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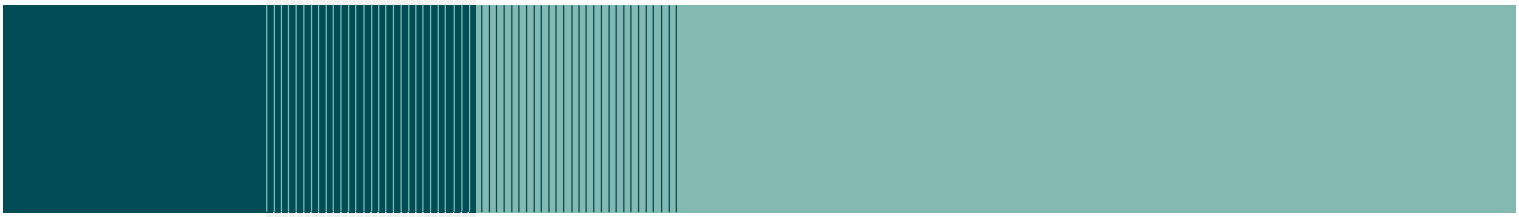
The Value of Imputation Credits

A report for the ENA, Grid Australia and APIA



NERA
Economic Consulting

Project Team

Greg Houston

Simon Wheatley (Academic Associate)

Brendan Quach

NERA Economic Consulting
Darling Park Tower 3
201 Sussex Street
Sydney NSW 2000
Tel: +61 2 8864 6500
Fax: +61 2 8864 6549
www.nera.com

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1. Introduction

This report has been prepared at the request of the Energy Networks Association (ENA), Grid Australia and the Australian Pipeline Industry Association (APIA), in response to the first review by the Australian Energy Regulator (AER) of the weighted average cost of capital (WACC) parameters for electricity distribution and transmission network service providers (NSPs).[1] Specifically, we have been asked to review the value of and methodology used to estimate the value of imputation credits (gamma).[2]

In the Australian Energy Regulator's (AER's) post tax revenue model (PTRM) the value of gamma is used to determine the proportion of assumed company income tax that does not need to be included in a regulated firm's annual revenue requirement. Gamma represents the value that equity investors place on the franking credits created through the payment of company income tax.

In developing this report we are cognisant that in undertaking the review the AER must have regard to:[3]

(1) the need for the rate of return calculated … to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing *standard control services*; and

(4) where … the values attributable to … parameters referred to in paragraph (d) cannot be determined with certainty:

(i) the need to achieve an outcome that is consistent with the *national electricity objective*; and

(ii) the need for persuasive evidence before adopting … a value for … that parameter that differs from the … value … that has previously been adopted for it.

Furthermore, the value of gamma for transmission network service providers is deemed by the NER to be 0.5. The adopted value of gamma for distribution network service providers is not explicitly set out in the NER. However, as seen in Table 1.1 the value adopted by all jurisdictional regulators is 0.5.

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[1] The National Electricity Rules (NER) clauses 6.5.4(b) and 6A.6.4(c) require that the AER complete the first review by 31 March 2009.

[2] Clauses 6.5.3 and 6A.6.4 of the NER state that gamma is the *assumed utilisation of imputation tax credits*. Gamma has been correctly interpreted in the Issues Paper as the value of imputation credits. The value that gamma takes on will affect the return the market requires on equity. The higher is gamma, and so the greater the value the market places on franking credits, the lower will be the return the market requires on equity.

[3] NER, clauses 6.5.4(e) and 6A.6.2(j).

Table 1.1
Value of Gamma Adopted in Electricity Distribution Determinations

Jurisdiction(s)	Regulator	Year	Gamma
ACT[4]	ICRC	2008	0.5
New South Wales[5]	AER	2008	0.5
South Australia[6]	ESCOSA	2005	0.5
Queensland[7]	QCA	2005	0.5
Victoria[8]	ESC	2006	0.5
Tasmania[9]	OTTER	2007	0.5

The report is structured as follows:

- Chapter 2 outlines the theoretical underpinnings of the use of gamma in establishing rates of return and cash flows;
- Chapter 3 examines the most recent studies on the value of gamma; and
- Chapter 4 sets out our conclusions as to whether there is persuasive evidence to adopt a value for gamma that is different from 0.5.

Appendix A references the material that has been relied on in this report. Appendix B provides an overview of the project team.

4 NER, Chapter 11: Savings and Transitional Rules - Appendix 1, clause 6.5.3.

5 NER, Chapter 11: Savings and Transitional Rules - Appendix 1, clause 6.5.3.

6 ESCOSA, *2005-2010 Electricity Distribution Price Determination: Part A – Statement of Reasons,* April 2005, pg 161.

7 QCA, *Regulation of Electricity Distribution: Final Determination*, April 2005, pg 129.

8 ESC, *Electricity Distribution Price Review 2006-10 Final Decision Volume 1 Statement of Purpose and Reasons,* October 2005, pg 413.

9 OTTER, *Investigation of Prices for Electricity Distribution Services and Retailer Tariffs on Mainland Tasmania: Final Report and proposed Maximum Prices, September 2007*, pg 152.

2. Theoretical Background

Australia has had an imputation tax system since 1 July 1987. The idea behind the system is to avoid corporate profits being taxed twice. Under a classical tax system, corporate profits are taxed at the corporate level and may be taxed again at the personal level. Under an imputation system, a franking credit is provided to individuals or institutions for tax paid at the corporate level. Franking credits, therefore, alter the rate at which individuals pay taxes at the personal level. A franking credit can be used to offset Australian tax due on the dividend to which the credit is attached or tax due on other income or, since 1 July 2000, credits can be used to produce a rebate from the Australian Tax Office (ATO).

In the recently released Treasury Discussion Paper entitled "*Australia's Future Tax System (AFTS)*" Australia's corporate tax was described as:[10]

- *a withholding tax on income earned by Australian residents, through shares in a resident (Australian) company; and*
- *a final tax on (generally Australian source) income earned by non-residents, through shares in an Australian company or a non-resident company's branch in Australia.*

In principle, the introduction of franking credits that can be used by investors to reduce the taxes they pay at the personal level can affect the values of companies and the projects they undertake. Whether the introduction of credits will in practice affect company and project values is an empirical matter and will depend on several factors. Officer (1994) examines what impact the existence of franking credits should have on the way in which one assesses company values. He introduces a parameter he labels 'gamma' that represents the 'value of personal tax credits' created, and he incorporates gamma into measures of the weighted average cost of capital (WACC). Our remit is to assess the empirical evidence on the value of gamma. To interpret the evidence, though, it is important that one understand what role gamma plays in theory. So in this chapter we discuss:

- why gamma appears in the WACC;[11]
- what assumptions are required for gamma, but not other tax parameters, to appear in the capital asset pricing model (CAPM);
- whether the fraction of credits redeemed can provide a guide as to the value of gamma; and
- why the value of gamma will depend on whether the Australian equity market is integrated with or segmented from international equity markets.

To summarise, the economic and financial literature provide a number of insights as to the likely impact of an imputation tax regime. These insights include:

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[10] Australian Treasury, *Architecture of Australia's tax and transfer system*, August 2008, pgs 260.

[11] We note that the under the NER a post-tax "vanilla" WACC is applied. However, as discussed in section 2.1.1, Officer's (1994) paper envisages that the return on equity should include a fraction of the franking credits created.

- there is *no need* to change the WACC formula to accommodate the impact of franking credits or personal taxes on the cost of capital. The WACC, conventionally defined, depends on the required returns to equity and debt and the values these take on will reflect the impact of franking credits and personal taxes;
- although franking credits provided to investors can affect the return the market requires on equity, taxes levied on dividends and capital gains can also affect the return. So, in general, other tax parameters besides gamma should appear in the CAPM. The combined impact of franking credits and of taxes on dividends and capital gains on the required return to equity is an empirical matter. We discuss the empirical evidence on what the *combined* impact is later;
- the value that investors place on imputation credits *cannot* be estimated from the fraction of credits redeemed; and
- because the Australian equity market is integrated with international equity markets, one would expect empirical studies to show that the value of imputation credits is *low*.

2.1. WACC and gamma

Personal taxes on dividends and interest will in general affect the returns investors require on equity and debt. Similarly, the provision of franking credits that can be used to reduce personal taxes or provide a cash rebate can affect the returns investors require on equity. Securities whose returns are heavily taxed must deliver higher before-tax returns to compensate investors for the taxes they must pay. Securities whose returns are not heavily taxed or that provide credits will deliver lower before-tax returns because investors, who will find such securities attractive, will bid up the prices of them. It follows that if dividends are heavily taxed at the personal level, the before-tax returns to high-yield stocks will be higher to compensate investors for the taxes they must pay. If a representative investor values franking credits, the before-tax returns to stocks that distribute franking credits will be lower than the returns would be if no such credits were distributed.

These considerations give rise to the question as to how should taxes levied at the personal level on income from equity and debt and the provision of credits that reduce those personal taxes affect the way in which a company or project is valued. Put another way, an interesting question is how should taxes levied at the personal level on income from equity and debt affect the WACC? Since most countries levy taxes at the personal level on income from equity and debt, this is a question to which significant attention has been given in the corporate finance literature. The answer is straightforward, at least if one is valuing a perpetual series of cash flows, growing or otherwise. The answer is that taxes levied at the personal level on income from equity and debt do not affect the WACC. As Professor Jonathan Berk of the University of California at Berkeley and Professor Peter DeMarzo of Stanford University make clear in their corporate finance text:[12]

> *'the WACC method does not change in the presence of investor taxes.'*
> [The emphasis is theirs]

[12] Berk, Jonathan and Peter DeMarzo, 2007, Corporate Finance, Pearson Addison-Wesley, Boston, MA, USA.

Personal taxes affect the return the market requires on equity and debt, but do not affect a firm's WACC, conventionally defined, for use in discounting cash flows, also conventionally defined, in any other way. If personal taxes on dividends are high, the market will require that the return to equity that pays dividends be high. If personal taxes on interest are high, the market will require that the return to holding debt be high. If franking credits can be used to reduce personal taxes, the market may accept a lower return to equity that delivers credits. So taxes at the personal level will affect a company's WACC *indirectly*. Taxes at the personal level, though, will not affect a company's WACC *directly*. As Berk and DeMarzo (2007) emphasize, in the conventional WACC formula:[13]

> 'the equity and debt cost of capital in the market *already* reflects the effects of investor taxes.'
> [Again, Berk and DeMarzo provide the emphasis]

2.1.1 Officer's framework

Officer (1994) provides an alternative way of answering the question of how one should value a company when there are taxes levied at the personal level on income from equity and debt and credits issued that lower personal taxes.[14] He assumes that the operating income of a company is a perpetuity and defines the return to the equity of a company to include a portion of the franking credits the company issues. In particular, he defines the required return to equity after company tax but before personal tax to be

$$\hat{r}_E = \left[\frac{1-(1-\gamma)T}{1-T}\right] r_E, \qquad (1)$$

where:

- T is the corporate tax rate;
- $\hat{r}_E$ is the required return to equity after company tax but before personal tax;
- g is the ratio of the value of franking credits created to the nominal value of the credits; and
- r_E is the with-dividend but without-franking-credit required return to equity, that is, the required return to equity conventionally defined.

If gamma is positive, Officer's required return to equity will exceed the required return to equity conventionally defined. If gamma is chosen to be 0.5, the value regulators have typically adopted, the difference between the two returns can be substantial. For example, if the corporate tax rate $T = 0.3$ and the required return to equity conventionally defined $r_E = 12$ per cent, then Officer's required return to equity $\hat{r}_E = 14.6$ percent. By way of an alternative example, if the corporate tax rate $T = 0.3$ and Officer's required return to equity

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[13] Berk and Demarzo, *op. cit.*, 2007.

[14] Officer, Robert R., *The cost of capital of a company under an imputation tax system*, Accounting and Finance, 1994, pages 1-17.

$\hat{r}_E = 12\,\text{percent}$, the required return to equity conventionally defined r_E = 9.9 per cent. This last example is used by Gray and Hall (2006) to illustrate that setting a value for Officer's required return to equity of 12 per cent leads to an unrealistically low value for the equity premium conventionally defined.[15]

Using the required return to equity defined by (1), Officer (1994) derives four different forms of the WACC that can be used to discount the cash flows the company produces.[16] The use of each different form of the WACC requires the cash flows of the firm be measured in a particular way. The National Electricity Rules (NER) currently require regulated electricity utilities to use the post tax nominal "vanilla" WACC, ie:

$$\frac{D}{V} r_D + \frac{E}{V} \hat{r}_E \qquad (2)$$

where:

- D is the market value of debt;
- E is the market value of equity;
- V is the market value of the firm; and
- r_D is the required return on debt.

Officer shows that one can uncover the value of a company by using the plain-vanilla WACC to discount the company's after-tax net cash flows defined as:

$$X_O - T(1-\gamma)(X_O - r_D D), \qquad (3)$$

where:

- X_0 is operating income.[17]

It is straightforward to show that, *conditional on a choice for the required return to equity conventionally defined*, r_E, the value of the firm one derives by discounting the after-tax net cash flows defined by (3) by the plain-vanilla WACC defined by (2) will be independent of the value of gamma. In other words, one can set gamma at zero or 0.5 without affecting the value of the firm. This implies that Officer's framework is consistent with the conventional framework that Berk and DeMarzo (2007) describe. The insertion of gamma into the expression for the after-tax net cash flows given by (3) is *necessitated* by defining the required return to equity in such a way that it too depends on gamma.

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[15] Gray, Stephen F. And Jason Hall, *Relationship between franking credits and the market risk premium*, Accounting and Finance 46, 2006, pages 405–428.

[16] Officer, Robert R., *op. cit.*, 1994, pages 1-17.

[17] This is consistent with the post-tax revenue model (PTRM) used by the AER, assuming no opex or economic depreciation. That is, the annual revenue requirements X_O equals return on capital (as set by the vanilla WACC) plus compensation for tax $T(X_O - r_D D)$ less the value of franking credits $gT(X_O - r_D D)$.

To see this, consider the following simple numerical example. Let

r_D = 8 per cent,

r_E = 14 percent,

D/V = 0.4,

T = 0.3,

X_O = 76.

Recall that r_E is the required return to equity conventionally defined. In the example, this quantity is held constant. If $g = 0.5$, then, from (1), Officer's required return to equity, $\hat{r}_E$ = 17 percent, from (2), the plain "vanilla" WACC = 13.4 percent, from (3), the after-tax operating cash flows are 67 and the value of the firm $V = 500$. If $g = 0$, then Officer's required return to equity, $\hat{r}_E$ = 14 percent, the plain "vanilla" WACC = 11.6 percent, the after-tax operating cash flows are 58 and again the value of the firm $V = 500$.

Using the plain-vanilla WACC defined by (2) to discount the after-tax net cash flows defined by (3) will produce the correct value for the firm. So no harm will be done by using Officer's (1994) framework. However, it is important that the plain-vanilla WACC be computed using the return to equity defined precisely in the way Officer defines the return. The required return to equity *must* include a fraction of the franking credits that the firm creates. A plain-vanilla WACC computed without a fraction of the franking credits included will be too low.

Intuitively, if a representative investor values franking credits, then the return, conventionally defined, that the market requires on equity will be lower than it would be in the absence of franking credits. Officer adds the value of the credits to the return, raising it to what it would be in the absence of franking credits. This necessitates making an adjustment to the cash flows one intends to discount. If correctly executed, the adjustments to the required return to equity and to the way in which the cash flows are measured should exactly offset one another.

It appears that the fact that Officer (1994) makes two offsetting adjustments in computing a firm's value has been lost on some practitioners. For example, the Issues Paper states on page 7 that the 'gamma value is not included in the WACC.' However, Officer (1994) shows that if the value that shareholders receive from the creation of imputation credits is added to a firm's cash flows – as in equation (3) – then the WACC must depend on gamma and the required return to equity that forms part of the WACC must be computed using the definition (1).

In other words, Officer's (1994) paper links the increase in a firm's cash flows to the use of a return to equity defined to be after company tax but before personal tax. The return to equity after company tax but before personal tax will be higher than the return to equity conventionally defined for any positive value for gamma.

2.1.2 Growth

The applicability of the argument that the WACC need not depend directly on gamma is not restricted to Officer's (1994) zero-growth framework. For simplicity, and because our focus is on the impact on firm value of franking credits issued to equity holders, consider the case

of an unlevered firm (ie, a firm with no debt) whose operating income is expected to grow perpetually through time. Consistent with Officer's equation (17), the required return to equity after company tax but before personal tax is defined to be:

$$\hat{r}_E = r_E + \left[\frac{\gamma T}{1-T}\right][r_E - g], \qquad (4)$$

where:

g is the rate of growth in the firm's operating income through time: and

$r_E - g$ is the equity's dividend yield, defined to be the ratio of next period's expected dividend to this period's price.

If g is zero, so the firm's operating income is a perpetuity, then (4) will collapse to (1).[18]

From (4), the difference between Officer's (2004) required return to equity and the required return conventionally defined will be smaller the larger is the growth in the firm's operating income. However, it is important to note that when operating income exhibits significant growth, even small differences in required returns can have a substantial effect on the way one measures firm value. This is because when operating income exhibits significant growth, the value of the firm will be largely tied to the value of operating income generated many periods from now. The value of operating income generated many periods from now will be sensitive to small changes in the rate at which one discounts the income. Another way of saying the same thing is that the duration of the firm's value with respect to the required return to equity, however measured, will be larger the higher the growth in operating income.

Like Officer (1994), we assume that the firm retains no earnings, and so the value of the growing firm will be:

$$\frac{X_O(1-T)}{r_E - g} = \frac{X_O(1-(1-\gamma)T)}{\hat{r}_E - g}. \qquad (5)$$

Again, it makes no difference to the value of the firm one computes whether gamma is set to be 0 or 0.5. The adjustments to the way one measures the cash flows of the firm and the required return to equity, if executed correctly, should exactly offset one another.

To see this, consider the numerical example we considered earlier. Once more, let

r_E = 14 percent,

T = 0.3,

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[18] ie, $\hat{r}_E = r_E + \left[\frac{\gamma T}{1-T}\right][r_E - 0] = \frac{1-T+\gamma T}{1-T} r_E = \frac{1-(1-\gamma)T}{1-T} r_E$

$X_O = 76.$

In addition, let g = 9 per cent. Again, r_E is the required return to equity conventionally defined and this quantity is held constant. If g = 0.5, then, from (4), Officer's required return to equity, $\hat{r}_E$ = 15.07 percent, from (5), the after-tax operating cash flows are 64.60 and the value of the firm V = 1064. If g = 0, then Officer's required return to equity, $\hat{r}_E$ = 14 percent, the after-tax operating cash flows are 53.20 and again the value of the firm V = 1064.

To summarize, making a firm's WACC a function of gamma is unnecessary. As Berk and DeMarzo (2007) emphasize, a firm's WACC does not depend directly on the taxes that investors face at the personal level. Its WACC will, though, depend indirectly on these taxes. This is because the required returns to equity and debt will in general depend on the taxes investors face at the personal level.

Changes in the taxes that investors face at the personal level can lead to changes in the required returns to equity and debt. Besides the introduction of the imputation system in 1987 and the changes made to the system in 1997 and 2000, there have also been a large number of other important changes to the way personal income is taxed in Australia. For example, there have been numerous changes to the personal tax rates that investors face and in recent years a complete overhaul of the way capital gains are taxed. There have been an even larger number of changes made to the ways in which foreign investors are taxed on personal income. All of these changes may have affected the required returns to equity and debt, not just those changes made to the imputation system.

The following section discusses how the required returns to equity might depend on the taxes investors face at the personal level.

2.2. Taxes and the CAPM

Current regulatory policy uses the CAPM to estimate the required return to equity and, so a natural place to begin thinking about the impact taxes on dividends and the provision of franking credits might have on returns is within the mean-variance framework. In a widely cited paper, Brennan (1970) introduces into the framework taxes on capital gains and dividends that can differ across investors.[19] His model predicts that when dividends are taxed at a higher rate than capital gains, high-tax-bracket investors will hold portfolios dominated by low-yield stocks and low-tax-bracket investors will hold portfolios dominated by high-yield stocks. High-bracket investors, though, will hold some high-yield stocks and low-bracket investors will hold some low-yield stocks because both sets of investors will wish to diversify. As a result, in Brennan's model the return the market requires on high-yield stocks will include a premium to compensate high-bracket investors for the additional taxes they must pay on high-yield stocks.

[19] Brennan, Michael, *Taxes, market valuation and corporate financial policy*, National Tax Journal 23, 1970, pages 417-427.

Monkhouse (1993),[20] Wood (1997)[21] and Lally and van Zijl (2003)[22] extend Brennan's (1970) model to examine the effect of the provision of franking credits. Monkhouse and Wood examine models in which the tax rates on capital gains and dividends are identical, while Lally and van Zijl examine a model in which the rates can differ but in which equity markets are segmented internationally. Tax rates on capital gains and dividends in Australia differ. Also, as we will discuss, the evidence indicates that equity markets are not segmented. So it makes sense to examine the impact on required returns of relaxing the assumptions that Monkhouse, Wood and Lally and van Zijl impose.

Monkhouse (1993), Wood (1997) and Lally and van Zijl (2003) each assume that investors receive returns to equity in three forms: as capital gains, as dividends and as franking credits. Investors face taxes on capital gains and dividends that can differ across investors. For example, tax exempt institutions face no taxes on either capital gains or dividends but taxable individuals typically face taxes on both. Similarly, investors also differ in their ability to use franking credits. For example, domestic investors can use franking credits to reduce the taxes that they must pay whereas foreign investors are limited in their ability to do so. Taxes and credits will affect what portfolios individuals will choose to hold. In Brennan's (1970) model each investor will hold the portfolio of risky assets that is, from the investor's perspective, after-tax efficient. Since, in his model, different investors face different tax rates, they will hold different portfolios. Individuals who face high taxes on dividends will hold portfolios with a lower weight placed on high-yield stocks while tax exempt investors will hold portfolios heavily weighted with high-yield stocks. Domestic investors will hold portfolios heavily weighted with domestic equities because of the franking credits that the equities provide. Foreign investors, on the other hand, will be discouraged from holding domestic equities because of their inability to use the credits effectively. All investors, though, will wish to diversify and so all investors will typically hold some position in each stock. It follows that *all* investors will be marginal investors, consequently one cannot identify an individual as the marginal investor for the purposes of determining the value of distributed franking credits.[23]

Brennan's (1970) model predicts that the required returns to high-yield firms will be high to reflect the additional taxes that investors face on dividends relative to capital gains. In other words, his model predicts that firms that pay relatively high dividends will face a penalty. Of course, Brennan's model is a partial equilibrium model that takes the dividend policies of firms as fixed. If firms that pay relatively high dividends face a penalty, they will have an incentive to limit the dividends they pay. If firms issue franking credits, the penalty on dividends may be offset by the benefit that the credits attached to dividends convey. Officer (1994) assumes that the tax rates that a representative investor faces on capital gains and dividends are identical. Effectively, he assumes that the required return to equity conventionally defined will be unambiguously lower to reflect the benefit that franking

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[20] Monkhouse, Peter H.L., *The cost of equity under the Australian dividend imputation tax system*, Accounting and Finance 33, 1993, pages 1-18.

[21] Wood, Justin, *A simple model for pricing imputation tax credits under Australia's dividend imputation tax system*, Pacific-Basin Finance Journal 5, 1997, pages 465-480.

[22] Lally, Martin and Tony van Zijl, *Capital gains tax and the capital asset pricing model,* Accounting and Finance 43, 2003, pages 187–210.

[23] See Allen, Bernardo and Welch (2000) and Guenther and Sansing (2007) for a discussion of this point.

credits convey. However, this assumption does not imply that one must incorporate gamma into the WACC. Rather, it simply implies that if the market values franking credits, the return required on equity will be lower than it would otherwise be.

Brennan's (1970) model makes some interesting predictions. As Guenther and Sansing (2007)[24] point out, in his model the dividend penalty that high-yield firms face does not depend on the fraction of a firm's shares owned by tax exempt investors. If it did, investors would face an incentive to shift funds from low-penalty firms to high-penalty firms. It follows that firms with a larger number of tax exempt institutions as shareholders will not face a smaller penalty per unit of yield distributed. Rather the penalty per unit of yield will be identical across all stocks. Similarly, the benefit that franking credits may deliver will not depend on the fraction of a firm's shares owned by investors able to use the credits the firm provides. If it did, investors would face an incentive to shift funds from high-benefit firms to low-benefit firms. It also follows that firms with a larger fraction of their shares held by domestic residents will not benefit from a greater reduction per unit of credit yield in the return the market requires on the shares. Rather, the benefit per unit of credit yield will be identical across all stocks.

In Brennan's (1970) model, the impact of taxes on required returns is determined by the taxes a representative investor faces. The taxes that a representative investor faces are weighted averages of the taxes that individuals face. The weights are determined in large part by the wealth of each investor. It follows that if equity markets are integrated, a representative investor will most closely resemble a foreign investor, because the aggregate wealth of foreign investors is greater than the aggregate wealth of domestic investors. In particular, a representative investor may most closely resemble a US investor because the aggregate wealth of US investors is high. Brennan's model therefore implies that if the Australian equity market is integrated with international markets, the taxes that a representative investor faces will be determined largely by the taxes that foreign investors face. This will be true even if foreign investors are discouraged from holding a large share of the domestic equity market because they are unable to use the franking credits domestic equities deliver. It is important to note that the value of franking credits that a firm issues will be determined by a representative of ***all*** investors, not by a representative of the investors that hold the firm's shares weighted by the fraction of the firm's equity each investor holds.

We understand that US tax rates on dividends and on long-term capital gains are similar. Capital gains and the payment of taxes they trigger can, of course, be postponed. Nevertheless, the low tax rate on dividends that US investors receive, coupled with an identical low tax rate on long term capital gains, suggests that there may be little difference between the tax rate that a representative investor faces on capital gains and the tax rate the investor faces on dividends. Thus the premium that high-yield stocks must deliver may currently be small. In other words, theory coupled with knowledge of existing tax rates in the US suggests that it is not unreasonable to assume that one can use a pricing model that does not take into account complications introduced by differences between the tax rates on dividends and capital gains.

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[24] Guenther, David A. and Richard Sansing, *The effect of tax-exempt investors on stock ownership and the dividend tax penalty*, Working Paper, Dartmouth College, NH, 2007.

Since foreign investors are limited in their ability to use franking credits and a representative investor is likely to most closely resemble a foreign investor, it is likely that franking credits will have little value. Again, it is important to emphasize that this will be true even if foreign investors are discouraged from holding a large share of the domestic equity market by their inability to use effectively the franking credits that domestic equities deliver. Domestic investors will place a substantially higher value on franking credits than foreign investors. Domestic investors, though, will be discouraged from collecting all of the franking credits that domestic firms issue because of the additional risk that they would face by doing so. There are benefits from diversifying internationally and to collect all of the franking credits delivered by domestic firms, domestic investors would largely have to forego these benefits.

To summarise, a theoretical analysis suggests that the premium that high-yield stocks must deliver because of the taxes investors must pay on dividends may be low. A theoretical analysis also suggests that the market value of franking credits may be low. Together these analyses suggest that a model that does not take into account personal taxes and credits may provide a required return for equity conventionally defined that is approximately correct. It is important, though, to examine what the empirical evidence reveals. It may be that U.S. investors do not have as large an impact on the tax penalty associated with dividends as the theory we review would suggest. Also, if foreign investors can derive some benefit from franking credits, then gamma, while low, may not be zero. We review the empirical evidence in Section 3.

2.2.1 Ex-dividend day behaviour

A sensible place to look for evidence is in the behaviour of equity prices around ex-dividend days. If a representative investor who trades around ex-dividend days resembles a representative investor who buys and holds equity, then the fall in stock price on the day a stock goes ex-dividend will match the value of the dividend if the tax disadvantage associated with the dividend is matched by a tax benefit associated with the franking credit attached to the dividend. In other words, evidence that the fall in stock price when the stock goes ex-dividend matches the dividend indicates that one can safely disregard personal taxes and imputation credits in estimating the required return to equity conventionally defined.

A number of studies have examined whether changes in Australian tax rates have had an impact, for a representative investor, on the tax disadvantage associated with dividends and any tax benefit associated with franking credits.[25] Our analysis of Brennan's (1970) model indicates that changes to Australian tax rates are likely to have only a limited impact on the required return to equity. If equity markets are integrated, the required return to equity will depend not only on Australian tax rates but also on international tax rates.

2.3. Redemption vs value

Over the years there has been some confusion over what gamma means. Part of this confusion may have its origin in Officer's (1994) original work. In the abstract of that paper, Officer says that 'gamma is the value of personal tax credits' created. On page 4 of the paper, he states that gamma is the 'proportion ... of the tax collected from the company (that) will be

[25] See, for example, Beggs and Skeels (2006) and Hathaway and Officer (2004).

rebated against personal tax and, therefore, is not really company tax but rather is a collection of personal tax at the company level.' The definition in the abstract of Officer's paper suggests that gamma is a value determined by the market while the second definition suggests that gamma represents the fraction of credits created that are redeemed. The two quantities will in general differ. It is tempting to think that they will be the same because franking credits are redeemed for cash and so valuing the credits seems as though it should be a straightforward proposition. To access the credits, though, investors must bear risk. In particular, to access a large share of the credits, Australian investors must forego the benefits that they would otherwise gain from diversifying internationally. Valuing the credits is not therefore as straightforward a proposition as it might first appear. Valuing the credits requires one estimate their value. Their value cannot be inferred directly from the fraction of the credits that are redeemed because this overlooks the costs that investors bear in accessing the credits.

In the model that we consider above the value the market places on one dollar's worth of credits will not in general equal the proportion of one dollar's worth of franking credits that is on average redeemed. A representative investor will most closely resemble a foreign investor because foreign investors have substantially more wealth than domestic investors. Foreign investors, though, will place little value on franking credits. So the model suggests that the market value of the credits will be low *even if a large proportion of franking credits are redeemed*. Thus Australian residents will receive the benefits that franking credits convey and may not have to pay for them through a lower return. They will instead bear the cost in accessing a large share of the credits of additional risk.

2.4. International equity market integration

An important determinant of the impact of franking credits on the returns the market requires on equity will be whether the Australian equity market is segmented from or integrated with world equity markets. The evidence indicates that Australian equity markets are to a large extent integrated with world equity markets. There are few barriers facing Australians who wish to invest in the larger and more developed international equity markets and there are few barriers facing investors from these markets who wish to invest in the Australian equity market.

One of the barriers that foreign investors who wish to invest in Australia face is an imputation tax system that discriminates between domestic residents and foreign residents. Domestic residents can capture the full value attached to franking credits whereas foreign residents can only use the credits to reduce or eliminate withholding taxes. Withholding taxes typically generate foreign tax credits and so reducing or eliminating withholding taxes reduces or eliminates these credits. Thus it is doubtful whether the ability to reduce or eliminate withholding taxes is of much value to foreign investors. In the early years of the imputation system a variety of ways of channelling franking credits from foreign residents to domestic residents existed. Legislation introduced by the Commonwealth Government and backdated to 1 July 1997, though, has made it more difficult to channel the credits to domestic residents.

Despite the existence of a discriminatory imputation tax system, the Australian Bureau of Statistics (ABS) (2008) estimates that non-residents held 29 per cent of the total value of equity on issue by Australian enterprise groups as of 30 June 2007. The ABS estimates the total value of equity on issue by Australian enterprise groups as of 30 June 2007 to be AUD

2,195 billion and non-resident holdings to be AUD 632 billion. Of course, it is no surprise that foreign investors hold such a large share of the Australian equity market. Australia has run a current account deficit every quarter for over 30 years, and so has been borrowing throughout this period from the rest of the world. One would expect that part of what Australia has borrowed would be in the form of equity and this turns out to be the case.

3. Current Gamma Estimates

Regulatory precedent is that the value of gamma is around 0.5. The empirical argument for setting the value of gamma to 0.5 appears to be based largely on a dividend drop-off study conducted by Hathaway and Officer (1992). For example, the National Electricity Code states that:

> In October 1993, researchers at the Melbourne University Graduate School of Management completed initial empirical research into the value of franking credits in Australia. The results of this research indicate that franking credits are, on average, valued by equity investors at approximately 50 cents in the dollar.
>
> As the ultimate owners of government business enterprises, tax-payers would value their equity (and post corporate tax cash flows) on exactly the same basis as they would value an investment in any other corporate tax-paying entity. On this basis, it would be reasonable to assume the average franking credit value (of 50%) in the calculation of the *Network Owner's* pre-tax *weighted-average cost of capital*.

In this chapter we examine the most recent studies on the value of gamma. Subsequently, in chapter 4 we draw a conclusion as to whether there is persuasive evidence that the adopted value for gamma of 0.5 is inappropriate.

Gamma is the product of two components:

- the fraction of imputation credits created that are assumed to be distributed to shareholders; and
- the market value of imputation credits distributed as a proportion of their face value.

The first component is the proportion of imputation credits created by a regulated firm that is distributed to shareholders by way of franked dividends. The second component is the value the market places on imputation credits attached to dividends. The product of the two components is the value the market places on the creation of an imputation credit of one dollar. Since the amount of imputation credits created is equal to the level of company tax paid, gamma also represents, in the post-tax revenue model used by the AER, the proportion of company tax paid that does not need to be included in a regulated firm's annual revenue requirement.

The two components of gamma are discussed in turn below.

3.1. Distribution of imputation credits

Imputation credits are conveyed to shareholders by attaching the credits to dividend payments. However, a percentage of imputation credits created by all Australian firms are retained and not distributed to shareholders. Hathaway and Officer (2004) report that in 2002 Australian firms were holding undistributed imputation credits of $77 billion.[26]

[26] Hathaway N. and Officer, B, *the Value of Imputation Tax Credits*, Working Paper, 2 November 2004, pg 4.

Imputation credits that are not distributed have no value to shareholders. However, determining the proportion of imputation credits that should be assumed to be distributed for electricity network service providers (NSPs) is a matter of contention. Literature suggests that there are three measures of the proportion of imputation credits distributed that one might use:

- a firm specific distribution ratio;
- a market wide historical average; or
- an industry historical average.

3.1.1 Firm specific distributions

Lally (2005) states correctly that in the Officer (1994) model, the distribution ratio is a firm specific parameter rather than a market average.[27] While Lally makes this argument, he outlines a number of practical difficulties with the use of firm specific estimates and in light of these, recommends that a relevant industry average distribution ratio be adopted.

Firm specific estimates of distribution ratios were, however, used by the ESC in its review of Victorian gas distributors.[28] The ESC found that the dividend yield necessary for the Victorian gas distributors to fully distribute the estimated imputation credits ranged from 0.78 per cent to 5.35 per cent. The ESC compared these minimum dividend yields with the average dividend yield of listed Australian regulated utilities as of 30 June 2006 of 8.1 per cent. Since the average listed dividend yield was substantially higher than that necessary to fully distribute all imputation credits the ESC concluded that distribution ratio was one.

A problem with the ESC argument is that a large fraction of the dividends that listed utilities paid in 2006 represented not the payment of dividends conventionally defined but the repayment of loans and interest on the loans. For example, in 2006, Envestra paid 9.5 cents in dividends and, of these 9.5 cents, 6.14 cents represented a partial loan repayment and 3.36 cents represented a payment of interest. Of the nine securities the ESC examined, seven (including Envestra) were stapled securities. Utilities tend to have high free cash flow relative to accounting profits because of the substantial depreciation charges they carry. Issuing stapled securities allows the companies to distribute the free cash flow and so limit the agency costs associated with accumulating free cash flow. The result is that few franking credits are distributed by utilities. In 2006, of the nine securities that the ESC examined, five distributed no franking credits.

While Officer's (1994) framework suggests that one should use a firm specific measure of the distribution ratio, a principle of Australian regulatory practice is that a regulated firm's cost of capital should be based on a benchmark firm. So, even absent the difficulties to which Lally (2005) refers, the use of firm specific characteristics may not be an appropriate method for determining the distribution ratio.

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[27] Lally, M., *Review of 'The Value of Imputation Credits for Regulatory Purposes', prepared for the QCA*, December 2005, pg 7.

[28] ESC, *Gas Access Arrangement Review 2008-2012: Draft Decision*, August 2007, pgs 429-430.

3.1.2 Historical market average

Historical market averages of the proportion of franking credits distributed have been computed by:

- Hathaway and Officer (2004);[29] and
- Lally (2003).[30]

Using Australian Tax office (ATO) statistics Hathaway and Officer (2004) calculate that over the 1988 to 2002 period net company tax collections were $265 billion and that $77 billion in imputation credits was retained by Australian firms. Consequently, $188 billion (71 per cent) of imputation credits created during this period were distributed.

The Hathaway-Officer approach is a generally accepted and statistically robust method for estimating the market average distribution ratio. However, the approach has potentially some limitations. Since their estimate is derived over a long period of time (1988 to 2002) it may not capture possible changes in imputation distribution policies over that period. Whether there is any evidence of a structural change in the distribution rate is discussed in greater detail in section 3.1.5.

A study by Lally (2003) estimates that the distribution ratio was around 1.0 but gives rise to a number of concerns.[31] Lally's estimate is based on the ratio of distributed imputation credits to tax paid by the eight largest listed firms in 2001. The firms Lally analyses are Telstra, News Corporation, NAB, BHP, Rio Tinto, Westpac, Commonwealth Bank and ANZ.[32]

One concern is that the sample of companies considered by Lally is limited to 8 firms from 4 different industries. The limited size of the sample group means the distribution ratio of the group is likely to be heavily influenced by the individual characteristics of the firms. For example, while News Corporation is a growth stock (ie, a low dividend paying company) almost all its revenue and profits are generated outside of Australia. Consequently, its dividends are still of a sufficient size to allow any imputation credits to be distributed. A second concern is that Lally provides no justification as to why this sample represents an appropriate industry benchmark for regulated companies, particularly given that no regulated utilities are included in the sample.

In our view the most reliable estimate of the market average distribution ratio is that of 0.71 provided by Hathaway and Officer (2004).

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[29] Hathaway N. and Officer, B, *The Value of Imputation Tax Credits*, Working Paper, 2 November 2004, pg 4.

[30] Lally, *Regulation and the cost of equity capital in Australia*, Journal of Law and Management, vol.2, no.1, November 2003.

[31] Lally, *op. cit.*, November 2003, pg 33.

[32] Note that while Lally advocates that the distribution ratio should be set by reference to an industry average the analysis underpinning his estimate is akin to a market average as the sample includes companies from a range of industries including banking, mining, media and telecommunications. Importantly, not one of the companies included in his sample is a regulated infrastructure company.

3.1.3 Historical industry average

An alternative approach is to determine the distribution ratio on the basis of an historical industry average. In a submission to the QCA for its 2006 gas distribution decision Envestra estimated the distribution ratio of listed Australian regulated utilities over the 2000 to 2004 period.[33] The sample included, AGL, Alinta, Australian Pipelines Trust, United Energy (until sale), Origin Energy, Envestra and GasNet Australia.

Envestra calculated that the distribution of imputation credits as a proportion of tax paid averaged 82 per cent and as a proportion of tax expense averaged 39 per cent over the 2000 to 2004 period.

In determining which of these two ratios is most appropriate to apply it is important to be mindful that under the AER's post tax revenue model (PTRM) the value of gamma is applied to the firm's estimated income tax liability in a given year and not to its future tax liabilities. In fact nowhere in the PTRM does it recognise the firm's future tax liabilities, as required by accounting standards. Consequently, when estimating the distribution ratio it is appropriate to calculate the distribution of imputation credits as a proportion of tax paid (ie, 82 per cent).

3.1.4 Market vs Industry average

Hathaway and Officer (2004) emphasise that:[34]

> *…market sectors or individual companies may experience substantial variations from the average.*

This statement highlights the expectation that individual companies, and potentially industries, may differ substantially from the market average distribution rate of 0.71. This suggests that a benchmark based on an industry average would be preferable to one based on a market average. However, applicability of the industry benchmark will depend on the extent to which the chosen sample is representative of electricity NSPs.

As a sample of listed Australian regulated utilities, the benchmark distribution ratio calculated by Envestra reflects a number of features that distinguish electricity NSPs from an average firm, including:

- relatively stable and predictable revenues and costs, which are associated with a higher than average distribution ratio;
- unique growth options that require regulated firms to reinvest funds to maintain the real value of their regulated asset base, which are associated with a lower than average distribution ratio; and
- very high levels of debt gearing, which is associated with a lower than average distribution ratio.

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[33] Envestra, Comments on the review by Martin Lally of "The Value of Imputation Credits for Regulatory Purposes", February 2006, page 9.

[34] Hathaway and Officer, op. cit., 2 November 2004, pg 8.

The dividend policies of the sample of listed Australian regulated utilities, though, are likely to differ from electricity NSPs in two key characteristics:[35]

- the use of complex financial structures such as trusts and stapled securities to distribute dividends that effectively comprises a return of capital; and
- strong differences in terms of capital expenditure growth rates.

A number of the listed Australian regulated utilities are in the form of stapled securities that entail 'stapling' a loan note to an ordinary share or alternatively 'stapling' a trust vehicle to a company.[36] Where the stapling involves a loan note, distributions to the security holder may include interest payments and a repayment of the loan principal as well as franked or unfranked dividends. In this respect, the dividend policies of Envestra's sample of listed Australian regulated utilities are not directly comparable with a benchmark electricity NSP.

However, the more important distinguishing feature is that a sample of Australian regulated utilities is unlikely to reflect the capital expenditure growth rates of a benchmark electricity NSP. The extent to which a firm requires capital to invest in growth will be an important factor in determining its ability to distribute dividends and therefore imputation credits.

Table 3.1 below, sets out the expected capital expenditure growth rates of electricity NSPs.

Table 3.1
Nominal increase in RAB for Australian Electricity NSP's

Company	Year of decision	Opening RAB	Closing RAB	Compounded growth
Transend[37]	2003	570.00	844.00	6.8%
TransGrid[38]	2005	3,012.76	4,115.70	6.4%
Powerlink[39]	2007	3,752.83	6,483.58	11.6%
ElectraNet[40]	2008	1,265.06	1,875.48	8.2%
SP AusNet[41]	2008	2,191.20	2,673.00	4.1%
ActewAGL[42]	2004	510.54	567.86	2.2%
EnergyAustralia[43]	2004	4,115.87	5,709.65	6.8%
Integral Energy[44]	2004	2,215.83	3,229.46	7.8%
Country Energy[45]	2004	2,374.61	3,196.62	6.1%

35 Note that only 2 of the 7 companies (AGL and United Energy) included in Envestra's sample are electricity NSP's.

36 Listed companies with complex financial structures include, Envestra, Alinta, Australian Pipeline Trust, GasNet, Hastings Diversified Utilities Fund, SP AusNet and Spark Infrastructure.

37 ACCC, Tasmanian Transmission Network Revenue Cap 2004-08/98, Dec 2003, p. 27.

38 NSW and ACT Transmission Network Revenue Cap: TransGrid 2004-05 to 2008-09, April 2005, p. 179.

39 AER, Powerlink Queensland transmission network revenue cap 2007-08 to 2011-12, June 2007, p. 138.

40 AER, ElectraNet transmission determination 2008-09 to 2012-13, April 2008, p. 103.

41 AER, SP AusNet transmission determination 2008-09 to 2013-14, Jan 2008, p. 7.

42 ICRC, Investigation into prices for electricity distribution services in the ACT: Final Decision, March 2004, p. 55.

43 IPART, NSW Electricity Distribution Pricing 2004/05 to 2008/09: Final Report, June 2004, p. 245.

44 Ibid. p. 253.

Company	Year of decision	Opening RAB	Closing RAB	Compounded growth
Australian Inland[46]	2004	64.87	70.85	1.8%
Energex[47]	2005	4,308.10	6,745.40	9.4%
Ergon[48]	2005	4,198.20	6,696.80	9.8%
ETSA Utilities[49]	2005	2,466.00	2,771.74	2.4%
AGL[50]	2005	578.40	679.36	3.3%
Citipower[51]	2005	990.90	1,290.07	5.4%
Powercor[52]	2005	1,626.50	2,161.19	5.8%
SP AusNet[53]	2005	1,307.20	1,729.09	5.8%
United Energy[54]	2005	1,220.30	1,456.76	3.6%
Aurora Energy[55]	2007	981.11	1,159.47	3.8%

The above table shows that, the compound growth rate of electricity NSP's over the period 2003/04 to 2007/08 ranged from 1.8 per cent to 11.6 per cent, with 12 of the 19 having a growth rate of 5 per cent or more. By comparison, the average capital growth rate of listed Australian regulated utilities is around 3 per cent.[56]

In its decision on the revenue cap for Powerlink for the period 2008 to 2012, the AER concluded that an industry benchmark dividend yield was not appropriate due to differences in capital growth rates. As an alternative, the AER used a benchmark dividend yield derived from a sample of listed companies with a capital expenditure growth rate similar to Powerlink's growth rate.

In light of the shortcomings of the listed utilities industry benchmark it would be appropriate to continue to use the historical market average, which was estimated to be 0.71 by Hathaway and Officer (2004).

3.1.5 Changing distribution ratio over time

The distribution of imputation credits by firms may potentially change over time for a multitude of reasons. As we have discussed, one of the primary factors in determining the

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45 Ibid. p. 261.

46 Ibid. p. 271.

47 QCA, Regulation of Electricity Distribution, April 2005, p. 93.

48 Ibid. p. 93.

49 ESCOSA, 2005-2010 Electricity Distribution Price Determination: Part A – Statement of Reasons, April 2005, p. 124.

50 ESC, Electricity Distribution Price Review 2006-10 Final Decision Volume 1: Statement of Purpose and Reasons, Oct 2005, p. 620.

51 Ibid. p. 638.

52 Ibid. p. 658.

53 Ibid. p. 678.

54 Ibid. p. 696.

55 Office of the Tasmanian Energy Regulator, Investigation of Prices for Electricity Distribution Services and Retail Tariffs on Mainland Tasmania: Final Report and Proposed Maximum Prices, Sep 2007, p 237.

56 AER, *Powerlink Queensland transmission network revenue cap 2007-08 to 2012: Decision,* 14 June 2007, pg100.

level of dividends and therefore the imputation credit distribution ratio is a change in the level of growth. However, detecting statistically valid changes in the distribution ratio is difficult given the noise in the series. For example, when Envestra calculated the industry distribution ratio over the 2000 to 2004 period the ratio varied from between 105 per cent to 63 per cent.[57]

Other factors may also influence the dividend policies of companies. For example, firms may be able to use mechanisms such as off-market buybacks to stream imputation credits more effectively to those investors who value them most highly. Firms may respond to this opportunity by increasing the distribution of franked dividends.

However, the incentive to stream imputation credits is well understood by the ATO and legislators and in 1990 resulted in the introduction of the first anti-streaming taxation laws aimed at reducing the ability of investors to extract the full value of franking credits. The recently released Discussion Paper entitled "*Australia's Future Tax System (AFTS)*" states:[58]

> *The different treatment of non-resident shareholders also creates incentives to pay franked dividends to resident shareholders and dividends that are not franked to non-resident shareholders 'dividend streaming', or otherwise transfer imputation credits to residents 'franking credit trading'. Guarding against these practices involves significant complexity in the tax law and compliance costs.*

This suggests that the ability of a firm to use a particular mechanism to 'target' the distribution of imputation credits more effectively is likely to be transitory. Furthermore, there is no evidence to suggest that in the future the ATO will be less vigilant in guarding against the streaming of franking credits.

Finally, a motive for companies to increase the distribution ratio would be if the value of imputation credits were to increase. Whether there is any evidence of an increase in the value of credits is discussed in section 3.2 below. However, even if the value were to increase, it is not clear that this would have a material effect on the distribution ratio. As we have discussed, a firm's dividend policy is determined by a range of factors including the requirement to fund future growth efficiently and so the impact could be minimal.

To conclude, to our knowledge no empirical study has concluded that the distribution ratio has changed over time. Furthermore, given the apparent volatility in the series it is unlikely that any study could identify a structural change in the distribution ratio given the short period of time over which data are available. In the absence of empirical evidence of a structural change we support the use of longer rather than shorter data sources as they generally provide more robust estimates. The Hathaway and Officer (2004) paper uses the longest sample period and estimates that the market wide distribution ratio is 0.71 which is a reasonable assumption for the distribution ratio for electricity NSPs.

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[57] Envestra, *Comments on the review by Martin Lally of "The Value of Imputation Credits for Regulatory Purposes"*, February 2006.

[58] Australian Treasury, *Architecture of Australia's tax and transfer system*, August 2008, pgs 262-263.

3.2. The value of imputation credits (theta)

There have been two primary approaches for quantifying the value of imputation credits. The first uses ATO statistics to quantify the proportion of imputation credits distributed by companies that are redeemed by shareholders. The alternative approach seeks to quantify the value of imputation credits from investor behaviour. This has been done through dividend drop-off studies and through an examination of derivative prices.

Each of these approaches is assessed in turn.

3.2.1 Redemption of imputation credits

One approach is to use ATO statistics to calculate the proportion of distributed imputation credits that have been used by investors to reduce their personal tax liabilities. This approach is predicated on the assumption that the market value of a redeemed imputation credit to an investor is equal to its face value and that an unredeemed imputation credit has no value to investors. Consequently, the *average* market value of an imputation credit is equal to the proportion of imputation credits redeemed.

The two most resent studies using this approach are set out in Table 3.2.

Table 3.2
Studies of Redemption Rates of Imputation Credits

Study	Period of Analysis	Estimated Theta Value
Hathaway & Officer (2004)[59]	1988-2002	0.38 – 0.44
Handley & Maheswaran (2008)[60]	1990-2004	0.71
	1990-2000	0.67
	2001-2004	0.81

We note that Hathaway and Officer (2004) caution against relying on their estimate given that they had to infer some of their data. Also, Handley and Maheswaran (2008) make a number of broad assumptions on the redemption rates of different groups of investors. For example, they assume that the redemption rate for resident individuals and resident funds is 100 per cent from 2001 onwards.

Irrespective of these issues, it is inappropriate to use a redemption rate as a proxy for the market 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. Therefore the

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[59] Hathaway N. and Officer, B, *the Value of Imputation Tax Credits*, Working Paper, 2 November 2004, pg 14.

[60] Handley J. and Maheswaran K., *A Measure of the Efficacy of the Australian Imputation Tax System*, The Economic Record, Vol 84 No 264, March 2008, pg90.

market value of imputation credits cannot be inferred directly from the fraction of the credits that are redeemed because inferring their value in this way overlooks the costs that investors bear in accessing the credits.

We note that at no point do Handley and Maheswaran (2008) claim that their study provides a value for imputation credits. To determine the value that investors place on imputation credits one must infer it from the behaviour of market prices.

3.2.2 Market value of imputation credits

The value of imputation credits to investors cannot be directly observed, and so studies instead attempt to infer a value for credits from market behaviour. This is accomplished through the application of econometric models to financial market data.

Table 3.3 below lists a number of recent market studies.

Table 3.3
Market Estimates of Theta

Study	Method	Period of Analysis	Estimated Theta Value
Cannavan, Finn and Gray (2004)[61]	Derivative prices	1994-1999	0.50 pre 45 – day rule
			0.00 post 45 – day rule
Hathaway & Officer (2004)[62]	Dividend drop-off	1986-2004	0.50
Beggs and Skeels (2006)[63]	Dividend drop-off	2001-2004	0.57
SFG (2007)[64]	Dividend drop-off	1998-2006	0.20 – 0.40

Each of these studies is discussed in greater detail below.

3.2.2.1. Cannavan, Finn and Gray (2004)

Cannavan, Finn and Gray (2004) estimate the value of cash dividends and imputation credits by comparing the prices of derivative securities and the shares underlying the securities. Their study examines the shares of the following companies, ANZ, BHP, Westpac, Newscorp, NAB, WMC, MIM and Rio Tinto, and derivatives written on those shares. The pre-45-day

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[61] Cannavan D., Finn F. and gray S., *The value of dividend imputation tax credits in Australia*, Journal of Financial Economics 73 (2004) 167-197.

[62] Hathaway N. and Officer, B, *the Value of Imputation Tax Credits*, Working Paper, 2 November 2004.

[63] Beggs and Skeels, *Market arbitrage of cash dividends and franking credits*, The Economic Record, vol.82, no.258, September 2006, p.252.

[64] SFG Consulting, *The impact of franking credits on the cost of capital of Australian companies: A report for Envestra, Multinet and SP Ausnet*, 25 October 2007.

rule period covered is from May 1994 to June 1997 and the post-45-day rule period is from July 1997 to December 1999.

The companies sampled by Cannavan et al pay dividends that are either fully franked, partially franked or unfranked. The different levels of franking are used by the authors to estimate the respective values that investors place on cash dividends and imputation credits.

The authors calculate the value that investors implicitly place on cash dividends and imputation credits by comparing the prices paid for futures contracts and low exercise price options[65] and the prices of the shares on which the contracts are written. One advantage of their approach is that it uses a large number of observations to estimate the value of cash dividends and imputation credits. The use of a large number of observations enables Cannavan, Finn and Gray (2004) to produce precise estimates of the values of cash dividends and franking credits. Another advantage of their approach is that since derivatives are traded well in advance of when the underlying stocks go ex-dividend, their estimates are not tainted by any short term arbitrage in the market.

Cannavan et al conclude that:

> *(i) cash dividends are fully valued relative to futures payoffs,*
>
> *(ii) prior to the 45-day rule, imputation credits were valued at up to 50% of face value for high-yielding firms, and*
>
> *(iii) since the 45-day rule, imputation credits are effectively worthless to the marginal investor of ISFs and LEPOs.*

Comments

The results of this study support the view that the Australian financial market is integrated with the world market. As we discussed in section 2, in an integrated market the representative investor will most closely resemble an international investor (since the weight given to each investor is determined in large part by the wealth of the investor). Therefore, the Cannavan et. al. results are consistent with the view that prior to the introduction of the 45-day rule, international investors gained some value from imputation credits and theta had a positive value. However, the introduction of the 45-day rule had its intended effect of removing the benefit of imputation credits to international investors and the value of theta fell to zero.

We also note that while the sample encompassed only a small number of stocks, theory suggests that the value of theta will be identical across all stocks (as discussed in section 2.2 above). If theta were not identical across stocks, investors would face an incentive to shift funds from high-theta stocks to low-theta stocks to capture the additional return that would be offered by low-theta stocks.

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[65] The study considers individual share futures contracts (ISFs) and low exercise price options (LEPOs).

3.2.2.2. Hathaway and Officer (2004)

Dividend drop-off studies measure the extent to which share prices drop at the time a stock goes ex-dividend. Hathaway and Officer's (2004) data set consists of all dividend events for stocks listed within the ASX/S&P 500 index between August 1986 and August 2004. The data set contains dividend events where stocks pay either fully franked, partially franked or unfranked dividends. The different levels of franking are used by the authors to estimate the respective values that investors place on cash dividends and imputation credits.

Hathaway and Officer (2004) carry out a number of regressions. After rejecting some regressions as being unreliable, Hathaway and Officer focus on the results from "Big Cap" firms (ie, top 50) and conclude that:

- a one-dollar cash dividend is valued by investors at between 80 and 81 cents; and
- a one-dollar imputation credit is valued by investors at between 48 and 52 cents.

Hathaway and Officer go on to assess whether the value of imputation credits has changed since the reduction in the company tax rate from 36 per cent to 32 per cent in 2000/01 and then to 30 per cent thereafter. The first step in their analysis is to assume that the value of a dollar of cash dividends is 80 cents, consistent with the estimate they compute for the 1988-2004 period.

Hathaway and Officer estimate that the value of imputation credits has increased to 60 per cent in recent years. However, Hathaway and Officer caution against relying on this estimate because:[66]

> *These changes have been too recent to enable any detailed analysis ... so whilst the results are intriguing we have no means of exploring them in depth. They might just be an artefact of the inherent noise in the estimating process.*

Comments

Hathaway and Officer's (2004) conclusion that the value of a distributed imputation credit to investors is approximately 50 per cent of its face value relies on their finding that investors value a cash dividend of one dollar at 80 cents. In other words, Hathaway and Officer find that shareholders do derive some value from the distribution of franking credits. However, to receive these franking credits investors must receive dividends and Hathaway and Officer find that investors only value a dollar of cash dividends at 80 cents.

Regulators have tended to cite Hathaway and Officer's (2004) study to support their findings that the required returns of companies should be lower to reflect the value placed by shareholders on franked dividends. However, this overlooks Hathaway and Officer's evidence that shareholders undervalue dividends. This inconsistency was correctly pointed out by SFG (2007).[67] Franking credits are attached to dividends. So to access the benefits

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[66] Hathaway N. and Officer, B, *the Value of Imputation Tax Credits*, Working Paper, 2 November 2004, pg 24.

[67] September 2006, p.252.

that come from franking credits, investors must receive dividends and pay the taxes that are levied on their receipt. How the market values a dollar of dividends is, of course, an empirical question. But Hathaway and Officer's evidence on that empirical question is that investors do not fully value dividends. Indeed, the most widely cited of their estimates of the value of franking credits rely on the assumption that the market places a value of 80 cents on a dollar of dividends.

There are two ways in which one can use Hathaway and Officer's (2004) results. First, one can use their evidence that the market values a one-dollar distributed imputation credit at 50 cents as an argument for lowering required returns *and* use their evidence that the market values a one-dollar dividend at 80 cents as an argument for simultaneously raising required returns. If dividends are fully franked and the corporate tax rate is 30 percent, then each dollar of dividend will be accompanied by a franking credit of 43 cents. If the market values a one-dollar dividend at 80 cents and a one-dollar franking credit at 50 cents, then the market will value a package of a one-dollar dividend and 43 cents of franking credits at one dollar and one cent. As an alternative, one could take advantage of the fact that Hathaway and Officer find that the value of a fully franked dividend (ie, the cash dividend plus the imputation credit) is approximately equal to the cash dividend. Either way, Hathaway and Officer's evidence suggests that it would be reasonable to ignore personal taxes and credits completely and set gamma to zero.

Again, to emphasize, if the market values a fully franked one-dollar dividend as being worth less than one dollar, then dividend-paying stocks must earn a premium to compensate investors for the penalty associated with the receipt of dividends. If the market values a fully franked one-dollar dividend as being worth more than one dollar, then the market will accept a lower return to dividend-paying stocks because of the benefit attached to the receipt of fully franked dividends. If the market values a fully franked one-dollar dividend as being worth exactly one dollar, then the market will not expect dividend-paying stocks to earn any more or less than otherwise identical stocks that pay no dividends. In this case, as a reasonable approximation, one can ignore taxes and credits completely and set gamma to zero. It is only a reasonable approximation because some firms will pay unfranked dividends.

As noted above, Hathaway and Officer find some evidence that the value of imputation credits has increased since the change in the company tax rates in 2000-01. However, even if one sets aside the warning by the authors that a limited amount of data means that their estimates are not reliable, the results as set out in Figure 12 of their report show that the fully franked drop-off remained unchanged at about one before and after the 2000 tax change.

3.2.2.3. Beggs and Skeels (2004)

Beggs and Skeels (2004) also undertook a dividend drop-off study to assess the value of imputation credits. Their study also explores the effects of a number of legislative amendments to the Australian dividend imputation regime since its inception in 1986.

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[67] SFG Consulting, *The impact of franking credits on the cost of capital of Australian companies: A report for Envestra, Multinet and SP Ausnet*, 25 October 2007., pgs 27-30.

The data covered companies and trusts whose primary listing is on the Australian Stock Exchange. Beggs and Skeels filter the data to remove firms with unreliable or incomplete dividend data, small firms and extreme events. Their sample covers dividend events from 1 April 1986 to the 10 May 2004.

Table 3.4 sets out the results of the Beggs and Skeels study.

Table 3.4
Beggs and Skeels Results

Period	Estimated cash drop-off ratio	Estimated franking credit drop-off ratio
1986-1988	0.465 (0.040)	0.752 (0.157)
1989-1990	0.646 (0.064)	0.450 (0.119)
1991	0.765 (0.115)	0.376 (0.206)
1992-1997	0.861 (0.059)	0.201 (0.103)
1998-1999	0.795 (0.099)	0.418 (0.186)
2000	1.168 (0.099)	0.128 (0.204)
2001-2004	0.800 (0.052)	0.572 (0.121)

As with the Hathaway and Officer study, Beggs and Skeels find that during the 2001-2004 period a dollar of cash dividend was valued by investors at 80 cents, while a dollar of distributed imputation credits was valued by investors at 57 cents. In reaching this conclusion Beggs and Skeels also observe that the 2000 tax changes[68] appear to have significantly increased the value of franking credits to investors.

Comments

The values that Beggs and Skeels estimate for cash dividends and distributed imputation credits are broadly inline with those found by Hathaway and Officer. This gives rise to similar comments, ie:

- that consistency requires that if the AER was to value distributed imputation credits at 0.57 it must also take account of the costs to investors of distributing dividends; alternatively

[68] In July 2000 changes allowed domestic individuals and funds to receive a rebate for any unused imputation credits.

- the AER may take advantage of the fact that the value to an investor of a fully franked dividend (ie, the cash dividend plus the imputation credit) is approximately equal to the cash dividend and ignore all personal taxes and credits completely by setting gamma to zero.

Beggs and Skeels conclude that the 2000 tax changes significantly increased the value of imputation tax credits. This conclusion relies on a test for a structural break between 2000 and 2001 – 2004.[69] However, the reported 2000 estimates are anomalous because they suggest that an investor values a dollar of dividends at $1.17. In contrast, in all other periods Beggs and Skeel estimate that investors value cash dividends at less than their face value. The value investors place on cash dividends plus imputation credits is unchanged between these periods, so the increase in the value of dividends in 2000 results in the value of imputation credits dipping in 2000.

The concerns with the 2000 estimates mean that one cannot draw any conclusion on whether the July 2000 tax changes have lead to an increase in the value of distributed imputation credits to the representative investor.

3.2.2.4. SFG Consulting (2007)

SFG Consulting submitted a report on behalf of the Victorian gas distribution businesses[70] that updated the studies undertaken by Hathaway and Officer and Beggs and Skeels to include dividend events over the 1998 to 2006 period. In addition, SFG Consulting also updated a report by the Allen Consulting Group (ACG) that was developed in the context of the SA Gas Access Arrangement review.

The results of SFG Consulting incorporating more recent data are set out below in Table 3.5.

Table 3.5
Updated Dividend Drop-off Studies
(2001-2006)

	Hathaway & Officer	Beggs & Skeels	AGC
Gross drop off	1.17	1.04	0.91
Cash dividend	0.98	0.88	0.82
Franking credit	0.41	0.33	0.20

SFG Consulting in updating the dividend drop off studies comes to the conclusion that:[71]

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[69] Note that on page 248 Beggs and Skeels indicate that the test for a structural break compared the period between 1998-2000 and 2001-2004. However, Table 5 which sets out their results for franking credit drop-off ratios tests for a structural break between the 2000 and 2001-2004 period.

[70] The Victorian gas distribution businesses are Envestra, Multinet and SP AusNet.

[71] SFG Consulting, *The impact of franking credits on the cost of capital of Australian companies: A report for Envestra, Multinet and SP Ausnet*, 25 October 2007, pg 44.

- *The combined value of a dollar dividend and the associated franking credit is around one dollar;*
- *A one dollar cash dividend has a market value in the range of about 75 to 95 cents; and*
- *Conditional on this estimated value of cash dividends, franking credits have a market value between about 20 and 40 cents.*

Comments

In updating these dividend drop-off studies SFG Consulting (2007) finds that investors do place some value on distributed imputation credits. However, consistent with previous studies SFG Consulting also finds that investors value cash dividends at less than their face value. As we have already discussed, if the AER were to include a positive benefit from distributed imputation credits, it should also include the penalty that investors face as a result of the taxes they must pay on the receipt of dividends.

Alternatively, since the value to an investor of a fully franked dividend is approximately equal to the cash component of the dividend, it would be reasonable for the AER to ignore all personal taxes and credits completely.

3.2.3 Conclusion

There have been two primary approaches for quantifying the value of imputation credits. The first uses ATO statistics to measure the proportion of imputation credits distributed by companies that are redeemed by shareholders. This approach implicitly assumes that the value to an investor of one dollar of redeemed imputation credits is equal to one dollar. This assumption is incorrect because it ignores the costs that domestic investors bear in accessing the credits. The cost to domestic investors in accessing a large share of the franking credits distributed is that domestic investors must forego some of the benefits from diversifying internationally.

An alternative and more reliable approach seeks to quantify the value of imputation credits from investor behaviour. Aside from Cannavan, Finn and Gray's (2004) study, all of the surveyed studies find that investors do place some value on distributed imputation credits. However, these studies also indicate that investors do not value cash dividends at face value.

SFG Consulting's (2007) report updates a number of recent dividend drop-off studies and finds that, *conditional* on cash dividends being valued at between 75 and 95 percent of their face value, the estimated value of distributed imputation credits is between 0.2 and 0.4.

SFG Consulting also find that the value to an investor of a fully franked dividend (ie, the cash dividend plus the imputation credit) is approximately equal to the cash component of the dividend. Therefore, rather than making two equally offsetting adjustments (ie, a downward adjustment for imputation credits offset by an upward adjustment for paying a dividend) a reasonable compromise would be to ignore all personal taxes and imputation credits completely by setting gamma to zero.

4. Conclusions

This report has discussed from a theoretical basis how investors might value imputation credits. The finance literature provides the following guidance:

- there is no need for gamma to appear *directly* in the WACC

  Imputation credits simply change the personal tax position of domestic shareholders and so may affect the returns investors require on equity. This may affect the WACC *indirectly*. The provision of credits, though, will not affect the WACC *directly*. The return the market requires on equity will *already* incorporate the impact of franking credits and, more generally, taxes levied on capital gains and dividends at the personal level. So, irrespective of whether firms pass on franking credits, one can use the conventional textbook formula for the WACC to discount cash flows conventionally defined.

- in general all taxes levied at the personal level can affect the returns the market requires on securities

  Taxes that investors face at the personal level can affect the return the market requires on equity and debt. There is no reason to single out imputation credits for special treatment. *All* taxes levied on personal income can in principle affect the returns the market requires on equity and debt.

- *all* investors will be marginal investors and a representative investor will most closely resemble a foreign investor

  All investors will wish to diversify and so, at least in theory, all investors will typically hold some position in each stock. A representative investor has characteristics that are a weighted average of the characteristics of all investors. The weights are determined in large part by the wealth of each investor. If equity markets are integrated, a representative investor will most closely resemble a foreign investor because foreign investors have substantially more wealth than domestic investors.

- the fraction of credits redeemed will *not* provide a guide as to the value of gamma

  The value the market places on a distributed imputation credit cannot be inferred directly from the fraction of the credits that are redeemed because inferring their value in this way ignores the costs that investors bear in accessing the credits.

- 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.

The empirical evidence suggests that investors place a small positive value on gamma. Gamma is the product of two components:

- the fraction of imputation credits created that are distributed to shareholders; and
- the market value of imputation credits as a proportion of their face value.

One of the primary factors determining the proportion of imputation credits created that are distributed is the extent to which a firm must finance future growth from existing cash flows. A review of the projected growth rates of electricity NSPs suggests a variety of requirements. Consequently, a market wide distribution ratio may be an appropriate value to use and the most reliable estimate is the Hathaway and Officer (2004) value of 0.71.

The most up-to-date estimate of the market value of distributed imputation credits is the value of between 0.2 and 0.4 produced by the SFG Consulting 2007 report.

Combining the assumed distribution ratio of 0.71 with the market value of distributed imputation credits of between 0.2 and 0.4, the value that the market place places on one dollar of imputation credits created is approximately 0.15 to 0.30. This demonstrates that the current estimated value of gamma of 0.5 is incorrect and that a lower value should be adopted.

However, these values for gamma are *conditional* on the idea that investors value cash dividends at less than their face value. There are two ways that the empirical evidence can be consistently applied. One way is to:

- reduce the required return of a regulated firm to reflect a positive value for gamma of between 0.15 and 0.30, but also increase the required return to reflect the fact that the market values a one-dollar dividend at less than one dollar.

Lowering the required return to equity to reflect a positive value for gamma and raising the return to reflect the penalty the market places on the payment of dividends leaves the return virtually unchanged. So a reasonable and simpler alternative is to:

- disregard all personal taxes and imputation credits by setting gamma to zero and by not making any adjustment for the cost of issuing dividends.

The impact of lowering the WACC below what is required by investors will be to encourage firms to shift investment away from regulated assets towards unregulated assets. This is clearly not consistent with the *national electricity objective* of promoting efficient investment in the national electricity system.

Appendix A. References

Allen, Franklin, A. Bernardo, and Ivo Welch, 2000, A theory of dividends based on tax clienteles, Journal of Finance 55, 2499-2536.

Australian Bureau of Statistics, 2008, Year Book Australia, 2008, Canberra, ACT, Australia. http://www.abs.gov.au/ausstats/abs@.nsf/bb8db737e2af84b8ca2571780015701e/8AA440FB134D512DCA2573D20010E0C8?opendocument

Berk, Jonathan and Peter DeMarzo, 2007, Corporate Finance, Pearson Addison-Wesley, Boston, MA, USA.

Brennan, Michael, 1970, Taxes, market valuation and corporate financial policy, National Tax Journal 23, 417-427.

Cannavan, D., Frank Finn and Stephen Gray, The value of imputation tax credits in Australia, Journal of Financial Economics 73, 167-197.

Gray, Stephen F. And Jason Hall, 2006, Relationship between franking credits and the market risk premium, Accounting and Finance 46, 405–428.

Guenther, David A. and Richard Sansing, 2007, The effect of tax-exempt investors on stock ownership and the dividend tax penalty, Working Paper, Dartmouth College, NH.

Handley J. and Maheswaran K., A Measure of the Efficacy of the Australian Imputation Tax System, The Economic Record, Vol 84 No 264, March 2008, 82-94.

Hathaway, Neville and Robert R. Officer, 2004, The value of imputation tax credits, Capital Research Pty Ltd.

Lally, Martin and Tony van Zijl, 2003, Capital gains tax and the capital asset pricing model, Accounting and Finance 43, 187–210.

Monkhouse, Peter H.L., 1993, The cost of equity under the Australian dividend imputation tax system, Accounting and Finance 33, 1-18.

Officer, Robert R., 1994, The cost of capital of a company under an imputation tax system, Accounting and Finance, 1-17.

SFG, The impact of franking credits on the cost of capital of Australian companies: A report for Envestra, Multinet and SP AusNet, 25 October 2007.

Wood, Justin, 1997, A simple model for pricing imputation tax credits under Australia's dividend imputation tax system, Pacific-Basin Finance Journal 5, 465-480.

Appendix B. Project Team

Gregory Houston (Director) has twenty years experience in the economic analysis of markets and the provision of expert advice in litigation, business strategy, and policy contexts. His career as a consulting economist was preceded by periods working in a financial institution and for government.

Greg Houston has directed a wide range of competition, regulatory economics and valuation-related assignments since joining NERA in 1989. His work in the Asia Pacific region principally revolves around the activities of the Australian Competition and Consumer Commission, the New Zealand Commerce Commission and other competition and regulatory agencies, many of whom also number amongst his clients. Greg has advised clients on merger clearance processes, access to bottleneck facilities, and enforcement proceedings involving allegations of predatory pricing, anti-competitive bundling and price fixing. His industry experience spans the aviation, e-commerce, building products, electricity and gas, grains, mining, payments networks, petroleum, ports, rail transport, retailing, scrap metal, medical waste and telecommunications sectors. Greg Houston has acted as expert witness in antitrust, regulatory and valuation-related proceedings before the courts, in various arbitration and mediation processes, and before regulatory and judicial bodies in Australia, Fiji, New Zealand, the Philippines, Singapore and the United Kingdom.

In December 2005, Greg was appointed by the Hon Ian Macfarlane, Minister for Industry, Tourism and Resources, to an Expert Panel to advise the Ministerial Council on Energy on achieving harmonisation of the approach to regulation of electricity and gas transmission and distribution infrastructure in Australia.

Greg is member of the United States board of directors of National Economic Research Associates Inc. and head of NERA's Australian operations, which he founded after transferring from London in 1998.

Brendan Quach is a **Senior Consultant** in our Sydney office and has over eight years experience as an economist. He specialises in network economics and competition policy in Australia, New Zealand and the Asia Pacific region. Since joining NERA in 2001, Brendan has advised clients on the application of competition policy in Australia, in such industries as aviation, airports, electricity, rail and natural gas. Brendan specialises in regulatory and financial modelling and the cost of capital for network businesses.

Simon Wheatley was until recently a Professor of Finance at Melbourne University. From the beginning of this year, Simon has taken a full time position outside the university sector, and also has a part time teaching position at Melbourne Business School. Simon's expertise is in the areas of testing of asset-pricing models, determining the extent to which returns are predictable and individual portfolio choice theory. Prior to joining the University of Melbourne, Simon taught at the Universities of British Columbia, Chicago, New South Wales and Washington.

A complete curricula vitae for each member of the project team can be provided on request.

NERA
Economic Consulting

NERA Economic Consulting
Darling Park Tower 3
201 Sussex Street
Sydney NSW 2000
Tel: +61 2 8864 6500
Fax: +61 2 8864 6549
www.nera.com

NERA Australia Pty Ltd, ABN 34 092 959 665