Report prepared for the

Australian Energy Regulator

A Note 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. In this regard, the AER has sought advice on the following matters in relation to the valuation of imputation credits[1]:

- the appropriate methodology and corresponding best estimate (or range of estimates) of the value of imputation credits ('gamma') in the context of a domestic Australian CAPM recognising the presence of foreign investors;

- a critique of the key issues raised in two papers: "The Value of Imputation Credits' by NERA Economic Consulting[2] and "The Impact of Franking Credits on the Cost of Capital of Australian Firms" by SFG Consulting[3], including but not limited to:

  (i) theoretical issues

  the impact of personal taxes and the form of the Capital Asset Pricing Model (CAPM), the relevance and identity of the "representative" investor and the presence of "home country bias";

  (ii) the relevance of utilisation rates in estimating theta

  the extent to which a utilisation rate of franking credits can be considered representative of their value ("theta");

  the assertion that a franking credit utilisation rate (such as is provided in the Handley and Maheswaran (2008)) paper does not provide an estimate of the market value of franking credits, and is therefore not relevant to an estimate of gamma;

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1 The terms "imputation credit" and "franking credit" are used interchangeably in this report.
2 NERA Economic Consulting (2008) and hereafter referred to as the NERA Report.
3 SFG Consulting (2008) and referred to hereafter as the SFG Report.

the argument that a utilisation rate does not take into account the lost diversification benefits from investing in domestic equities;

(iii) The value of cash dividends from drop-off studies

the empirical result (often derived) from dividend drop-off studies that cash dividends are worth less (~0.8) than their face value (assumed to be due to differential tax rates on capital and dividends); and

the assertion that, consistent with the CAPM, the regulatory regime should compensate for the "penalty" associated with the payment of dividends and in particular the suggestion to set gamma to zero.

2. THE SFG REPORT

The key issues raised by SFG Consulting followed by comments thereon are set out below.

2.1 The Franking Credits Distribution Rate

> *"It is also generally recognised in the finance literature and in the Australian regulatory process that gamma should be interpreted as the value of franking credits at the point of creation (by the payment of Australian corporate tax). There are two components of this value: a. The distribution rate* (F)*: the rate at which franking credits that are created by the firm are distributed to shareholders, attached to dividends; and b. Theta* (θ)*: the value to investors of a franking credit at the time they receive it". – SFG Consulting (2008 para.3)*

As noted in the Issues Paper[4], the generally accepted approach by regulators is to define the value of imputation credits 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 value of a distributed credit i.e.

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

where F is the distribution ratio, θ (theta) is the utilisation rate and γ (gamma) is the value of one dollar of imputation credits. This approach also appears in certain finance literature including Cannavan, Finn and Gray (2004 p.170), Hathaway and Officer (2004 p.7) and Monkhouse (1996 p.198), (1997 p.72) as well as the NERA Report.[5]

An alternative view is that a decomposition of gamma along these lines is unnecessary since, for valuation purposes, it is appropriate to assume the distribution ratio is equal to one. In other words, the appropriate assumption is a 100% distribution of a firm's free cash flow and therefore a 100% distribution of (associated) imputation credits i.e.

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4 Australian Energy Regulator (2008 p.72).
5 NERA Economic Consulting (2008 p.16).

$\gamma = \theta$. This suggested alternative approach is then not only consistent with the standard WACC valuation framework (within a classical tax environment) due to Miller and Modigliani (1961), and which underlies standard valuation practice such as that formulated by McKinsey & Company, Inc. (2005) and Stewart (1991)[6],[7] but is also consistent with the valuation framework which underlies Officer's (1994) set of WACC definitions appropriate to the Australian imputation tax system.[8]

To be clear, it is not suggested here that firms actually payout 100% of their free cash flow each period but rather, that this is the standard assumption for valuation purposes.[9]

Accordingly, the discussion in section 3.1 of the NERA Report concerning the choice of the appropriate measure of the distribution ratio – firm specific, industry average or market wide average – is unnecessary.

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[6] For example, McKinsey & Company, Inc (2008 p.viii) state: "Valuation is an age-old methodology in finance. Its intellectual origins lie in the present value method of capital budgeting and in the valuation approach developed by Professors Merton Miller and Franco Modigliani (both Nobel laureates) in their 1961 Journal of Business article entitled 'Dividend Policy, Growth and the Valuation of Shares'".

[7] See Handley (2008) for further discussion of the importance to valuation of assuming a full distribution of free cash flow (in the context of a classical tax system).

[8] Officer (1994 p.5) explicitly assumes that all cash flows are perpetuities and derives one before company tax and four after company tax versions of the WACC. The after tax cases differ with respect to whether the interest tax shield and the value of imputation credits are included in or excluded from the corresponding (consistent) definition of after tax cash flow.

[9] The standard approach assumes that cash flow retained for one or more periods can be reinvested at the firm's cost of capital such that the present value of the firm remains unchanged. Although retained imputation credits can not be reinvested, the cash flow which would otherwise be paid out in distributing those credits can be. In this way, retained credits correspond to retained (underlying) cash flow which generates future (taxable) cash flow and thereby generates future credits. There will, of course, be some time value loss associated with the retention of credits, however, subject to the franking rules, firms may choose to distribute retained credits at will – including by way of special dividend and share buy back arrangements. So whilst the current value of a retained credit ultimately depends on the expectation of when it is paid out, it is suggested here that the most appropriate assumption for valuation purposes is the one which is consistent with the standard cost of capital formulae i.e. assume a full distribution of free cash flow and therefore assume a full distribution of imputation credits. In contrast, the current approach reflected in equation (1) implicitly assumes retained imputation credits have zero value.

2.2 The Identity of the Marginal or Representative Investor

> *"Technical theoretical discussions about the definition of the market, the identity of the marginal investor, and so on are likely to confuse and side-track the analysis". – SFG Consulting (2008 para.8)*

In contrast to the statement by SFG Consulting, the view here is that such considerations are essential in both understanding what the various parameters in the CAPM represent and in determining appropriate methodologies for their estimation.

Arguably the most critical choice to be made when using the CAPM concerns the proxy for the market portfolio. Once you choose the market, 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. The CAPM assumes neither segmentation nor integration of capital markets – but interpretations such as these naturally follow once the market is chosen.

The CAPM is an equilibrium asset pricing model i.e. it specifies the trade-off between (expected) return and risk when the market is in equilibrium. It is equally valid to speak in terms of either the equilibrium price (value) of an asset or the equilibrium expected rate of return. A number of important features of the CAPM equilibrium framework include:

- all investors agree on the equilibrium value of each asset otherwise the market is not in equilibrium, by definition;

- the equilibrium value of all assets in the market are determined jointly relative to all other assets in the market by all investors in the market i.e. neither individual assets nor individual investors are considered in isolation; and

- it is somewhat misleading, within the CAPM framework, to talk of the marginal investor since all investors collectively determine the prices of all assets and therefore all investors are collectively "the marginal investor". In this case, the

equilibrium value of an asset does not depend on the level of risk aversion of any single individual investor, but rather depends on the aggregate level of risk aversion in the economy as a whole. This in turn represents a complex weighted average of the level of risk aversion of all investors in the market – with the weights based on individual levels of wealth.[10] The weighted average investor is often called the representative investor.[11]

Officer (1994) adjusts the standard CAPM by suggesting returns should be grossed up to include the "value" of tax credits – but provides no further details.[12]

The CAPM is an equilibrium model and so it follows that the appropriate interpretation of γ (gamma) is the value of one dollar of imputation credits in equilibrium. Based on the above discussion, all investors agree on the value of γ which in turn represents a complex weighted average of the value of franking credits and level of risk aversion of all investors in the market – with the weights based on individual levels of wealth. This interpretation of gamma is consistent with the interpretation of the equilibrium aggregate tax factor T in the Brennan CAPM.[13]

For clarity, it is not suggested that the identity of the marginal investor should be assumed nor that the existence of foreign investors should be assumed away. Rather, by choosing a domestic market portfolio, the equilibrium value of gamma is by definition equal to a weighted average over all investors in the domestic market, including foreign investors but only to the extent that they invest domestically.

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10 See for example Brennan (1992) and sections 4.15-4.16 of Huang and Litzenberger (1988).

11 This view is shared by NERA Economic Consulting who state: "all investors will be marginal investors" (p.31).

12 Officer (1994 p.10).

13 Brennan (1970) extends the standard CAPM to allow for heterogeneous and differential personal taxes on dividends and capital gains under a classical tax system and shows that expected returns reflect an aggregate tax factor which represents a complex weighted average of personal tax rates and levels of risk aversion across all investors in the market.

2.3 Use of Redemption (or Utilisation) Rates

> *"One approach that has been considered when estimating theta (and consequently gamma) is to examine the average redemption rate of franking credits. This involves using aggregate tax statistics to see how many investors use the franking credits that are distributed to them. In my view, measuring how many investors use a particular type of asset does not give us a value of that asset". – SFG Consulting (2008 para.9)*

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%.[14] 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. It is noted that the estimate of (around) 70% is based on pre-2001 data and so includes no allowance for cash refunds of excess franking credits, whereas the estimate of (around) 80% assumes the cash refund provisions, introduced in 2001, have taken full effect.

[14] See Table 4 in Handley and Maheswaran (2008).

2.4 Interpretation of Results from Dividend Drop-off Studies

> *"Essentially the dividend drop-off method involves examining stock price changes on ex-dividend days. The amount by which stock prices change (on average) is assumed to reflect the value of the dividend and franking credit that has been separated from the shares. On average, we have*
>
> $$\Delta P = aD + \theta FC$$
>
> *where ΔP represents the change in the stock price, D represents the amount of the cash dividend, FC represents the amount of franking credits, a is the estimated value of a \$1.00 dividend and θ (theta) is the estimated value of a \$1.00 of franking credit". – SFG Consulting (2008 para.61)*

An important issue concerns the interpretation of the drop-off in the price of a share on an ex-dividend date. In an ideal economy characterized by no transactions costs or differential taxes, no information asymmetries, competitive price-taking and rational behaviour, the share price is expected to drop on the ex-dividend date by the amount of the dividend. 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, and in the particular case where dividends are taxed at a higher rate than capital gains, the drop-off should be less than the amount of the dividend.[15] The Beggs and Skeels (2006) study is based on an extension of the Elton and Gruber (1970) model to the Australian imputation tax environment.

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 the differential tax rates of all investors in the market (with the weights based on individual levels of risk aversion) and (ii) the

[15] The higher tax rate on dividends compared to capital gain is commonly referred to as a "tax penalty" on dividends.

variance of the ex-dividend stock price.[16] The adjustment for risk is to always reduce the drop-off relative to the amount of the dividend.

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 Michealy (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 across time as well as according to the tax rules of the particular country under consideration. Further, the drop-off can be greater than the face value of the dividend under an imputation tax system which makes dividends tax preferred to capital gains. For example, McDonald (2001) reports an average drop-off of 1.26 associated with DAX 30 stocks listed on the Frankfurt Stock Exchange between 1989 and 1996, representing about 88% of the combined face value of the DEM 1 of dividend and DEM 0.43 of tax credit.

The above discussion indicates that the presence of differential taxes and risk complicates the interpretation of results from dividend drop-off studies. In particular,

- The regression coefficient a does not represent the estimated value of one dollar of dividends but rather also reflects the impact of two variables: the average differential personal tax rate on dividends compared to capital gains, and risk.

  It is only if there are no differential taxes and risk involved in trading around the ex-dividend date, or one assumes them away, that the coefficient can validly be interpreted as the (before personal tax) value of one dollar of dividends.

[16] An equilibrium framework is necessary for analyzing dividend drop-offs since Heath and Jarrow (1988) show that arbitrage considerations alone are insufficient to explain the drop-off in terms of the dividend.

- Similarly, the regression coefficient θ does not represent the estimated value of one dollar of franking credits but rather also reflects the impact of the average differential personal tax rate on dividends compared to capital gains, and risk.

  It is only if there are no differential taxes and risk involved in trading around the ex-dividend date, or one assumes them away, that the coefficient can validly be interpreted as the (before personal tax) value of one dollar of franking credits.

- If dividends are valued on a before personal tax basis at 100% of their face value (and this is a sensible assumption to make) then the before personal tax value of one dollar of franking credits (relative to the value of dividends) can be estimated from θ but only after using a to remove the effect of differential taxes and risk. If risk is ignored (and this is unlikely to be a sensible assumption particularly since the introduction of the dividend trading rules in 1997), then the estimate is θ/a.[17]

  However, SFG Consulting (2008 para.126-8) suggest that multicollinearity considerations make it difficult to properly estimate θ and a separately and instead that estimates of the combined value of the dividend and franking credit are more reliable. In this case, the regression coefficient would again reflect the impact of average differential personal tax rates, on dividends compared to capital gains, and risk.

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

[17] This follows from footnote 2 in Beggs and Skeels (2006) and is the matter raised by Associate Professor Lally in the recent roundtable discussion on the WACC – see Australian Competition and Consumer Commission (2008, p.21-22).

2.5 The Results from Dividend Drop-off Studies

> *"The first point to note when interpreting the empirical evidence from drop-off analyses is that there is essentially uniform agreement among the various studies that for a fully franked dividend the $1.00 dividend and the $0.43 franking credit that is attached to it have a combined value of about $1.00"– SFG Consulting (2008 para.118)*

A summary of the results from Hathaway and Officer (2004),[18] Beggs and Skeels (2006) and a new study undertaken by SFG Consulting – which appears in the SFG Report – is set out in Table 1.

TABLE 1

Average Estimated Drop-offs From Empirical Studies

	Drop-off Associated with a $1 Cash Dividend	*Drop-off Associated wih a $1 Fully Franked Dividend*
Hathaway and Officer (2004)		
1986 – 2004	0.79	1.08
Beggs and Skeels (2006)		
1986 – 2004 (excluding 2000)	0.72	1.03
1998 – 1999	0.80	1.03
2001 – 2004	0.80	1.05
SFG Consulting (2008)		
1998 – 1999	0.81	0.86
2001 – 2006	0.89	1.03
1998 – 2006 (excluding 2000)	0.85	0.97

Source: Hathaway and Officer (2004) – based on results reported in Table 3 for big and mid cap stocks across three estimation methods. Beggs and Skeels (2006) – based on results reported in Table 5. SFG Consulting (2008) – based on (shaded) results reported in Tables 3 – 8.

Based on the results in Table 1, the empirical evidence indicates that the drop off associated with the payment of a $1 fully franked dividend is approximately $1.00, as claimed. This is further supported by the results in Table 2 of the SFG Report which

[18] Since Hathaway and Officer (2004) represents an update of a version of the study two years earlier, then the earlier version is not considered here.

shows that that the median drop-off associated with payment of a $1.00 fully franked dividend is exactly 1.00 over the 2001–2006 period.[19] It is noted that there is insufficient information in Hathaway and Officer (2004) and SFG Consulting (2008) to assess the statistical significance of the estimates. Based on the discussion in the previous section, to go further and interpret the reported drop-off as representing the value of a one dollar fully franked dividend requires additional assumptions concerning the impact of differential personal taxes and risk (such as no differential taxes and no risk of trading around the ex-dividend date).

SFG Consulting suggests the results of Hathaway and Officer (2004) and Beggs and Skeels (2006) are consistent with an estimate of the value of franking credits of approximately 50 cents in the dollar. This follows from a suggested decomposition of the combined value of $1.00 into 75-80 cents attributed to the dividend and 20-25 cents attributed to the franking credit.[20] This interpretation is reasonably consistent with the results of Beggs and Skeels (2006) for the most recent period of 2001–2004, which shows a combined value of $1.05 of which 25 cents is attributed to the franking credit, implying franking credits are valued at 58 cents in the dollar. In comparison, the results of SFG Consulting for the most recent period of 2001–2006 shows a combined value of $1.03 of which 14 cents is attributed to the franking credit, implying franking credits are valued at 33 cents in the dollar. If instead the full estimation period is used, SFG Consulting reports an implied average value of franking credits of 28 cents in the dollar (range $0.20-$0.35).[21] Arguably the period since 2001 is most relevant since this corresponds to the date from which certain resident investors became entitled to a cash refund of excess franking credits (although it is noted that SFG Consulting strongly advocates using the entire period).[22]

As discussed in the previous section, SFG Consulting suggests that estimates of the combined value of the dividend and franking credit are more reliable than separate estimates of the components. Accordingly, SFG Consulting focuses attention on the

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19 SFG Consulting (2008, para. 191).

20 SFG Consulting (2008, para.102). At a 30% corporate tax rate, a $1.00 fully franked dividend carries a franking credit of 43 cents. If the franking credit is valued at 20-25 cents then this implies franking credits are valued at 46-58% of their face value.

21 SFG Consulting (2008, para.109).

22 See SFG Consulting (2008, para.78).

result that the combined value of a $1.00 dividend and attached franking credit is approximately $1.00 and advocates the following alternative interpretation:

> *"If one estimates the value of $1.00 of cash dividends to be worth $1.00 (which is consistent with other empirical evidence, and is also the assumption that is made in the CAPM) the estimated value of franking credits is negligible". – SFG Consulting (2008 para.19)*

Three arguments are offered by SFG Consulting in support. First, the other evidence that SFG Consulting is referring to is (likely) Cannavan, Finn and Gray (2004) who argue that the simultaneous security price method (which is based on a comparison of the price of a stock with a corresponding futures contract) overcomes certain weaknesses implicit in the dividend drop-off method, for estimating the value of franking credits.[23] Cannavan, Finn and Gray (2004) report, based on data during the period July 1997 to December 1999, that the implied value of franking credits has been insignificantly different from zero.

Second, SFG Consulting argues that the results of dividend drop studies should be interpreted in a manner which is consistent with the assumptions underlying the standard CAPM and in particular, the assumption of no differential personal taxes on dividends compared to capital gains:

> *"In my view, assuming that a $1.00 cash dividend is valued at (a) $1.00 when estimating the required return on equity, but (b) 75-80 cents when estimating the effect of franking credits presents a clear inconsistency that must be resolved. The inconsistency can be resolved by estimating theta conditional on a $1.00 cash dividend being worth $1.00 (consistent with CAPM). If this is done, the estimate of theta (and consequently gamma) is negligible". – SFG Consulting (2008 para.21)*

[23] See SFG (2008, para.90) and Cannavan, Finn and Gray (2004, p.174).

Third SFG Consulting proposes that assigning a negligible value to franking credits is consistent with market practice in Australia:

> *"I note that the standard practice of Australian firms and independent expert valuation practitioners is to make no adjustment for dividend imputation franking credits when estimating WACC". – SFG Consulting (2008 para.22)*

For clarity, the issue of debate here is not the result that the combined drop-off of a $1.00 dividend and attached franking credit is approximately $1.00 but rather, what this implies about the value of franking credits.

The key difficulty with SFG Consulting's interpretation of this result is that it is inconsistent with the substantial body of very persuasive international evidence concerning dividend drop offs, discussed in section 2.4 above. In particular, if franking credits have negligible value as argued – a proposition consistent with the notion that pricing in the Australian equity market is essentially determined by foreign investors[24] – then one would expect to see on average, a dividend drop off in the Australia market similar to that observed in international markets and in particular, to that observed in the U.S. i.e. if franking credits have negligible value then the average dividend drop-off should be less than the amount of dividend. Instead we observe an average drop-off equal to the amount of the dividend – which is consistent with franking credits having positive value.

On the second matter, SFG Consulting is correct to point out the apparent inconsistency regarding the treatment of differential taxes i.e. in using the standard CAPM one assumes no differential taxes but in interpreting the results of the drop-off studies, one allows for the impact of differential taxes. SFG Consulting suggests one way to resolve the inconsistency – effectively change the interpretation of the empirical evidence of the drop-off studies to match the assumption of the standard CAPM. However, an alternative way to resolve the inconsistency is to change the CAPM to match the interpretation of the empirical evidence of the drop-off studies. In other words, the

[24] For example NERA Economic Consulting suggest that Australia is integrated with international equity markets and foreign investors extract little value from franking credits. See section 3.2 below for further discussion.

drop-off studies appear to suggest that the Brennan CAPM (or some other tax adjusted version of the CAPM) may be more appropriate for estimating returns. However, at this stage there is insufficient evidence to justify replacing the standard CAPM with the Brennan CAPM, as although differential personal taxes clearly effect pricing around ex-dividend dates, "a growing body of evidence shows that within static, single period equilibrium models, there is no convincing evidence of a significant cross-sectional relation between stocks' returns and their dividend yields".[25]

On the third matter, the observation that market practitioners generally do not make any explicit adjustment for imputation credits does not necessarily imply that market practitioners generally believe imputation credits to have zero value. The review of market practice in KPMG (2005) documents the many and varied stated reasons for making no adjustment and conclude, "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" [emphasis added here].[26]

Finally, 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.[27] This issue is discussed further in section 3.1 below.

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25 Allen and Michaely (2003 p.368).

26 KPMG (2005 p.14).

27 The misinterpretation of the conventional approach to valuation is also suggested by Monkhouse (1996, p.185) who states "the traditionally accepted valuation technique ignores the imputation credits associated with the dividend stream and essentially ascribes zero value to the imputation credits".

3. THE NERA REPORT

The key issues raised by NERA Economic Consulting followed by comments thereon are set out below.

3.1 The Relevance of Gamma

> *"There is no need for gamma to appear directly in the WACC … irrespective of whether firms pass on franking credits, one can use the conventional textbook formula for the WACC to discount cash flows conventionally defined". – NERA Economic Consulting (2008 p.31)*

Officer (1994) examines the WACC valuation framework within the context of the Australian dividend imputation tax system and presents a number of alternative definitions (formulae) of a firm's WACC and appropriate cash flows suitable for valuation purposes. Five cases are presented – one before company tax and four after company tax versions of the WACC – as set out in Table 2.

TABLE 2

Officer's (1994) Consistent Set of WACC Valuation Formulae

	Cash flow	**WACC**
Before Tax Case	X_O	$r_O = \frac{k_E}{1-T(1-\gamma)}\frac{E}{V} + k_D\frac{D}{V}$
After Tax Case (i)	$X_O(1-T)$	$r_i = k_E\frac{1-T}{1-T(1-\gamma)}\frac{E}{V} + k_D(1-T)\frac{D}{V}$
After Tax Case (ii)	$X_O(1-T(1-\gamma))$	$r_{ii} = k_E\frac{E}{V} + k_D(1-T(1-\gamma))\frac{D}{V}$
After Tax Case (iii)	$X_O - T(X_O - X_D)(1-\gamma)$	$r_{iii} = k_E\frac{E}{V} + k_D\frac{D}{V}$
After Tax Case (iv)	$X_O(1-T) + \gamma T(X_O - X_D)$	$r_{iv} = k_E\frac{E}{V} + k_D(1-T)\frac{D}{V}$

where X_O is the firm's operating income (or free cash flow), T is the corporate tax rate, γ is the value of franking credits, k_E is the firm's after company before personal tax cost of equity and k_D is the firm's before company before personal tax cost of debt. The after corporate tax cases differ with respect to whether the interest tax shield and the value of imputation credits are included in or excluded from the corresponding (consistent) definition of after company tax cash flow.[28] By definition, k_E is the cost of equity grossed-up for the value of imputation credits.[29]

The issue raised by NERA Economic Consulting is best examined using After Tax Case (i). Officer (1994) assumes a standard perpetuity setting in which to derive his valuation formulae. Accordingly, using After Tax Case (i), the value of the firm is:

$$V = \frac{X_O(1-T)}{r_i}. \tag{2}$$

By inspection, the cash flow, $X_O(1-T)$ does not include γ but the discount rate, $r_i = k_E \frac{1-T}{1-T(1-\gamma)}\frac{E}{V} + k_D(1-T)\frac{D}{V}$ does – or so it seems. In fact, it is easy to show that, within this framework, $k_E \frac{1-T}{1-T(1-\gamma)} = k_E^*$ where k_E^* is the corresponding conventional measure of the cost of equity i.e. the equity return excluding the value of imputation credits.[30] In this case, the value of the firm is:

$$V = \frac{X_O(1-T)}{r_i^*}. \tag{3}$$

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[28] It should be noted that the conventional approach to describing a return as "after company tax" is potentially ambiguous in an imputation setting since Officer (1994) suggests that company tax paid consists of a mixture of personal tax, which is effectively prepaid at the corporate level, and genuine corporate tax.

[29] Note that After Tax Case (iii) corresponds to the so-called "Vanilla WACC".

[30] Divide both sides by $1-T$ gives $\frac{k_E}{1-T(1-\gamma)} = \frac{k_E^*}{1-T}$ which is simply two ways of expressing the before corporate tax cost of equity.

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

The key observation is that equation (3) represents the conventional approach to valuation, commonly used by practitioners i.e. there is no explicit recognition of the value of imputation credits in either the cash flows or in the discount rate. Under a classical tax system, or equivalently, pre-imputation, (3) is interpreted as an after company before personal tax approach to valuation. Under an imputation tax system, (3) is more appropriately interpreted as an after company after some personal tax approach to valuation.

The key implication is that (3) was derived without making any assumption concerning the value of imputation credits and so it does not require one to assume that imputation credits have zero value.[31]

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.[32] Officer (1994, p.10) argues the conventional approach "is not feasible because the level of personal withholding tax, paid at the company level, will vary between firms, and between the firm and the market portfolio. Therefore, specific recognition of this fact is required in the level of franked dividends paid. Ignoring the relative proportion of franked dividends (relative to total dividends) will create errors because a franked dividend is clearly worth more than an unfranked dividend insofar as $\gamma > 0$. Therefore, differences in the value of franked and unfranked dividends and differences in the proportions of franked dividends paid require specific recognition. Conventional measures of the costs of equity capital, where these differences are not recognised in either the net cash flow or in the discount rate (WACC) are inappropriate".

[31] In comparison, Officer (1994, p.7) suggests "if $\gamma = 0$ i.e. the tax credits have no value, then there is no difference between the WACCs under a classical or imputation tax system".

[32] It is also necessary to examine this issue within a non perpetuity framework.

This argument is similar to ones used in favour of the Brennan CAPM (or some other after tax version) over the standard CAPM, when differential personal taxes are present. In essence the choice between the conventional and imputation approaches rests on the question of whether equity returns are determined in the market, on an after company but before personal tax basis or on some other basis. Ultimately, this is an empirical issue.

3.2 International Equity Market Integration and the Identity of the Representative Investor

> *"because the Australian equity market is integrated with international equity markets and foreign investors get little value from franking credits, gamma is likely to be close to zero. A representative investor will most closely resemble a foreign investor and foreign investors do not receive any benefit from franking credits. The value the market places on franking credits is therefore likely to be close to zero". – NERA Economic Consulting (2008 p.31)*

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.[33] 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 credits across all investors in the market, with weights based on individual levels of wealth. However,

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

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.

NERA Economic Consulting is clearly of the view that the Australian equity market is integrated with international equity markets. Consistency considerations would then require an international CAPM be used for pricing purposes – which in turn would necessitate the use of an international risk free rate, an international market portfolio and stock betas measured relative to this international market portfolio.

However, there is little evidence in the NERA Report to support their claim. Moreover, the evidence in the finance literature concerning this important issue is mixed.[34]

[34] For example, according to Karolyi and Stulz (2003), "Overall, the evidence shows that country risk premiums change dynamically and predictably over time with their covariance with the world market portfolio return, a result that is supportive of international asset pricing. However, it is much less clear how the cross-section of expected returns across global securities is affected by global factors when one goes from a purely domestic asset pricing model to an international asset pricing model" (p.992) and further, "Models that rely on perfect financial markets do not explain important stylized facts in international finance, such as the home bias and the volatility of capital flows. Though introducing barriers to international investment, especially differences in information between local and foreign investors, helps in understanding these facts better, our understanding of these facts is still quite incomplete" (p.1014).

3.3 Use of Redemption Rates

> *"it is inappropriate to use a redemption rate as a proxy for the market value value of imputation credits. To access the credits, investors must bear risk. In particular, to access a large share of the credits distributed, Australian investors must forego the benefits that they would otherwise gain from diversifying internationally. (2008 p.14)*

The relevance of redemption rates in relation to the value of imputation credits is discussed in section 2.3 above. The irrelevance of non-market assets, in this case in relation to international diversification considerations, is discussed in section 3.2 above.

4. CONCLUSION

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

It is noted that the upper bound of the above estimate is based on pre-2001 data and so includes no allowance for cash refunds of excess franking credits.

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