealth is measured on the basis of a global set of assets rather than on a domestic set of assets. In other words, NERA's position on the characterisation of the representative investor would be appropriate if an international CAPM was being used.

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[24] Brennan (1970 p.420).

The AER's characterisation of the representative investor is consistent with both the Sharpe and Brennan versions of the CAPM. Contrary to the claim by NERA, it is also consistent with the model of Guenther and Sansing (2007). Whilst discussion of the CAPM tends to focus on equilibrium prices, an integral part of the model is the composition of each investor's optimal portfolio i.e. the quantity of each asset demanded by each investor. In the Sharpe CAPM, all investors collectively determine the prices of all assets and demand (hold) the same portfolio of risky assets in equilibrium – the market portfolio. In other words, all investors hold the same portfolio as the representative investor. In the Brennan CAPM, all investors collectively determine the prices of all assets notwithstanding different investors demand (hold) different portfolios of risky assets in equilibrium – in this case, portfolio holdings are tilted according to the each investors tax rates relative to the average market tax rate. So whilst prices reflect the influence of all investors, different investors hold different portfolios. Guenther and Sansing (2007) simply explore further the tilting of equilibrium portfolios which occurs under the Brennan CAPM. It is noted that the concept of tilted portfolios within a CAPM framework is not new and has previously been examined by Black (1974) and Elton and Gruber (1978).[25] Further, one could argue that use of the term "representative investor" in this case is a bit loose.

The third assertion used by NERA to challenge the AER's characterisation of the representative investor is that the influence of foreign investors is not limited by the extent to which they currently invest in the Australian equities market. Further, for illustrative purposes, NERA present a numerical example based on a simple general equilibrium version of Wood (1997). It is important to note upfront that Wood's (1997) model is based on the international version of the CAPM originally due to Black (1974) and subsequently extended by Stulz (1981). Both Black and Stulz specifically take into account model segmentation in international capital markets by assuming domestic

[25] For example, Guenther and Sansing (2007 p.3) state *"we demonstrate which factors affect how much of each stock is held by the tax-exempt investors. If dividends, interest, and accrued capital gains are all taxed at the same rate, our results simplify to the familiar risk-sharing result in which each type of investor holds the same percentage of each stock, and the percentage is based on the aggregate risk tolerance of that type of investor relative to the aggregate risk tolerances of all investors in the economy (Wilson 1968). But investors shift their portfolios if different types of income are taxed at different rates For example, if the two stocks have the same risk and price, tax-exempt investors will hold more of the stock with the larger dividend. This result is consistent with Elton and Gruber (1978), who find that investors with tax rates lower than the average investor tax rate hold more high-dividend stocks."*

investors are taxed on foreign security holdings.[26] So there is an immediate fundamental problem with NERA's assertion and that is, that Wood (1997) is a different model to the one used under the NER. Wood (1997) is an international CAPM – it deals with the pricing of both domestic and foreign assets, and so by definition, takes into account global rather then domestic levels of wealth. It is not the Sharpe CAPM. It is not a domestic CAPM. Accordingly, NERA's conclusions and illustrations based on Wood (1997) are irrelevant.[27] As the GasNet decision demonstrates, it is important to remain true to the model – and that means remaining true to the Sharpe CAPM.[28]

Conclusion

In my opinion, the AER's characterisation of the representative investor remains sound. Accordingly, for the purposes of estimating gamma, foreign investors should be recognised but only to the extent that they invest in the domestic market i.e. the weighting given to foreign investors should be based on their domestic level of wealth and not on their global level of wealth.

[26] As Black (1974 p.338) states: "the tax is intended to represent various kinds of barriers to international investment, such as the possibility of expropriation of foreign holdings, direct controls on the import or export of capital, reserve requirements on bank deposits and other assets held by foreigners, and restrictions on the fraction of a business that can be foreign owned. It is even intended to represent the barriers created by the unfamiliarity that residents of one country have with other countries." In relation to Black (1974) and Stulz (1981), Wood (1997 p.467) states: "these models assume investors face *a tax penalty* on their foreign asset holdings. In contrast, the two-country version of the model we adopt assumes that domestic investors receive a *tax credit* on their domestic asset holdings."

[27] This should not be interpreted as a critique of the Wood (1997) model.

[28] See Australian Energy Regulator (2008 p.41, 118) and Network Industry Submission (2009 p.61).

4. USE OF TAX STATISTICS

The Key Issue

The third issue concerns the theoretical relevance of using estimates of redemption / utilisation rates, sourced from tax statistics, in the estimation of gamma.

The AER has concluded that, for the purposes of estimating gamma, (estimated) redemption / utilisation rates sourced from tax statistics do provide a reasonable upper-bound estimate of theta.

The JIA disagree with this approach. For example, NERA states:

> *"Redemption rates are not a reasonable basis for estimating the market value of theta. Their use – even as the basis for establishing an upper bound - introduces a clear upward bias to the estimated value of gamma."*[29]

> *"Redemption rates will over-estimate the value of theta because a disproportionate weight is placed on domestic shareholders. Redemption rates do not take into account the costs to investors of accessing high levels of imputation credits."*[30]

Further, SFG presents a counterfactual example regarding foreign ownership restrictions which he suggests invalidates the use of redemption rates:

> *"My earlier report argues that redemption rates should not be used to estimate theta. In that report I set out a number of reasons for this conclusion. To help crystallise the point I provided a counterfactual example. The purpose of this example was to show that if redemption rates are used to estimate theta, an artificial reduction in the amount of foreign capital available to Australian firms (e.g., via the passing of a law to restrict foreign investment) would lead to an*

[29] NERA Economic Consulting (2009 p.iii).
[30] NERA Economic Consulting (2009 p.18).

increased estimate of theta and a proportional decrease in the estimated cost of capital."[31]

Analysis and discussion

In my earlier report I set out the arguments for why redemption / utilisation rates sourced from tax statistics are relevant for estimating gamma:

> *"The use of redemption or utilisation rates as a means of estimating the value of franking credits is driven by conceptual considerations. Depending on tax status and domicile, franking credits are used by investors to reduce their personal taxes. It is this reduction in personal taxes, if any, which is the ultimate source of value to an investor. The extent to which observed stock prices reflect the value of franking credits can only be determined empirically. Alternatively, theory tells us that in equilibrium γ represents a complex weighted average of the values of franking credits across all investors in the market. In this regard, Handley and Maheswaran (2008) examine taxation statistics in order to estimate the extent to which franking credits have ex-post reduced the personal taxes of various classes of resident and non-resident equity investors in Australian companies over the seventeen years from 1988 to 2004. By comparing the (estimated) aggregate dollar amount of credits received by investors to the (estimated) aggregate dollar amount of credits used by investors (to reduce personal taxes), Handley and Maheswaran (2008) report an average utilisation rate across all investors of around 70–80%.*[32] *Notwithstanding this represents a simple average of utilisation rates across investors rather than a (complex) weighted average and assuming the set of investors is indicative of the set of investors in the domestic market portfolio, this estimate may be interpreted as a reasonable upper bound on the value of gamma."*[33]

In other words, the value of an imputation credit ultimately comes from a reduction in personal taxes. Handley and Maheswaran (2008) provide a (reasonable) historical

31 SFG Consulting (2009 p.4).
32 See Table 4 in Handley and Maheswaran (2008).
33 Handley (2008 p.8).

estimate of the aggregate reduction in personal taxes due to the aggregate receipt of imputation credits. Since it is extremely unlikely that credits would be worth more than this amount then, by definition, the redemption rate represents an upper bound on the value of gamma.

I will first address NERA's arguments and then those of SFG.

NERA suggests two conditions that must be satisfied for the AER approach to be valid:

> *"There are at least two necessary conditions for imputation utilisation rates to be a reasonable estimate of the market value of imputation credits, ie:*
> - *imputation credits must be allocated to investors on the basis of their wealth; and*
> - *investors must incur no costs to accrue imputation credits."*[34]

NERA argue that neither of these conditions is satisfied and so redemption rates have no role in the estimation of gamma. The problem with this argument, however, is NERA's implicit starting point that the weighting given to foreign investors should be based on their global level of wealth rather than on their domestic level of wealth – as discussed in section 3 above, this is a position which is consistent with an international CAPM but is not consistent with the (domestic) Sharpe CAPM used by the NER. This leads NERA to interpret redemption rates as a weighted average of investors' holdings, rather than a weighted average of investors' wealth and therefore to conclude that redemption rates will overestimate gamma since foreign investors' holdings of domestic assets are small compared to their total foreign wealth. They again seek to illustrate this point using an example based on a simple version of Wood's (1997) model.

But, within a domestic Sharpe CAPM setting, there is no distinction between the value of investors' holdings and the value of investors' wealth because non market assets and the wealth invested therein are outside the model. In other words, given the assumed set of assets – in this case the domestic stock index – investors' holdings and investors' wealth are one and the same. So the estimated redemptions rates in Handley and

[34] NERA Economic Consulting (2009 p.16).

Maheswaran (2008) may be interpreted as (reasonable) wealth weighted averages for the purposes of a domestic CAPM and so satisfy the first of NERA's necessary conditions. Further, since non market assets are irrelevant for pricing purposes then international diversification considerations – NERA's second necessary condition – are similarly irrelevant.

It is worth noting that, like it's position on the characterisation of the representative investor, NERA's position on the use of redemption rates in estimating gamma would be appropriate if an international CAPM was being used under the NER. In this case, estimates of redemption rates based on investors' holdings would no longer correspond to redemption rates based on investors' wealth and so would overestimate the value of gamma. But it is again stressed that a shift from a domestic to an international CAPM setting would have implications beyond the estimation of gamma and in particular, for the market risk premium, the risk free rate and the estimation of beta.

Now turning to SFG's counterfactual example. SFG argues that if redemption rates are used to estimate theta, then a reduction in the amount of foreign capital available to Australian firms would lead to: (i) an increase in the estimate of theta; and (ii) a decrease in the estimated cost of capital, and so:

> *"In my view it makes no sense to conclude that steps to reduce the amount of foreign capital available to Australian firms can somehow reduce their cost of funds – yet this is the logical result of using redemption rates to estimate theta".*[35]

Note that SFG does not assume a decrease in the total available supply of capital to investors but rather that there is a partial switch in the source of capital from foreign investors to domestic investors i.e. the case being considered is the partial substitution of foreign investment by domestic investment subject to no net change in supply.[36]

[35] SFG Consulting (2009 p.4).
[36] SFG Consulting (2009 para.14).

Regarding the suggested impact on the estimated theta. The CAPM is a static model which is based on an assumed set of assets and an assumed set of investors. If you change the set of investors (or the set of assets) then you change the setup for the model and so you will change the resulting equilibrium. This means that a proper consideration of a change in investors requires a complete examination of the impact on both asset demand and asset prices (including the value of imputation credits). Now if one assumes that nothing else changes, then SFG is correct to conclude that the estimated value of theta would increase. But this is exactly what one would expect within a CAPM framework and simply reflects the fact that aggregation is given effect by taking a wealth weighted average (of certain investor characteristics) over all investors in the market. So SFG assumes that a proportion of foreign investors (who generally place no value on imputation credits) is replaced by domestic investors (who generally place full value on imputation credits) and so the wealth weighted average value of imputation credits will mechanically increase. This is a inherent fundamental characteristic of a domestic CAPM. If instead an international CAPM was used, then the estimated value of theta would likely change very little (if at all) since the combined wealth of foreign investors dwarfs the combined wealth of domestic investors.

Regarding the suggested impact on the estimated cost of capital, SFG argues:

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> *"There is also general agreement that, other things equal, an increase in gamma will result in a proportional decrease in the estimated cost of equity capital in the manner derived by Officer (1994)."*[37]

SFG illustrates this argument in Appendix C of his earlier report:

> *"In the detailed numerical example in his Appendix, Officer (1994, pp. 11 - 17), shows how the CAPM can be used to derive a required return on equity of 17.7% and that the firm's cost of equity is ... 13.4% using the parameter values assumed in the example. That is, the imputation tax system has reduced the firm's cost of equity capital by 4.3% in this case ... In a classical system, the firm has to generate all of this return. In an imputation system, the government*

[37] SFG Consulting (2009 p.7).

funds some of this required return (in fact 4.3%) which reduces the firm's after tax cost of equity from 17.7% to 13.4%. That is, the CAPM tells us what return equityholders require (a return that is measured after company tax but before personal tax) and Officer (1994) derives the proportion of that return that must be generated by the firm."[38]

I have difficulty with this whole argument and in particular with SFG's suggestion that an increase in gamma automatically implies a lower cost of capital. To explain why, we need to go back to Officer's (1994) definition of returns. Officer (1994) suggests that under a classical tax system, the after-company-before-personal-tax (discrete) rate of return on equity over a single period is given by:

$$k_E^* = \frac{\Delta P + D}{P_0} \tag{3}$$

where ΔP is the capital gain over the period, D is the dividend (if any) paid at the end of the period and P_0 is the stock price at the start of the period. In other words, under a classical tax system, equity returns consist of two components: capital gains and dividends. In comparison, Officer (1994) suggests that under an imputation tax system, the after-company-before-personal-tax (discrete) rate of return on equity over a single period is given by:

$$k_E = \frac{\Delta P + D + \gamma C}{P_0} \tag{4}$$

where ΔP, D and P_0 are as previously defined, C is amount of imputation credits (if any) paid at the end of the period and γ is the value of a dollar of imputation credits. In other words, under an imputation tax system, equity returns consist of three components: capital gains, dividends and the value of imputation credits.[39] If one separates out the dividend and capital gains component from the imputation credit component, then equation (4) may be expressed as:

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38 SFG Consulting (2008 p.48).

39 Equation (3) corresponds to Officer's (1994) equation (14) and equation (4) corresponds to Officer's (1994) equation (15).

$$k_E = \frac{\Delta P + D}{P_0} + \frac{\gamma C}{P_0} = k_E^* + \tau_E \quad (5)$$

where k_E^* is the conventional measure of the cost of equity, τ_E is the imputation tax credit yield and k_E is the grossed-up cost of equity.[40] Importantly, Officer (1994) suggests that the proportion of company tax that can be fully rebated against personal tax liabilities is best viewed as personal income tax collected at the company level.[41] This means that the grossed up cost of equity k_E is measured on an after-company-before-personal-tax basis whereas the conventional cost of equity k_E^* is measured on an after-company-after-some-personal-tax basis. In other words, k_E and k_E^* are two different ways of describing the same thing – the first describes the cost of equity on an after-company-before-personal-tax basis whereas the second describes the (same) cost of equity but on an after-company-after-some-personal-tax basis. Also note that if gamma is positive then by definition k_E is greater than k_E^*.

So in relation to the SFG's illustrative example above, the 17.7% corresponds to the grossed up equity return, the 13.4% corresponds to the conventional equity return and the 4.3% corresponds to the imputation tax credit yield. It is obvious that the 13.4% is less than the 17.7% but this does not represent a reduction in the firm's after tax cost of equity because these amounts are measured on different bases. In fact, they represent the same thing i.e. the after-company-before-personal-tax equity return of 17.7% is equivalent to an after-company-after-some-personal-tax equity return of 13.4%. In general, for a given after-corporate-before-personal-tax cost of equity, the lower cost of capital that SFG describes reflects nothing more than the component of the total return that is due to dividends and capital gains. In this regard, I also have difficulty with SFG's interpretation that the imputation credit component of the after-company-before-personal-tax equity return is funded by the government and the dividend and capital gains component is funded by the firm. In fact the entire return – capital gains, dividends and imputation credits – is generated by the firm, since imputation credits

[40] Equation (5) corresponds to Officer's (1994) equation (17).
[41] Officer (1994 p.2).

simply represent tax paid at the firm level, on income generated by the firm, which is available to reduce the personal tax liabilities of investors in the firm i.e. the whole objective of the Australia's imputation system is to remove the double taxation that would otherwise be imposed on corporate income distributed in the form of dividends.

Finally, the important question of what impact the introduction of imputation tax system has had on the cost of capital of Australian firms can only be answered within an formal equilibrium setting and ultimately depends on the extent to which the Australian equity market is integrated with world equity markets. As mentioned in my previous report, integration within this context, does not refer to whether there are capital flows in and out of Australia (which we know there are) or whether the Australian equity market is effected by events on foreign equity markets (which we know it is) but rather whether returns are better explained by an integrated asset pricing model compared to a segmented asset pricing model. In the CAPM framework, this translates to whether domestic assets are priced relative to a domestic benchmark (such as the All Ordinaries Accumulation Index) or are priced relative to an international benchmark (such as the S&P500 or the MSCI World Index).

Conclusion

In my opinion, the AER's conclusion that redemption / utilisation rates sourced from tax statistics are relevant to estimating gamma remains sound.

5. INTERPRETATION OF DIVIDEND DROP-OFF STUDIES

The Key Issue

The fourth issue concerns the interpretation of results from dividend drop-off studies, for the purposes of estimating gamma. NERA states:

> *"Handley cautions against drawing conclusions from dividend drop-off studies. He cites a study by Michaely and Vila (1995), that Allen and Michaely (2003) reference, and notes that the study suggests that: the drop-off should reflect not just the impact of differential taxes but also the risk involved in trading around the ex-dividend date. As we explain later, subsequent studies by Michaely et.al. not cited by Handley confirms that while risk will play a role in determining the ex-dividend day behaviour of stock prices its impact is negligible compared with the average dividend payment."*

and

> *"Handley argues that it can be difficult to infer the value of franking credits from ex-dividend day studies"*[42]

Analysis and discussion

In my earlier report, I expressed the view that the most appropriate framework for analyzing dividend drop off studies is the equilibrium framework originally due to Michaely and Vila (1995):

> *"A more complete explanation is, however, provided by Michaely and Vila (1995) and Allen and Michaely (2003) who suggest that the drop-off should reflect not just the impact of differential personal taxes but also the risk involved in trading around the ex-dividend date. Specifically, using an equilibrium argument, they show that the drop-off reflects (i) a complex weighted average of*

[42] NERA Economic Consulting (2009 p.21).

the differential tax rates of all investors in the market (with the weights based on individual levels of risk aversion) and (ii) the variance of the ex-dividend stock price."[43]

This view is based on both theoretical and empirical considerations. Theoretical justification for an equilibrium framework principally comes from Heath and Jarrow (1988) who show that arbitrage considerations alone are insufficient to explain the drop-off in the underlying stock price in terms of the dividend. Further, according to Allen and Michaely (2003 p.369):

"This framework incorporates short-term, corporate and individual investors' desire to trade around the ex-dividend day. The model explicitly accounts for the risk involved in the trade, and concludes that it is not arbitrage, but equilibrium, that determines prices and volumes. In other words, the existence of risk precludes pure arbitrage opportunities and prices are determined in equilibrium."[44]

Empirical support for the impact of differential taxes and risk on ex-dividend day pricing comes from Elton and Gruber (1970), Michaely and Vila (1995), Graham, Michaely and Roberts (2003) and Rantapuska (2008).

The key implication is that one needs to be careful in interpreting the regression coefficient from dividend drop off studies since:

"In summary, the regression coefficient θ reflects not only the value of one dollar of franking credits but also the impact of differential personal tax rates, on dividends compared to capital gains, and risk. This implies that multiple

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43 Handley (2008 p.9).

44 Similarly, Michaely and Vila (1996 p.473) suggest: *"By contrast, risk and transaction costs reduce volume by making more costly the transfer of dividend-paying stocks from investors who do not like dividends to those who do. First, a tax "arbitrage" strategy entails a (temporary) deviation from optimal risk sharing, since around the ex-day, investors do not hold the market portfolio. For example, a corporate investor buying for tax purposes a stock going ex will be overexposed to movements of the stock's price. This risk will be large if the minimum holding period necessary to claim the dividend exclusion is large. But even if the stock is only held overnight, the risk is not trivial. Assuming an overnight risk of about $1 on a $100 stock, which is not unreasonable, one can see that tax-related trading should be treated not as a pure arbitrage, but as a risky investment."*

interpretations of the value of franking credits are possible depending upon what is assumed about differential personal taxes and risk."[45]

NERA appear to have interpreted my comments as implying that dividend drop-off studies have no role in the estimation of theta. This was not and is not my intention. To be clear, the point I was trying to make is simply that the regression coefficient potentially reflects a variety of things – the before personal tax value of the distribution (the dividend and any attached imputation credits), differential tax rates of all investors in the market and risk of trading around the ex-dividend date. Accordingly, given a regression coefficient, what one assumes about differential personal taxes and risk largely determines what one implies about the before personal tax value of the distribution. Even if risk is negligible as NERA suggest, what one assumes about differential personal taxes largely determines what one implies about the before personal tax value of the distribution or vice versa. For example, ignoring risk and transactions costs, Elton and Gruber (1970) suggest that the drop-off should reflect the impact of differential personal taxes on dividends compared to capital gains, conditional on $1 of dividend having a before personal tax value of $1.

Finally, NERA note that my earlier report does not cite the study by Michaely, Vila and Wang (1996). This was not a deliberate omission, for all three related studies – Michaely and Vila (1995), Michaely and Vila (1996) and Michaely, Vila and Wang (1996) – are discussed in the more recent survey paper by Allen and Michaely (2003), on which my comments are largely based.

Conclusion

In my opinion, there is no disagreement concerning whether dividend drop off studies have a role in the estimation of gamma. But again it is noted that caution needs to be exercised due to the possibility of multiple interpretations.

[45] Handley (2008 p.11). Further, according to Kalay and Lemmon (2008 p.16), *"The existing empirical evidence documents a stock price drop that is significantly smaller than the dividend per share… Indeed, the more empirical evidence on stock price ex-day behavior we obtain, the harder it is to interpret"*.

6. THE VALUE OF CASH DIVIDENDS AND CONSISTENCY WITH THE CAPM

The Key Issue

The fifth issue concerns an apparent inconsistency regarding the AER's treatment of differential taxes i.e. in using the standard CAPM, the AER assumes no differential taxes but in interpreting the results of dividend drop-off studies (for the purposes of estimating gamma), the AER allows for the impact of differential taxes.

The position of the AER is based on its interpretation of two classes of empirical evidence. First, the results of U.S. dividend yield studies provide evidence that dividends are "fully valued" i.e. differential taxes have no effect on prices, and so differential taxes do not need to be taken into account in estimating equity returns. Second, the results of U.S. drop-off studies are interpreted as evidence that dividends are "less than fully valued" (due to the impact of differential taxes), and so differential taxes do need to be taken into account in estimating gamma, and which in turn leads to a positive value of gamma. The AER is not concerned with, what at first appears to be an inconsistency, since it is relying on the appropriate evidence in the appropriate context i.e. U.S. dividend yield studies in relation to the CAPM and U.S. drop-off studies in relation to gamma.

The JIA agrees with the AER's interpretation of the U.S. dividend yield studies but not with the AER's interpretation of the U.S. drop-off studies i.e. the JIA suggests that differential taxes do not need to be taken into account in estimating both equity returns and gamma, and which in turn leads to a zero value of gamma. For example, SFG argues:

> *"In my view, it is neither logical nor correct to use inconsistent estimates of the same parameter (the value of cash dividends in this case) in two steps of the same WACC estimation exercise. ... In any event, I demonstrate in this report that the US drop-off evidence actually supports an estimate that cash dividends are valued at 100 cents in the dollar. ...Both types of study support the view that cash dividends are fully valued and are consistent with the use of the CAPM to*

estimate required returns. Consistency then demands that theta also be estimated on the basis that cash dividends are fully valued."[46]

Analysis and discussion

It is noted that there is no disagreement concerning the AER's interpretation of the U.S. dividend yield studies. For example, according to SFG:

"It is generally accepted that these studies find that there is no difference at all between the average returns of high- and low-yield companies. This suggests that investors do not differentiate between firms that provide them with returns via dividends and firms that provide returns via capital gains ... This is consistent with the CAPM, which estimates the required return on equity conditional on cash dividends being valued at 100 cents in the dollar. That is, this evidence provides no reason to use a model other than the Sharpe CAPM to estimate required returns."[47]

Where disagreement arises is in relation to the results of U.S. drop off studies. The principal evidence supporting the AER's position was set out in my previous report and is repeated here for convenience:

"There is substantial empirical support for the notion that differential taxes and risk effects ex-dividend day pricing including Elton and Gruber (1970), Michaely and Vila (1995), Graham, Michaely and Roberts (2003) and Rantapuska (2008). According to Allen and Michaely (2003, p.376), "in most periods examined, the average price drop is less than the dividend paid". In particular, Graham, Michaely and Roberts (2003) report the median drop-off (as a proportion of the face value of the dividend) associated with stocks listed on the New York Stock Exchange (NYSE), decreased from 0.89 during early 1997, to 0.83 during mid 1997 to mid 2000, to 0.75 during 2001, as the NYSE decimalised its price quotation of stocks. The size of the effect will likely vary

46 SFG Consulting (2009c p.3).
47 SFG Consulting (2009c p.9).

across time as well as according to the tax rules of the particular country under consideration."[48]

Three features of the Allen and Michaely (2003) study should be noted. First, the study represents a comprehensive survey of the literature dealing with dividend and payout policy in general and dealing with the impact of taxes on security prices, in particular. Second, Allen and Michaely (2003) are very clear on the evidence concerning U.S. drop-off studies:

> *"differential taxes affect both prices (at least around the ex-dividend day) and investors' trading decisions. In most periods examined, the average price drop is less than the dividend paid, implying a negative effect on value"(p.376).*

Third, Allen and Michaely (2003) are neither oblivious nor overly concerned about the the apparent inconsistency between the results from U.S. dividend yield and U.S. drop-off studies effectively attributing the puzzle to methodological issues associated with the former:

> *"In light of the above discussion, perhaps it is less surprising that tests of the static models [eg CAPM] have not been successful [i.e. in picking up a tax effect]. These tests cannot accommodate dynamic trading strategies, which seem to be important in this context" (p.377).*

Despite its strength, SFG does not accept the above evidence and in fact draws the following contrary conclusion:

> *"In my view, the US drop-off literature supports the conclusion that the most appropriate estimate for the value of cash dividends is 100 cents per dollar. This conclusion is based on the analysis set out above:*
>
> *a. Boyd and Jagannathan (1994) conclude that dividend drop-off analysis, when properly executed (in terms the econometric specification and the sample size) leads to the conclusion that cash dividends are fully valued.*

[48] Handley (2008 p.10).

In a setting in which there are no franking credits, a one dollar cash dividend results in a drop-off of one dollar.

b. *Graham, Michaely and Roberts (2003) also show that cash dividends are fully valued so that a one dollar cash dividend results in a drop-off of one dollar in cases where the dividend represents a yield of 2% or more."*[49]

In other words, SFG bases his conclusion on (i) the study by Boyd and Jagganathan (1994) and (ii) a subset of the results of the study by Graham, Michaely and Roberts (2003). The Boyd and Jagganathan (1994) is quite rightly an important study as SFG states, but it should be noted that it is primarily an arbitrage framework and as discussed in the previous section, arbitrage considerations alone are insufficient to explain the drop-off in the underlying stock price in terms of the dividend. In relation to the Graham, Michaely and Roberts (2003) study, SFG suggests that one should focus only on the results reported for high dividend yield stocks (having a yield of 2% or more) since the average annual dividend yield on the firms in the ASX 200 index is in the order of 5% and Australian firms pay dividends twice a year – implying an average yield per dividend "event" of 2.5%. There are two problems here. First, the average dividend yield for the stocks in Graham, Michaely and Robert's (2003) high yield group is not disclosed and so we cannot say how close or otherwise it is to 2.5%. Second and more importantly, as shown in Table V of Graham, Michaely and Roberts (2003), the full sample consists of 22,546 ex-dividend day events but only 1,038 relate to the high yield group. In other words, SFG's suggestion is to focus on results which cover less than 5% of the entire sample.

There are two other items to briefly address/note. First on the treatment of gamma in the valuation process, SFG argues:

> *"However, it plainly does not follow from this that "the inclusion of imputation credits in the analysis will not affect company values as long as they are consistently recognised in the cash flows as well as the discount rate." If we set gamma to 0, the different approaches all produce the same company value as*

[49] SFG Consulting (2009c p.12).

each other. If we set gamma to 0.65, the different approaches all produce the same company value as each other – but it is a different company value from the case where gamma is set to 0." [50]

SFG is correct to assert that changing gamma will change the value of the firm if one assumes that the return due to dividends and capital gains remains constant. However, what the statement "the inclusion of imputation credits in the analysis will not affect company values as long as they are consistently recognised in the cash flows as well as the discount rate" is meant to convey is that, if one assumes that the return due to dividends and capital gains remains constant then, for a given gamma, the firm can be valued on either an after-company-before-personal tax basis (where gamma is taken into account in the cash flows and the discount rate) or an after-company-after-some-personal-tax basis (where gamma is not taken into account in the cash flows and the discount rate) and the same firm value will result.[51]

Second, NERA presents evidence from a study by Lajbcygier and Wheatley (2009) who test for a negative relation between credit yield and return (which is suggested to represent a test of the hypothesis that imputation credits have positive value). Rather than finding evidence of a negative relation they find evidence of a positive relation which leads them to conclude:

"These estimates are sufficiently large that the null hypothesis that there is a negative relation between returns and credit yields after controlling for risk can be rejected at the 1 percent level no matter which of the three pricing models is used. In other words, conditional on there being no tax penalty for dividends, the evidence indicates that there is no support for using a positive value for gamma."[52]

In my view there is insufficient detail presented to allow one to place much reliance on this study. More importantly, in my view, it is not clear how the stated results of the study should be interpreted. NERA suggests that, conditional on no tax penalty on

50 SFG Consulting (2009c p.5).
51 This is discussed further in section 7 below.
52 NERA Economic Consulting (2009 p.26).

dividends, the finding of no negative relation between returns and credit yields means that gamma is not positive. However, the reported finding is not only that there is no negative relation between returns and credit yields but rather that there is a positive relation between returns and yields. So, conditional on no tax penalty of dividends, this could mean that gamma is negative – but then gamma would be below the theoretical lower bound of zero. Alternatively, if one allows for a tax penalty on dividends (and assuming no difficulties with the methodology of the test) then this may simply mean that the negative impact of the tax penalty on dividends outweighs the positive tax benefit from imputation credits.

Conclusion

In my opinion, notwithstanding the complexities involved in interpreting the results of dividend drop off studies, the weight of evidence supports the AER's position.

7. MARKET PRACTICE

The Key Issue

The sixth and final issue concerns the implication of market practice in regards to the value of imputation credits. Evidence from recent surveys of experts reports – such as Lonergan (2001) and KPMG (2005) – clearly indicates that, in the majority of cases where the CAPM has been adopted for estimating the cost of equity, the expert has made no adjustment for imputation credits. There is no disagreement concerning what experts do. There is, however, disagreement concerning why they do it – in particular whether this practice indicates that experts generally believe imputation credits to have zero value.

The AER has expressed the view that an omission of imputation credits from a valuation analysis does not of itself indicate that imputation credits have negligible value, and accordingly, the AER's recognition of a positive gamma is not inconsistent with market practice (provided that the principle of consistency between cash flows and the discount rate is adhered to).

In contrast, both the JIA and the Financial Group (FIG) interpret the survey evidence as suggesting that the dominant market practice is to set gamma to zero when estimating WACC and performing valuation exercises and accordingly, the AER's recognition of a positive gamma is inconsistent with market practice.

For example, according to SFG:

> *"In summary, the evidence is clear that the dominant practice of Australian listed companies is to set gamma equal to zero when estimating the cost of capital as part of a valuation exercise."*[53]

[53] SFG Consulting (2009b p.6).

and similarly the FIG states:

> *"independent expert valuers do not attribute value to imputation credits because, on balance, they are not convinced that the available evidence provides sufficient justification for them to do so".*[54]

Analysis and discussion

The key to this debate concerns how one should interpret the survey evidence concerning market practice. The evidence clearly indicates that in most cases no adjustment is made for imputation credits. But why is no adjustment made ? Both SFG and FIG interpret the evidence of no adjustment as implying that experts have assumed that credits have no value. However, as mentioned in my previous report, this is not necessarily the case, for there are other possible reasons which may have caused the expert to decide not to make any adjustment.

The reviews of market practice in Lonergan (2001) and KPMG (2005) document the reasons stated by experts as the basis behind their decision for not adjusting for imputation credits. For example, SFG states:

> *"Lonergan (2001) also provides a list of conceptual grounds cited in reports for not adjusting for imputation credits, including:*
>
> *a. The value of franking credits is dependent on the tax position of each individual shareholder;*
>
> *b. There is no evidence that acquirers of businesses will pay additional value for surplus franking credits;*
>
> *c. There is little evidence that the value effects of dividend imputation are being included in valuations being undertaken by companies and investors or the broader market;*
>
> *d. Foreign shareholders are the marginal price-setters of the Australian market yet many such shareholders cannot avail themselves of the benefit of franking credits; and*

[54] Financial Investor Group (2009 p.46).

e. *There is a lack of certainty about future dividend policies, the timing of taxation and dividend payments and consequently about franking credits".*[55]

This list also appears in the FIG report.[56] The important point to note is that this list contains not one but a variety of reasons for why no adjustment was made including, uncertainties and difficulties with estimation and methodology (points a. and e.), methodological precedent (point c.) and the suggestion that acquirers do not pay extra for imputation surplus credits regardless (point b.). Arguably only point d. can unambiguously be interpreted as corresponding to credits having no value. FIG also document the following view expressed by Grant Samuel in 2008 that, in the particular case under consideration, no adjustment was made on the basis of conservatism:

> *"there is undoubtedly merit in the proposition that dividend imputation affects value ... In Grant Samuel's view, however, the evidence gathered to date as to the value the market attributes to franking credits is insufficient to rely on for valuation purposes ... Accordingly it is Grant Samuel's opinion that it is not appropriate to make any such adjustments in the valuation methodology. This is a conservative approach".*[57]

Recognition that there is a variety of reasons used by experts to justify not adjusting for credits also appears in KPMG (2005) who state:

> *"The range of reasons offered for not adjusting for imputation credits is similar to that found in Lonergan (2001). The common theme that emerges from most expert reports is that whilst imputation credits are valuable to investors, including such value in company valuations or the cost of capital involves more complex considerations."*[58]

55 SFG Consulting (2009b p.4).
56 Financial Investor Group (2009 p.43).
57 Financial Investor Group (2009 p.45).
58 KPMG (2005 p.14).

Interestingly, KPMG later conclude

> *"Based on these results, KPMG considers that the standard market practice in relation to estimating the cost of capital in Australia, as evidenced by independent expert reports relating to takeovers, is to assume a zero value for imputation credits".*[59]

and it is this second conclusion that is referred to by SFG.[60] But based on the above discussion, KPMG's second conclusion is not consistent with their first.

So, whilst some experts no doubt assume/believe that imputation credits have zero value, the evidence does not support the assertion that standard practice is the blanket assumption that credits have no value. From a logical point of view, this amounts to saying that the assumption that credits have no value is a sufficient but not a necessary condition for making no adjustment to the valuation methodology.[61]

There is a second matter dealing with market practice which requires further explanation. In my earlier report, I made the suggestion that:

> *"a possible alternative explanation of market practice is that (at least some) Australian firms and independent expert valuation practitioners recognise that, the conventional approach to valuation – meaning there is no explicit recognition of the value of imputation credits in either the cash flows or in the discount rate – remains valid under the imputation tax system (subject to certain implicit assumptions). In other words, imputation credits are not assumed to have zero value but rather they are simply not explicitly taken into account."*[62]

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59 KPMG (2005 p.17).

60 SFG Consulting (2009b p.5).

61 The statement "the assumption that credits have no value is a sufficient condition for making no adjustment to the valuation methodology" means that the first (credits have zero value) implies the second (no adjustment in methodology). The statement "the assumption that credits have no value is not a necessary condition for making no adjustment to the valuation methodology" means that the second (no adjustment in methodology) does not imply the first (credits have zero value).

62 Handley (2008 p.16).

The purpose of this comment was to note that there is a theoretically valid alternative valuation methodology according to which one may assume imputation credits have a positive value, yet make no explicit adjustment for credits in the cash flows or the discount rate. In response, SFG states:

> *"The AER adopts a similar view in the Explanatory Statement ... That is, the suggestion is that there is a valuation framework that is valid and produces the correct results, but which does not require the estimation of gamma. It is my view that no such valuation framework exists and I explain the reasons for this below. However, if such a valuation framework can be identified, it would seem that it should be used in the regulatory setting to avoid the costly debate about the appropriate value of gamma."*[63]

The alternative valuation methodology referred to in my earlier report is After Tax Case (i) in Officer (1994).[64] In this case, the value of the firm is equal to the capitalised value of the conventionally measured free cash flow (i.e. excluding the value of imputation credits) using a conventionally measured WACC (i.e. excluding the value of imputation credits). In Officer's (1994) perpetuity setting, this may be expressed as:

$$V = \frac{X_O(1-T)}{r_i^*}. \tag{6}$$

and

$$r_i = k_E^* \frac{E}{V} + k_D(1-T)\frac{D}{V}. \tag{7}$$

63 SFG Consulting (2009b p.9).
64 Officer (1994, p.6).

where X_O is the firm's operating income (or free cash flow), T is the corporate tax, k_E^* is the conventional measure of the cost of equity (i.e. based on dividends and capital gains only) and k_D is the firm's before company before personal tax cost of debt.[65]

Equations (6) and (7) may be described as an after-company-after-some-personal-tax approach to valuation since both the cash flows and the discount rate do not include imputation credits. The conventional measure of the cost of equity k_E^* may be estimated using the Sharpe CAPM in the normal way using returns based on dividends and capital gains only.[66]

Finally, the above suggestion by SFG that the regulatory setting can perhaps avoid the costly debate surrounding about the appropriate value of gamma corresponds to the statement made in my earlier report:

> *"A deep issue for further consideration is whether the conventional approach to valuation (involving no explicit recognition of the value of imputation credits in either the cash flows or the discount rate) or the imputation approach to valuation (involving explicit recognition of the value of imputation credits) is the most appropriate."*[67]

Officer (1994) argues in favour of the imputation approach over the conventional approach on the basis that *"differences in the value of franked and unfranked dividends and differences in the proportions of franked dividends paid require specific recognition"* (p.10). But the recognition of such differences comes at a cost – the non trivial task of having to estimate gamma.

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65 Equation (6) corresponds to equation (d) in Officer (1994) and equation (7) corresponds to equation (7) in Officer (1994) – after noting that, within Officer's (1994) framework, $k_E \frac{1-T}{1-T(1-\gamma)} = k_E^*$ for any value of γ.

66 Elton and Gruber (1984) show that the differences between most non-standard forms of the CAPM come about from a simple change in the definition of returns and a difference in which market portfolio is assumed to be efficient.

67 Handley (2008 p.19).

Conclusion

In my opinion, market practice does not imply that experts generally assume imputation credits have zero value and accordingly the AER's recognition of a positive gamma is not inconsistent with market practice.

8. OVERALL CONCLUSION

Based on the discussion in this and my earlier report, in my opinion, a reasonable estimate of gamma is within the range 0.3 – 0.7.

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