The Effect of Franking Credits on FOXTEL's Cost of Capital

A Submission on the Access Undertaking of FOXTEL Management Pty Ltd

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Contents

Author and Scope of Report

This report has been prepared by Prof. Stephen Faulkner Gray. I am Professor of Finance in the UQ Business School at the University of Queensland. I have Honours degrees in Commerce and Law and a PhD in Finance from the Graduate School of Business at Stanford University. A copy of my CV is attached to this report as an appendix.

I have been asked to provide my views on the following questions:

1. To what extent do dividend imputation franking credits affect the cost of capital of Australian listed firms?
2. To what extent do dividend imputation franking credits affect the cost of capital of FOXTEL?
3. What is Australian market practice in relation to the effect of franking credits on corporate cost of capital?

Assumptions

I have been asked to make the following assumptions throughout this report:

1. FOXTEL has never paid a dividend to its shareholders and has no intention of paying a dividend to its shareholders in the foreseeable future.
2. FOXTEL has never been required to pay corporate tax and is unlikely to have to pay corporate tax in the next five years.

Materials Provided

I have been provided with the following materials and data:

1. The ACCC (December 2003) Section 152ATA Digital Pay TV Anticipatory Individual Exemption Application lodged by FOXTEL Management Pty Limited: Final Decision.
2. FOXTEL Profit and Loss Summaries for 2001-2005.

I also refer to a number of published papers, for which a full citation is provided within the body of the report.

Federal Court Guidelines

I have been provided with the "Guidelines for Expert Witnesses in Proceedings in the Federal Court". This report has been prepared in a way that is consistent with those Guidelines.

1. Executive Summary and Conclusions

1.1. To what extent do dividend imputation franking credits affect the cost of capital of Australian listed firms?

In my view, dividend imputation franking credits do not affect the cost of capital of Australian listed firms. I have reached this conclusion for the following reasons:

- The most recent empirical evidence that is peer-reviewed and published in leading journals concludes that franking credits do not affect the cost of capital of Australian listed firms.
- A range of empirical methods applied to different types of market data, when analyzed and interpreted properly, support the view that franking credits do not affect the cost of capital of Australian listed firms.
- If franking credits did affect the cost of capital of Australian firms, the returns paid by the firm to its shareholders would be reduced by the value of these credits. Since foreign investors cannot utilize these franking credits, they would receive only the reduced return paid by the firm. These foreign investors would not accept the reduced return offered by Australian companies since they are free to invest in comparable investments outside Australia where they would earn a full appropriate return. However, Australia is a consistent net importer of capital and foreign investors own around 30% of the shares of listed Australian companies. Clearly, foreign investors are willing to buy shares in Australian listed companies. If franking credits did affect the cost of capital of these firms, foreign investors would not invest as they would receive relatively uncompetitive returns, reduced by whatever value is ascribed to the franking credits. The presence of significant amounts of foreign investment is inconsistent with franking credits affecting the cost of capital of Australian listed firms.

I conclude that franking credits do not affect the cost of capital of Australian listed firms. This does not imply that all investors find franking credits to be worthless. In fact, I demonstrate that franking credits are as valuable as cash dividends to resident investors. The firm's cost of capital, like any price, is set by the marginal price-setting investor whose trade clears the market. What is relevant is the value of franking credits to this investor. One cannot identify an individual who values franking credits and then conclude that they must therefore affect the corporate cost of capital.

1.2. To what extent do dividend imputation franking credits affect the cost of capital of FOXTEL?

The conclusions that apply generally to substantial Australian firms above, also apply to FOXTEL in particular.

In addition, there are a number of specific considerations in relation to FOXTEL. All of these considerations suggest that, relative to the average firm, FOXTEL's cost of capital is even less likely to be affected by franking credits. These considerations are as follows:

- Franking credits are created by the payment of Australian corporate tax. To the extent that FOXTEL has not paid Australian corporate tax and is unlikely to pay corporate tax in the near future, it has no franking credits to distribute to its shareholders.

- Franking credits can only be paid to shareholders as an attachment to cash dividends. To the extent that FOXTEL has never paid a dividend to its shareholders and has no plans to do so in the foreseeable future, there is no mechanism to distribute franking credits to shareholders even if they did exist.

- There is a deterministic mathematical relationship that is used to determine the proportion of the shareholders' required return that comes from franking credits. Using the parameter values in the ACCC's 2003 Report[1] and setting the value of franking credits to 0.5 implies that shareholder's receive a return of 2.8% per year from franking credits. This requires a dividend yield of at least 10.9%, which is three times the yield of the average Australian listed company. That is, these parameter values are inconsistent with one another.

1.3. What is Australian market practice in relation to the effect of franking credits on corporate cost of capital?

A view of Australian market practice in relation to the effect of franking credits on corporate cost of capital can be obtained from two sources: expert corporate valuation reports and surveys of Australian companies. In both cases, the results suggest that the dominant practice is to ignore franking credits when estimating corporate cost of capital. Both sources suggest that the overwhelming majority practice is to effectively set the value of franking credits, gamma, to zero.

[1] ACCC. (December 2003). Section 152ATA Digital Pay TV Anticipatory Individual Exemption Application lodged by Foxtel Management Pty Limited: Final Decision. p..58.

2. The Mechanics of Dividend Imputation

2.1. Overview

In this section of the report, I explain the concept of dividend imputation and illustrate the mechanics of the Australian dividend imputation tax system. I explain what franking credits are and why they are of value in the hands of some shareholders but not in the hands of others.

2.2. Reasons for a dividend imputation tax system

Under a classical tax system, corporate profits are taxed twice: once in the hands of the company and again when distributed as dividends to shareholders. Suppose, for example, that the corporate tax rate is 30% and the personal tax rate is 50%. If a company earns a profit of $100, it must pay $30 corporate tax and can then distribute the after-tax income of $70 as a dividend to shareholders. On receipt of this dividend, the shareholders collectively must pay personal income tax of $35, leaving only $35 of the original $100 profit in the hands of the shareholder. The original $100 profit has effectively been taxed at the rate of 65%.

To remove this double-taxation of dividends, many countries have adopted some form of dividend imputation system. A dividend imputation tax system has operated in Australia since July 1, 1987. Under a dividend imputation system, shareholders receive a personal tax credit for some of the tax paid at the corporate level. Under a full imputation system, such as operates in Australia, the net effect is that the original corporate profit is taxed at the shareholder's marginal personal tax rate.

2.3. Creation of franking credits

Under the Australian system, when a company pays corporate tax in Australia "franking credits" (or imputation tax credits) are created. Every dollar of corporate tax paid in Australia generates one dollar of franking credits. When an Australian company pays company tax to a foreign government (on offshore income, for example) no franking credits are created.

2.4. Distribution of franking credits to shareholders

Franking credits can be distributed to shareholders when attached to dividend payments. The maximum amount of franking credits that can be attached to each dollar of dividends is $\$T/(1\text{-}T)$, where T represents the corporate tax rate that applied at the time the franking credits were created. At the present 30% corporate tax rate, 43 cents of franking credits can be attached to each dollar of dividends.

2.5. Fully franked, unfranked, and partially franked dividends

A dividend that has the maximum amount of franking credits attached is known as a "fully franked dividend." For example, a $1 fully franked dividend has 43 cents of franking credits attached.

A dividend that has no franking credits attached is known as an "unfranked dividend." This may occur when a dividend is paid out of profits that are generated and taxed outside Australia. It is only the payment of corporate tax in Australia that creates franking credits.

A dividend that has some franking credits attached, but less than the maximum permissible amount, is known as a "partially franked dividend." This may occur when a dividend is paid out of profits, some of which have been generated and taxed in Australia and some of which have not.

2.6. Use of franking credits by resident investors

Resident Australian shareholders can use these franking credits to offset personal tax obligations in Australia. In particular, the personal tax obligations of Australian resident shareholders is reduced by the amount of the franking credit received. An Australian resident shareholder who receives a $1 franking credit will pay $1 less personal tax as a result. Since 1 July, 2000, Australian resident shareholders who have no personal tax obligations to reduce (charitable entities and low-income individuals, for example) receive a rebate equal to the amount of franking credits received. That is, the franking credits can effectively be redeemed for cash.

2.7. The operation of dividend imputation for resident investors

Numerical example

Table 1 presents an example of the mechanics of the Australian dividend imputation tax system for a fully franked dividend received by an Australian resident investor.

Table 1: The Mechanics of Dividend Imputation: Fully-franked Dividends

Cash Flows	Personal Tax Rate	
	50%	15%
Company Profit	100	100
- Company Tax	(30)	(30)
Net Profit after Tax	70	70
Dividend Paid	70	70
Grossed-Up Dividend	100 [a]	100 [a]
Personal Tax	(50) [b]	(15) [c]
Franking Credit	30	30
Net Tax Effect	(20)	15
After-tax value of Dividend	50	85

Notes: (a) 70/(1 - 0.3)
(b) 0.5 (100)
(c) 0.15 (100)

Table 1 considers two investors who face personal tax rates of 50% and 15%, respectively. In Australia, this would correspond (approximately) to an individual in the top tax bracket and a superannuation or pension fund.

Both investors own one share in a company that earns a profit before tax of $100 per share. First, the company pays corporate tax at the rate of 30%. The remaining $70 is paid out in full as a dividend to shareholders. Because this dividend is paid out of corporate profits that have already been taxed in Australia, it is a fully franked dividend.

Grossed-up dividends

To compute personal tax payable on a franked dividend, one must first compute the "grossed up dividend. This is effectively the (pre-tax) source profit from which the dividend was paid. In this case, the $70 dividend was paid out of the $100 pre-tax source profit. Formally, the grossed-up dividend is equal to the actual cash dividend received, divided by one minus the corporate tax rate that was applied to the corporate profit. In this case, the grossed-up dividend is computed as:

$$\underset{\text{Dividend}}{\text{Grossed}-\text{up}} = \frac{\text{Actual Dividend}}{1-T} = \frac{70}{1-0.3} = 100$$

where T represents the corporate tax rate.

In this case we take the actual dividend of $70 and divide by one minus the corporate tax rate of 30%. The result is a grossed-up dividend of $100. Note that this is the same as the original company profit. The point of grossing-up the dividend is to figure out the source of the dividend. In this case, the $70 dividend is sourced from the $100 company profit.

Personal tax obligations

Next, the entire grossed-up dividend attracts personal tax. In this example, therefore, the individual shareholder has a personal tax liability of $50 and the superannuation fund has a tax liability of $15.

Franking credits

Finally, the shareholders receive a franking credit, for the amount of company tax that has already been paid (which is $30 in this example). For our individual shareholder, this $30 credit can be used to partially offset the $50 personal tax obligation. The net effect is that the company earns a $100 profit, pays corporate tax of $30, and then pays a $70 dividend. The individual shareholder receives the $70 and pays personal tax of $20 (the total personal tax obligation of $50 less the $30 franking credit), which leaves $50. Thus the original $100 profit is effectively taxed at the shareholder's personal tax rate of 50%.

The superannuation fund, however, has a tax obligation of only $15. The $30 imputation credit eliminates this obligation, and there is still $15 of tax credits to spare. These excess credits can be used to offset tax on other income or claimed as a cash rebate. Thus the receipt of the $70 dividend has a tax benefit associated with it. Not only does the fund get $70 cash, but the dividend also entitles them to pay $15 less tax on income from other sources or to receive a cash rebate if the entity has no other tax obligations. The logic for this is that the fund has an obligation to pay $15 tax on the $100 source profit. However, $30 has already been collected at the corporate level and paid on their behalf. This is too much, so the surplus $15 is refunded to them by the taxing authority. The net effect is that the superannuation find receives $85 of value from the dividend: $70 cash and $15 in tax benefits (either as a reduction in tax on other income or as a cash rebate from the Tax Office). Thus the original $100 profit is effectively taxed at the shareholder's marginal rate of 15%.

Franking credits are equivalent to cash dividends for resident investors

Note that in both cases, a dollar of franking credits is as valuable as a dollar of cash dividends. Indeed the impact of the imputation system is perfectly equivalent to a system in which the cash dividend is simply increased by the amount of the franking credit. That is, suppose each shareholder received a cash dividend of $100 instead of the package of a $70 dividend and a $30 franking credit. The individual shareholder would have to pay personal tax of $50 on this $100 dividend, leaving $50 to consume. The fund would have to pay tax of $15 on this $100 dividend, leaving $85. This is exactly the same outcome as occurs under the imputation system in Table 1. Consequently, for Australian resident shareholders a dollar of franking credits can be considered to be equivalent in value to a dollar of cash dividends.

2.8. The operation of dividend imputation for non-resident investors

Franking credits are of no value if received by non-resident investors

Under the Australian imputation tax system, franking credits are of no value when received by non-resident shareholders. Non-resident shareholders cannot use franking credits to reduce their personal tax obligations. This is because the government in the investor's country of residence, to whom the shareholder's personal tax obligations are due, will not allow any credit for company tax paid to the Australian government. Moreover, only resident investors can apply for a cash rebate of unused franking credits. Consequently, around 50% of the franking credits that are distributed by Australian companies, attached to dividends, are not redeemed.

A non-resident receiving the fully-franked dividends in Table 1 would simply pay personal tax in their residency jurisdiction on the amount of the dividend received. Thus, the individual and fund would each be taxed on $70 of income in their home jurisdiction.

Avoiding withholding tax is of no benefit under a double tax agreement

On occasion it is argued that franking credits are valuable to non-resident investors because franked dividends are immune from Australian withholding tax whereas unfranked dividends are not. In this case, withholding tax is tax levied by the Australian government on dividends being repatriated

offshore. For example, a $70 dividend being repatriated to the U.S. would attract a 10% (or $7) withholding tax. However, under the double tax agreements that Australia has signed with most developed nations, this $7 tax is rebated against the shareholder's personal tax obligations in the home jurisdiction. If, for example, the U.S. investor's marginal tax rate in the U.S. were 40%, a total of $28 personal tax would be payable on a $70 dividend (whether franked or not). If this dividend were unfranked, $7 of this would be paid as withholding tax in Australia and the remaining $21 would be paid as personal tax in the U.S. If the dividend were fully franked, no withholding tax would be paid, and the total $28 would be paid as personal tax in the U.S. Thus, franking credits do not affect the net tax liabilities of a non-resident investor from a country with which Australia has a double tax agreement.

Some non-resident investors do not pay tax. For example, U.S. pension funds are tax exempt. As part of the double tax agreement, Australia does not levy withholding tax on these investors. They simply pay no tax in any jurisdiction. Consequently, franking credits are also irrelevant for this class of investor.

2.9. Franking credits are valuable to residents, but worthless to non-residents

In summary, a dollar of franking credits received by an Australian resident shareholder is as valuable as a dollar of cash dividends. Conversely, a dollar of franking credits received by a non-resident shareholder is worthless.

3. Definition and Economic Interpretation of Gamma

3.1. Overview

Officer (1994) defines a parameter gamma (γ) to be "the proportion of corporate tax that is really a pre-collection of personal tax on behalf of the shareholder."[2] He also shows how this parameter affects the calculation of the firm's weighted-average cost of capital. In this section of the report, I precisely define what gamma means and develop the appropriate economic interpretation of gamma.

3.2. The value of distributed franking credits

Section 2 above, illustrates that a dollar of franking credits received by an Australian resident shareholder is as valuable as a dollar of cash dividends. Conversely, a dollar of franking credits received by a non-resident shareholder is worthless. This is the value of *distributed* franking credits. It addresses the question of how much a shareholder will value a dollar of franking credits that is distributed to them, attached to a dividend. The empirical techniques that are used to estimate the value of franking credits measure this quantity – the value of distributed franking credits. The value of distributed franking credits is likely to be 100% of its face value for resident shareholders, and zero for non-resident shareholders.

3.3. Distribution and retention of franking credits

Gamma, the parameter value that is required for estimation of the weighted-average cost of capital, is more complicated than the value of distributed franking credits. This is because gamma, in the formulas derived by Officer (1994), applies to franking credits at the point of *creation* not *distribution*. The two can differ to the extent that not all franking credits are distributed.

Indeed, most Australian firms do not distribute all of their profits as dividends every year. Some profits are retained, for example, to internally finance future growth. To the extent that some profits, on which Australian corporate tax has been paid, are not distributed as dividends, some of the franking credits that have been created are not immediately distributed to shareholders. These franking credits can be distributed in later years, but their value is not indexed so there is a loss of time value if they are not distributed immediately. In a recent paper, Hathaway and Officer (2004) estimate that on average the amount of franking credits distributed each year is only 70% of the amount of franking credits that are created in that year.

The effect of not distributing all franking credits is illustrated in Table 2. This table uses the same data as does Table 1, but assumes that 70% of corporate profits are distributed as dividends and, consequently, that 70% of franking credits are distributed.

[2] Officer, R.R. (1994) "The Cost of Capital of a Company Under an Imputation Tax System," Accounting and Finance, May, p. 4.

Table 2: The Mechanics of Dividend Imputation: Fully-franked Dividends 70% Distribution Rate

Cash Flows	Personal Tax Rate			
	50%		15%	
Company Profit	100		100	
- Company Tax	(30)		(30)	
Net Profit after Tax	70		70	
Retained Profit	21	a	21	a
Dividend Paid	49	b	49	b
Grossed-Up Dividend	70	c	70	c
Personal Tax	(35)	d	(10.5)	e
Franking Credit	21	f	21	f
Net Tax Effect	(14)	g	10.5	h
After-tax value of Dividend	35	i	59.5	j

Notes: (a) 30% × $100 (f) 49 ×0.3/(1-0.3)
(b) 70-21 (g) (35)+21
(c) 49/(1 - 0.3) (h) (10.5)+21
(d) 0.5 (70) (i) 49+(14)
(e) 0.15 (70) (j) 49+10.5

In Table 2, the company generates a profit of $100 and pays corporate tax of $30, leaving $70 available for distribution to shareholders. Of this, the company elects to retain $21 and distribute the remaining $49 as a dividend. This dividend is then grossed-up (by dividing by one minus the corporate tax rate) to $70 to determine total personal tax obligations. The maximum amount of franking credits that can be attached to this $49 dividend is:

$$\text{Dividend}\frac{T}{1-T} = 49\frac{0.3}{1-0.3} = 21.$$

Note that $30 of franking credits have been created, but only $21 are distributed to shareholders. This $21 franking credit is redeemed in full by both resident shareholders.

In this example, the distribution ratio of franking credits is 70%. Of the $30 of franking credits that have been created, $21 are distributed to shareholders. This distribution rate is consistent with data for the average Australian company presented by Hathaway and Officer (1992).

3.4. Definition of gamma

Gamma is the product of the distribution rate of franking credits and the value of franking credits once distributed:

$$\gamma = \frac{\text{Distribution}}{\text{Rate}} \times \frac{\text{Value of Distributed}}{\text{Franking Credits}}.$$

In Table 2, the distribution rate is 70%. Because the franking credits were distributed to resident shareholders (who can redeem them in full), the value of distributed franking credits is one (i.e., they are fully valued by the recipients). In this case, the appropriate value of gamma is $0.7 \times 1 = 0.7$. That is, even though all franking credits could be fully utilized in the hands of the shareholders, gamma is not equal to one. The rate at which franking credits are distributed is also an important consideration.

If the franking credits in Table 2 had been distributed to non-resident shareholders who could not use them, the value of distributed franking credits would be zero (i.e., they are of no value to the recipients). Of course, the distribution rate is still 70%. In this case, the appropriate value of gamma is $0.7 \times 0 = 0$.

Most major Australian firms have both resident and non-resident shareholders. Around 30% of the shares of listed Australian firms are held by non-residents. Franking credits distributed to residents are fully valued but franking credits distributed to non-residents are not valued at all. Consequently, there is no single value for distributed franking credits. The appropriate value to use for the value of distributed franking credits in these circumstances is addressed in subsequent sections of this report.

4. How franking credits affect the cost of equity capital

4.1. Overview

This section examines how franking credits, to the extent that they are valued by the market, affect a company's weighted-average cost of capital (WACC). Everything in this section is consistent with the framework developed by Officer (1994).

4.2. The value of franking credits can be reflected in the discount rate or the cash flows

Officer (1994) presents definitions of WACC on a before and after corporate tax basis. In this section, I begin by examining his first definition of after corporate tax cash flows and WACC, for ease of exposition. Under this definition, the effect of franking credits is incorporated in the discount rate – the cost of equity capital. The same arguments apply regardless of which definition of WACC is used and whether franking credits are incorporated in the WACC or the cash flows. We subsequently examine the vanilla WACC specification, under which the effect of franking credits is incorporated in the cash flows. We demonstrate that the two approaches are entirely equivalent and lead to the same conclusions, based on the same intuition. Moreover, Officer demonstrates that all of his WACC/cash flow definitions produce identical results so long as they are applied consistently.

4.3. Incorporating the value of franking credits in the discount rate

Officer (1994) begins by defining after corporate tax cash flows as $X_o(1-T)$, consistent with the standard textbook treatment. Here X_o represents operating income and T represents the relevant corporate tax rate. The definition of the after corporate tax discount rate that is consistent with this definition of cash flows is stated in his Equation (7) as:

$$r_i = r_e \frac{E}{V} \frac{1-T}{1-T(1-\gamma)} + r_d \frac{D}{V}(1-T)$$

where:

r_i is the weighted-average cost of capital, reflecting the tax deductibility of interest and the value of franking credits,

r_e is the return on equity capital required by investors,

r_d is the return on debt capital required by investors,

$\frac{E}{V}$ is the proportion of equity finance,

$\frac{D}{V}$ is the proportion of debt finance,

T is the corporate tax rate, and

γ is the value of franking credits.

4.4. Government subsidy of debt finance

In this framework, r_d is the return that debt holders require (before personal tax) to compensate them for the risk involved in lending to the firm. Since these interest payments are tax deductible at the corporate level, the firm's after-tax cost of debt capital is $r_d(1-T)$. That is, if debt holders require a return of 7% and the corporate tax rate is 30%, the firm's after-tax cost of debt is 4.9%. Of the 7% required return, 4.9% is provided by the firm and 2.1% is effectively provided by government via the tax system.

4.5. Government subsidy of equity finance

There is also a potential tax subsidy that may reduce the firm's cost of equity capital. Here, r_e is the return that equity holders require (before personal tax) to compensate them for the risk involved in owning shares in the firm. In the Australian regulatory framework, and in commercial practice, r_e is usually estimated using the Capital Asset Pricing Model (CAPM). This provides an estimate of the return that the equity holders require. As is the case for debt, there is a difference between the investors' required return and what the firm must pay if a government tax subsidy is relevant. In particular, equity holders require a total after corporate tax return of r_e. This return potentially has three components: dividends, capital gains, and franking credits. The firm is responsible for generating dividends and capital gains. Franking credits are paid by government via the tax system. Officer's WACC formula quantifies the proportion of r_e that must be generated by the firm, $\frac{1-T}{1-T(1-\gamma)}$, and the proportion that is paid by government via the imputation tax system, $\frac{\gamma T}{1-T(1-\gamma)}$. Thus, the firm's after-tax cost of equity capital is $r_e \frac{1-T}{1-T(1-\gamma)}$. Indeed this is the key contribution of Officer (1994). He derives the proportion of the required return on equity that must be generated by the firm via dividends and capital gains.

The calculation of these proportions is relatively straightforward, and can be best explained by way of an example. Consider Table 3 below.

Table 3: Derivation of Components of Equity Return

	$	Symbol
Corporate Level		
Company Profit	100	1
- Company Tax	30	T
After tax Profit	70	$1-T$
Shareholder Level		
Dividend Received	70	$1-T$
Franking Credit Received	30	T
Value of Franking Credit	$\gamma 30$	γT

Table 3 illustrates a company that earns a $100 profit, pays $30 corporate tax and distributes the remaining $70 as a dividend. The shareholder receives this $70 dividend plus $30 of franking credits,

each of which is worth γ. Thus, the shareholder receives a \$70 dividend from the firm and franking credits with a value of $\$30\gamma$ from government.

Algebraically, for every \$1 of corporate profit, the firm can distribute dividends worth $\$1-T$ and the government provides franking credits with a value of $\$\gamma T$. Consequently, the total shareholder return is:

$$1-T+\gamma T=1-T(1-\gamma).$$

The proportion of this provided by the firm is $\frac{1-T}{1-T(1-\gamma)}$ and the proportion provided by government is $\frac{\gamma T}{1-T(1-\gamma)}$.

Consider, for example, a corporate tax rate of T=30%. If franking credits are fully valued when created (recall that this requires that all franking credits be immediately distributed and that they can be fully utilized when received by investors) then γ=1. In this case, the firm must provide 70% of the return required by shareholders and the other 30% is provided by government via franking credits.

If, however, franking credits are not valued (because they are received by non-residents, for example), then γ=0. In this case, the firm must provide 100% of the return required by shareholders.

The fact that the firm provides only a portion of the return required by investors, with the balance provided by government via various tax subsidies, is well recognized in the academic and practitioner literature. Copeland, Koller and Murrin (2000, p. 134), for example, note that the WACC is "the opportunity cost to all the capital providers weighted by their relative contribution to the company's total capital." They also note (p. 134-5) that, "the opportunity cost to a class of investors equals the rate of return the investors could expect to earn on other investments of equivalent risk. The cost to the company equals the investors' costs less any tax benefits received by the company (for example, the tax shield provided by interest expense)." In a dividend imputation system, the government may also subsidize equity returns via the payment of franking tax credits.

4.6. Past ACCC analysis

The ACCC's December 2003 Report followed Australian regulatory precedent at the time in assuming that a value of γ=0.5 is appropriate.[3] In this case, the firm must provide 82% of the return required by shareholders, with the remaining 18% being provided by government via franking credits.[4]

4.7. Incorporating the value of franking credits in the cash flows

In its 2003 Report, the ACCC used the "vanilla" WACC and incorporated the assumed value of franking credits in the cash flows of the regulated entity. Officer (1994) shows how the value of franking credits can be incorporated in the firm's cash flows rather than the discount rate. In his Equation (12), Officer defines the vanilla WACC as:

$$r_{iii} = r_e \frac{E}{V} + r_d \frac{D}{V}.$$

This discount rate should be applied to cash flows defined as in his Equation (11):

$$(X_0 - X_D)(1 - T(1-\gamma)) + X_D,$$

where X_D represents interest payments to debt holders.

That is, under an imputation system, the cash flow to equity holders is:

$$(X_0 - X_D)(1 - T(1-\gamma)).$$

Without imputation $(\gamma = 0)$, the cash flow to equity holders would be:

$$(X_0 - X_D)(1 - T).$$

Thus, the component of the cash flow to equity that is due to the value of franking credits is the difference between the two:

$$(X_0 - X_D)\gamma T.$$

[3] ACCC. (December 2003). Section 152ATA Digital Pay TV Anticipatory Individual Exemption Application lodged by Foxtel Management Pty Limited: Final Decision. p..58.

[4] $\frac{1-T}{1-T(1-\gamma)} = \frac{1-0.3}{1-0.3(1-0.5)} = 0.82.$

Therefore, the proportion of the total cash flow to equity that is due to franking credits is:

$$\frac{(X_0 - X_D)\gamma T}{(X_0 - X_D)(1-T(1-\gamma))} = \frac{\gamma T}{1-T(1-\gamma)}.$$

This is the same proportion of the cost of equity that was due to franking credits, as derived above. That is, if we prefer to incorporate the value of franking credits in the discount rate, we can conclude that $\frac{\gamma T}{1-T(1-\gamma)}$ proportion of the cost of equity is paid by the government via franking credits. If we prefer to put the value of franking credits into the cash flows instead, we conclude that $\frac{\gamma T}{1-T(1-\gamma)}$ proportion of the total cash flow to equity is paid by the government via franking credits. In both cases, the balance, $\frac{1-T}{1-T(1-\gamma)}$, must be generated by the firm itself.

4.8. Non-technical summary

There are two steps in computing the firm's cost of equity capital. The first step is to compute the return required by shareholders. This required return reflects the risk of owning shares in the company. The most common method for determining this required return is to use the Capital Asset Pricing Model. This approach is adopted in the ACCC's 2003 Report, yielding an estimate of the cost of equity of 15.49%.

The second step is to determine the proportion of that return (or, equivalently, the proportion of the cash flows to shareholders) that will be provided by government via franking credits. Using the parameters adopted in the ACCC's 2003 report, this proportion is

$$\frac{\gamma T}{1-T(1-\gamma)} = \frac{1-0.3}{1-0.3(1-0.5)} = 18\%.$$

That is, of the total return of 15.5% required by shareholders, 0.18 × 15.5% = 2.8% is provided by government via franking credits. The remaining 82% (or a return of 12.7%) is the firm's cost of equity capital.

Using the parameters of the ACCC's 2003 Report, the firm is assumed to generate cash flows that are sufficient to provide a return of 12.7% to shareholders and the government is assumed to provide franking credits that are sufficient to provide a return of 2.8%.

5. Inconsistency of parameter values

5.1. Overview

Recall that the parameters used in the ACCC's 2003 Report imply that FOXTEL's shareholders require a return of 15.5% p.a. and that FOXTEL's cost of equity capital is 12.7% p.a. because shareholders are assumed to receive a return of 2.8% p.a. from franking credits. This return from franking credits is an immediate consequence of the assumption that gamma is equal to 0.5. In this section, I demonstrate that a 2.8% return from franking credits can only occur if FOXTEL's dividend yield takes a ridiculous value. That is, the assumed return from franking credits (and, consequently, the assumed value of gamma) is demonstrably inconsistent with economically reasonable values of FOXTEL's dividend yield.

5.2. Inconsistency with dividend yield

I begin with the assumption in the ACCC's 2003 Report that franking credits provide a return of 2.8% p.a. to FOXTEL's shareholders. This is a direct consequence of the assumed value of 0.5 for gamma. This value of gamma was consistent with Australian regulatory precedent in 2003 which often involved breaking the estimate into its two component pieces – assuming that around 80% of the franking credits that are created by the firm are distributed to shareholders and that the distributed franking are valued by shareholders at 60% of their face value.

If franking credits generate a return of 2.8%, and if distributed franking credits are valued at 60% of their face value, the amount of franking credits distributed must be 2.8%/0.6 = 4.7% of the value of the shares. That is, if the share price is $10, the firm must distribute 47 cents of franking credits each year, which would then be worth 28 cents (60%) to shareholders.

Of course, franking credits must be attached to dividends and the maximum amount of franking credits that can be attached to each dollar of dividends is $\$T/(1\text{-}T)$, where T represents the corporate tax rate that applied at the time the franking credits were created.[5] At the 30% corporate tax rate assumed in the ACCC's 2003 Report, 43 cents of franking credits can be attached to each dollar of dividends. Thus, if 47 cents of franking credits are to be distributed, they must be attached to $1.09 of dividends. This implies that a dividend yield of 10.9% p.a. is required in order to generate the 2.8% p.a. return from franking credits that is assumed in the ACCC's 2003 Report.

A 10.9% dividend yield is around three times the dividend yield of the average Australian stock (3.5-4.0%). Moreover, FOXTEL itself has never made a dividend payment to its shareholders and has not indicated that it has any plans to make any such payment in the foreseeable future.

If a significant value is to be assumed for the value of franking credits, as in the ACCC's 2003 Report, there must be a mechanism for distributing sufficient franking credits to shareholders. In this case, there is not. The value of franking credits that is assumed in the 2003 Report is

[5] See Paragraph 1.5 above.

demonstrably inconsistent with any economically reasonable estimate of dividend yields for Australian companies in general and for FOXTEL in particular.

6. The marginal price-setting investor

6.1. Overview

Franking credits received by resident investors are as valuable as cash dividends, but franking credits received by non-residents are worthless. In this section, I examine whose valuation of franking credits is embedded in the firm's cost of capital. I establish that the firm's cost of capital is set by the marginal price-setting investor, whose trade clears the market. I present conceptual arguments as to why this marginal price setting investor is likely to be a non-resident who does not value franking credits. This implies that franking credits do not affect the cost of capital of Australian firms. Ultimately, though, whether the cost of capital is affected by franking credits is an empirical question, which I address subsequently.

6.2. Definition of the marginal price-setting investor

In auction markets, the price is set at the value of the marginal investor whose trade clears the market. Different investors will have different estimates of the value of an asset. If there are a fixed number of these assets to sell, the marginal investor is the one who is last to buy. It is the price that this marginal investor is willing to pay that clears the market. Thus, the marginal investor is often called the price-setting investor.

Suppose, for example, that an individual has a case of wine to sell. The individual offers these bottles for sale to a group of colleagues. All 12 bottles must be sold at a single price – the individual cannot charge a different price to different colleagues. (This is to mimic the operation of the stock market – at any point in time, there is a single share price for any given company. There are not different prices for different types of investors). Suppose colleagues make the following bids:

- 2 bottles at $50 each
- 4 bottles at $45 each
- 6 bottles at $40 each
- 4 bottles at $35 each
- 9 bottles at $30 each

In this case, the market clearing price is $40 – all 12 bottles can be sold at this price. Even though some colleagues are willing to pay more than $40, the market will not clear at any higher price. At a price of $45, for example, only 6 bottles will sell. The third colleague is needed in order to clear the market. The price must therefore be set so as to attract this individual to the market. This is the marginal price-setting investor – this colleague's valuation determines the market price.

When considering franking credits and the market for Australian shares, there are two types of investor. Resident investors, who fully value every dollar of franking credits distributed to them, will be prepared to pay a price for the shares that reflects the value of franking credits to them. Non-

resident investors, who do not value franking credits, will not pay a price that incorporates a value for franking credits that they cannot use. Consequently, whether a share price reflects a value for franking credits (and, equivalently, whether franking credits affect the firm's cost of capital) depends upon whether the marginal price setting investor, whose trade clears the market, values franking credits. This, in turn, depends upon whether Australian capital markets are segmented from or integrated with global capital markets.

6.3. Shareholder returns in global capital markets

For the purpose of analyzing the value of franking credits, stock markets in different countries are integrated if investors in one country can easily buy shares in companies listed in another country. For example, U.S. investors can easily purchase shares in companies based in the U.S., many European counties, Australia, and so on.

Among these integrated markets, the return available to investors must be the same for a particular type of company, regardless of its location. Suppose, for example that shares in U.S. and European electricity generation companies were expected to generate returns of 10% and 12% respectively. This would result in investors selling the shares of U.S. companies and buying the shares of European companies. This activity is possible because the markets are integrated and it would continue until there was parity between the expected returns of the comparable companies.[6]

6.4. Australia is a small open economy and a net importer of capital

It is well established that Australia is a small open economy that is a consistent net importer of capital. In this regard, see Officer (1987) and Cashin and McDermott (2002). That is, Australian financial markets are deregulated to the extent that capital can flow relatively freely in and out of the country. In particular, Australian residents can purchase shares offshore and non-residents can purchase shares in Australian companies.

Also, Australian capital markets collectively are price takers in world capital markets. Since Australian capital makes up 1-2% of global capital, Australian markets collectively will be unable to influence world prices for investment capital.

Finally, Australia is a net importer of capital – there is considerably more demand for investment capital among Australian companies than there is domestic capital available to finance it. Indeed, at present, between 30 and 40% of the shares of Australian listed firms are owned by non-resident investors.

[6] Of course, to the extent that there are any differences between the firms, these must be controlled for. For example, not all electricity generation companies are identical. They are of different sizes, some are more highly geared, some also have distribution and retail activities or investments in gas and other energy assets, and so on. These must all be controlled for. It is also necessary to control for differences in the sovereign risk of the countries in which the firms operate. Operations in some countries are inherently riskier than others, due to differences in political and financial stability. This national sovereign risk is accommodated in the CAPM via the risk-free rate of interest. For the remainder of this discussion, I assume that all of these differences have been controlled for so that returns in different countries are directly comparable.

6.5. Consistency with estimation of other parameters

All WACC parameters are based on the marginal price-setting investor's valuation. Risk-free rates, for example, are set initially by the auction of government bonds to potential investors and then by trade between investors. Some investors value government bonds highly and are prepared to bid a high price. Others bid moderate or low prices. Most investors do not bid at all and hold no government bonds. In such an auction, the price is set by the marginal investor—the investor who buys the last bond, thus clearing the market. This investor's valuation will be recorded as the market price and will determine the risk-free rate at that time. All investors with a higher valuation will also receive bonds, but their valuations are irrelevant to the market-clearing price. All that matters is that they had a higher valuation—how much higher makes no difference to the equilibrium outcome price. Similarly, the value of government bonds to unsuccessful bidders and to non-bidders is also irrelevant to the price. The price that we observe in the market is the valuation of the marginal, price-setting, market-clearing investor. To compute the value of government bonds to the average investor, we would need to know how much every investor valued government bonds and then take an average. This would presumably require survey data, because it cannot be inferred from market prices. This would not only be difficult, but also irrelevant as it has nothing to do with the firm's cost of funds which depends on actual market prices, which are set by the marginal investor's valuation.

6.6. Consistency with the 2003 Report

The notion that the cost of capital of Australian firms is set by global capital markets (Australia is a price taker) is consistent with the WACC calculation in the ACCC's 2003 Report which considers "evidence of overseas subscription television companies."[7] There is an implied assumption that investors in all of these firms, wherever they are located, will assess risk and required returns in the same way.

6.7. Implications of setting gamma to 0.5

The ACCC's 2003 Report concludes that equity investors in a business such as FOXTEL require an expected return of 15.5% before committing equity funds. It further concludes that franking credits provide a return of 2.8% so that the firm's cost of equity capital is 12.7%. That is, the firm must provide a return of 12.7%, the government provides 2.8% via franking credits, and the total expected return of 15.5% is equivalent to the sort of return that can be earned on comparable investments elsewhere in integrated capital markets.

However, an Australian subscription television company that was priced so that its dividends and capital gains provided an expected return to equity investors of 12.7% would be unable to attract foreign capital. Because non-residents obtain no value from franking credits, the total expected return for such investors must come from dividends and capital gains – 12.7% in this case. Assuming that Australia is part of an integrated capital market (so that the analysis of foreign comparables is legitimate), these non-resident investors can expect returns of 15.5% from comparable companies elsewhere.

[7] Ibid, p. 26.

Resident investors, who can fully utilize franking credits, will consider a return of 12.7% from dividends and capital gains plus 2.8% from franking credits to be equivalent to the returns that could be earned from comparable investments elsewhere. However, non-residents will view Australian media firms as offering them a return of only 12.7%, compared to the 15.5% that could be obtained from similar companies elsewhere.

This may not be a problem unless Australia is a small open economy that is a consistent net importer of capital – which it is. Australian firms cannot be expected to attract the required foreign capital if they do not offer foreign investors a competitive return.

Consequently, if foreign capital is required to finance Australian firms their cost of capital is not reduced to reflect the value of franking credits. This is because non-resident investors cannot use franking credits and will not accept reduced returns from the firm as a result. This implies that the firm must provide the entire return required by investors. There is no reduction for a government subsidy in the form of franking credits because this subsidy does not extend to foreign capital, which is required to finance the firm. This is all consistent with setting gamma to zero.

6.8. Summary and conclusions

The foregoing analysis lays out a conceptual framework in which franking credits are fully valued by all resident investors and yet do not affect the corporate cost of capital. Just because some (or even the majority of) investors value franking credits, it does not follow that they must have an effect on the corporate cost of capital.

Ultimately, the value of franking credits, in terms of their effect on corporate cost of capital, must be estimated empirically from market data. The foregoing analysis simply demonstrates that just because some investors value franking credits, it does not necessarily follow that they must impact corporate cost of capital. By analogy, we learn little about the value of the stock market by observing how many individuals own shares and how many do not. The subsequent sections, therefore, examines various techniques to empirically estimate the value of franking credits insofar as they may affect the corporate cost of capital.

7. Potential changes in the value of franking credits

7.1. Overview

Before I turn to the empirical work that seeks to estimate the value of franking credits, it should be noted that some recent changes to Australian tax laws have the potential to affect the value of franking credits. This section reviews those tax law changes and examines their possible effect on the value of franking credits. It is important to consider these key dates in relation to the data that is being used to estimate the value of franking credits. Studies that use data that pre-dates these tax law changes, for example, should be interpreted with caution.

7.2. The 45-day rule: July 1, 1997

In the Federal Budget in May 1997, the Treasurer announced the introduction of the 45-day rule, which is designed to prevent the transfer of franking credits. The problem, from the Federal Treasury's point of view, was that non-residents were able to effectively transfer franking credits to residents so that they could be redeemed, reducing tax revenue. This could be done via various dividend streaming mechanisms that direct franking credits into the hands of resident investors.[8] Under one of the simplest mechanisms, a non-resident could simply transfer their shares to a resident immediately before the dividend and receive them back immediately after. The resident then receives the dividends and uses the franking credit. The two parties then split the value of the franking credit. As these transfer mechanisms became institutionalized, the Federal Treasury saw the impact on its revenue as significant. The 45-day rule was designed to eliminate this transfer of franking credits.

The 45-day rule requires an investor to own the shares for at least 45 days around the dividend ex-date in order to redeem the franking credits. Moreover, the investor must substantially bear the risk of owning the shares—they cannot hedge price movements using futures or options and they cannot lock in a price for a future sale. The idea is that a resident might be willing to hold the stock for a day or two in order to get a share of the value of the franking credit, but they are unlikely to want to bear 45-day's worth of stock market risk just to collect a franking credit.

The 45-day rule appears to have had an economic impact, with several large investment vehicles, that were designed to transfer franking credits, winding up or restructuring after the rule was announced. The Australian Financial Review reported that "the effect on the market was immediate" and that "the Tax Office application of the new rules will effectively stop schemes like Macquarie Bank's Qanmacs, in which offshore holders can own shares through a warrant while the bank keeps the franking credits."[9] The same article reported that "the changes are likely to cause a complete repricing of the options market, curtail the practice of lending against shares, and force investors to consider the price of individual products such as Macquarie Bank's endowment warrants. The

[8] For example, a firm could allow investors to choose between receiving a fully franked dividend of $1 (with a franking credit that is worth 43 cents at a 30% corporate tax rate) or an unfranked dividend of, say, $1.20. Resident investors would then choose the fully franked dividend as they would find the package of dividend plus franking credit to be more valuable than the unfranked dividend. Non-resident investors would choose the higher unfranked dividend since the franking credits are worthless in their hands. Thus, the franking credits have been streamed to resident investors who can use them. This procedure was eliminated by Taxation Law Amendment Bill (No.2) 1990.

[9] Durie, John (1997), "Trading hit as markets digest tax changes," *Australian Financial Review*, 15 May 1997, p.1.

Australian quotes a leading tax practitioner who states that "Not only has the Government killed the franking credit market, it is dancing on the grave."[10]

This introduction of this rule may impact the value of gamma. If the marginal price-setting investor were a non-resident who was previously able to transfer franking credits via one of these schemes, and if the 45-day rule works so that they are now unable to make such a transfer, the market value of franking credits would fall. Previously, franking credits were valuable because they could effectively be sold, but now they are worthless to non-residents because the market for their transfer has been closed down. Of course, whether the marginal investor *is* a non-resident and whether the 45-day rule really works, is a matter for empirical investigation. I address this issue below. Nevertheless, studies that use data which exclusively pre-dates the 45-day rule may not measure the current market value of franking credits for use in cost of capital estimates.

7.3. The rebate provision: July 1, 2000

Another potentially important change to Australian tax legislation is the introduction of a rebate for unused credits in July 2000. Previously, franking credits could be used to offset Australian personal tax obligations. But if the investor had completely exhausted their personal tax obligations and still had more franking credits, these excess credits could not be used, and could not be stored up for future use—they were wasted.

The rebate provision, however, allows the investor to obtain a cash refund from the Tax Office for the value of any unused franking credits. This means that franking credits that were previously worthless are now valuable. If, therefore, the marginal investor is a resident individual or superannuation fund who has no tax liability and unused surplus franking credits, this new provision may increase gamma. However, relatively few individuals and funds are likely to be in this position. Moreover, Hathaway and Officer (2004) report that, in aggregate across the Australian economy, proportionally fewer franking credits are being redeemed subsequent to this provision. Therefore it is unlikely that this provision has increased the market value of franking credits for use in cost of capital estimates.

[10] White, Andrew (1997), "Tax man's heavy hand whacks all," *The Australian*, 12 July 1997, p. 54, quoting Bill Tynan, financial services tax partner at Deloitte Touche Tohmatsu.

8. Empirical methods to estimate the value of franking credits

8.1. Overview

This section examines the empirical techniques that have been used to infer how franking credits affect the corporate cost of capital.

8.2. Three broad empirical techniques have been used

Three types of empirical technique have been employed to try to estimate the value of franking credits insofar as it affects the corporate cost of capital.

The first technique uses official tax statistics for the Australian market in aggregate to infer (1) what proportion of franking credits that are created via the payment of corporate tax are distributed to shareholders with dividends, and (2) what proportion of credits received by shareholders are redeemed against personal tax obligations.

The second technique examines how stock prices change around ex-dividend dates. By examining the average decline in the stock price as the dividend and franking credit separate from the share, it is hoped to estimate the value of both dividends and franking credits, on average, across all listed firms. The idea is that on the ex-dividend date, on average, the stock price should fall by the value of the dividend plus the value of the franking credit. Prior to this ex-date, the stock trades with the dividend and franking credit attached. They both separate from the share on the ex-date.

The third type of research methodology that has been used to estimate the value of franking credits is to compare simultaneous prices of different securities, one of which entitles the holder to dividends and franking credits, and one that does not. The leading example of this methodology is Cannavan, Finn, and Gray (2004). This paper compares simultaneous prices of shares and futures contracts on those shares. If an investor buys the shares themselves, they are entitled to receive dividends and franking credits. The futures contract does not entitle the holder to any dividends or franking credits. Thus, the prices of these two securities will differ according to the value of dividends and franking credits.

In the following sections, we examine each of these three research methodologies in turn. We summarize the results and examine the strengths and weaknesses of each methodology.

9. Using official tax statistics to estimate the value of franking credits

9.1. Overview

The Australian Taxation Office publishes aggregate (economy-wide) data on (1) the proportion of franking credits created (via the payment of corporate tax) that are distributed to shareholders with dividends, and (2) the proportion of credits received by shareholders that are redeemed against personal tax obligations.

9.2. Early results

The leading paper in this area is Hathaway and Officer (1992; 2004). The first version of this paper was published in 1992. It has subsequently been revised a number of times using updated data sets. The early versions of this paper report that of all franking credits created, only 80% are ever distributed. This is because many firms prefer to retain some profits within the firm to finance future growth, rather than pay a dividend that is sufficiently high to distribute all available franking credits.

Early versions of this paper also report that of all franking credits that are distributed, only 60% are redeemed against personal tax obligations.

This implies that, in aggregate, only about half of all created franking credits are ever redeemed. Half of the franking credits that are created never get used.

9.3. Adoption by Australian regulators

A number of Australian regulators have interpreted this result as implying that gamma should be set at 0.5. In Section 10, I establish that gamma refers to the value the marginal price-setting investor obtains from a dollar of franking credits created by the firm. That is, the firm's weighted-average cost of capital is simply a price – the price that must be paid to attract capital. This price, like any market price, is set by the marginal price-setting investor. On average when a firm creates a dollar of franking credits (by the payment of corporate tax) it distributes 80 cents of franking credits to shareholders (attached to dividend payments). If the marginal price setting investor values franking credit received at 60% of their face value, the dollar of franking credits created will be worth 48 cents.[11] A number of Australian regulators have adopted the practice of setting gamma to 0.5 on the basis of this result.

The National Electricity Code, Chapter 6, Clause 5.2 states that

[11] As I explain below, this is a fundamental misinterpretation of the results.

> "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…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."

This is a reference to the 1992 version of the Hathaway and Officer paper. This paper, and the direction from the National Electricity Code has formed the basis for Australian regulators setting gamma to 0.5 in their determinations.

The Queensland Competition Authority (QCA) specifies a "distribution rate" of 80% and a "utilisation rate" of 62.5% to justify setting gamma to 0.5. Since Hathaway and Officer (1992-2004) is the only paper to separately estimate and report these components, it clearly forms the basis for the QCA's estimate of gamma.

The Essential Services Commission of South Australia (ESCoSA) also sets gamma to 0.5 and uses a "utilisation rate" of 60%. Again, since Hathaway and Officer are the only authors to report this utilisation rate of 60%, their paper clearly forms the basis for ESCoSA's estimate of gamma.

9.4. Updated results

I will subsequently explain why this empirical method cannot be used to estimate gamma. If it is to be relied upon, however, the most recent updated results should be used. Hathaway and Officer (2004) contains results updated to include data through to June 2002. They report that "two issues arise: how many credits are issued (access) and how many of these distributed credits are redeemed (utilisation)? We find that the access factor is 71% and about 50% of distributed credits are being redeemed. Overall, about 35% of company tax is actually pre-payment of personal tax."

These results contain data from before and after the 1997 tax law amendment that essentially prevents the trade in franking credits. In the earlier data period there were a number of mechanisms that allowed non-resident investors to transfer franking credits to investors. The 1997 introduction of the 45-day rule was designed to prevent this activity. The revised results suggest that this has been successful.

Finally, the updated results of Hathaway and Officer (2004) indicate that the tax law amendment in 2000, which provides for a rebate of unused credits, has had little impact on the economy-wide utilization rate. This is expected, given that the proportion of credits being received by non-taxed investors is likely to be very small.

Whatever empirical technique is to be relied upon, the most recent available data should be used. In this case, the most recent data cannot support a value for gamma of more than 0.35.

9.5. Irrelevance of these results

Unfortunately, these aggregate tax statistics tell us little about gamma. Recall that the earlier versions of this paper have been interpreted as suggesting that gamma should be set to 0.5 based on 80% of created franking credits being distributed and these distributed franking credits being worth 60% of their face value to the marginal price-setting investor. There are at least two problems with this interpretation.

The distribution rate must be measured for the individual firm, not the aggregate market. Consider, for example, a firm that pays no dividends at all. Why would any investor accept lower returns in return for franking credits that are never distributed? When assessing the value of franking credits, investors in a particular firm will consider the distribution rate of that firm, not the average firm in the economy.

It is a misinterpretation of the Hathaway and Officer results to suggest that the marginal price-setting investor values franking credits at 60% of their face value. Their results only suggest that 60% of distributed franking credits are redeemed. It is not the case that all investors value franking credits at 60% of their face value. Rather, investors are likely to value franking credits fully (if they are residents) or not at all (if they are non-residents). Consequently, the relevant question is whether the marginal price-setting investor is in the 60% who will use the credit or the 40% who will not. In aggregate across the economy, 30-40% of Australian shares are held by non-resident investors who cannot, and apparently do not, use the franking credits that are distributed to them. Since these investors cannot use franking credits, and since their capital investment is required, it is likely that the marginal price-setting investor does not value franking credits.

For both of these reasons, economy-wide aggregate tax statistics are not helpful in determining an appropriate value of gamma to be used to determine a particular firm's cost of equity capital – except to the extent that they highlight the significant proportion of franking credits that are distributed to investors who cannot use them. Presumably these investors would not collectively pay for franking credits that they cannot use, which implies that franking credits do not affect the corporate cost of capital.

10. Using stock price changes around ex-dividend dates to estimate the value of franking credits

10.1. Overview of methodology

Another approach that has been used to estimate the value of franking credits is to observe the change in stock prices around ex-dividend dates.

On the ex-dividend date, the dividend and franking credit separates from the shares. Investors who buy the shares prior to the ex-date are entitled to receive the dividend and franking credit. Investors who buy the shares on or after the ex-date are not.

On average, the share price is expected to drop by the value of the package of dividend plus franking credit on the ex-date. For this reason, this methodology is often referred to as the "dividend drop-off" approach. Recall that if the corporate tax rate is 30%, a one dollar fully-franked dividend has 43 cents of franking credits attached. Thus, if dividends and franking credits are both fully valued, we would expect that, on average, the stock price would decline by $1.43 on the ex-date. This reflects the fact that the stock is worth $1.43 more if the dividend and franking credit are attached.

If dividends are fully valued (a dollar of cash is worth a dollar of cash) but franking credits are not valued by the marginal investor, we would expect that, on average, the stock price would decline by one dollar on the ex-date. This reflects the fact that the stock is worth one dollar to the marginal investor if the (fully-valued) dividend and (non-valued) franking credit are attached.

When using this method, it is common to observe share prices at the close of trading on the ex-date and compare these with closing prices from the previous day. Of course, there are many reasons other than a dividend for a stock price to change over the course of a day. Also, some firms pay very small dividends. For example, NewsCorp may pay a one cent dividend on a $25 share price. It is therefore difficult to precisely measure the effect of the dividend.

For these reasons, it is necessary to compose a large sample of ex-dividend dates to obtain any acceptable degree of statistical precision. Since Australian companies usually pay only two dividends per year, it is necessary to aggregate over the entire market to obtain an acceptable sample size. That is, it is impossible to obtain an estimate of the value of franking credits for an individual firm using this method. Even if a firm had paid franked dividends since 1987, we would only have 36 observations available (two per year since 1987). Given the fact that stock prices vary considerably for reasons other than the dividend payment, such a small number of observations would generate estimates with such low statistical precision that they are unusable. In such cases, a large number of observations are required to obtain acceptable levels of statistical precision. Here, the sample size can only be increased by aggregating observations across different companies and over the longest possible period of time. This involves examining the ex-dividend date stock price change for a large group of companies over several years. Although this improves statistical precision, the results must be interpreted as the average effect over that group of companies and that time period. To the extent that franking credits are of potentially different value in different companies (due to the nature of the company and its shareholder base) and may change value over time (due to tax law amendments), such average estimates are relevant only to the extent that the group of companies and

time period being examined are considered to be homogeneous – at least in terms of the value of franking credits. Other techniques, reviewed below, do not require such aggregation over large groups of companies and over time.

10.2. Ordinary least squares regression

The approach that is generally used is to apply ordinary least squares (OLS) regression to examine the relationship between ex-date stock price changes and the value of dividends and franking credits.[12] The regression model can be expressed mathematically as:

$$\Delta P = aD + bFC + \varepsilon$$

where ΔP represents the change in stock price, a represents the value of dividends, D represents the dividend amount, b represents the value of franking credits, FC represents the amount of franking credits and ε represents the part of the stock price change that occurs for reasons other than the dividend. The residual term, ε, may be positive or negative and will average out to zero in a large sample.

If the firm pays a one dollar fully-franked dividend, and if dividends and franking credits are fully valued, we would expect that on average

$$\Delta P = aD + bFC = 1 \times 1.00 + 1 \times 0.43 = 1.43$$

since the residual terms average out to zero in a large sample.

In some papers, all terms in the regression equation are divided by the amount of the dividend, D, so that price changes are expressed in proportional rather than absolute terms. In other papers, adjustments are made for the movement in the aggregate stock market on the ex-date. However, the basic form of the relationship is as indicated above.

10.3. Bruckner, Dews and White (1994)

Dividend drop-off methodology

In an unpublished industry paper, Bruckner, Dews, and White (1994), for example, argue that the dividend drop-off is informative about the package of the cash dividend plus the franking credit.

[12] OLS regression is a statistical technique that is used to determine the relationship between a set of explanatory variables and a dependent variable. In particular, the dependent variable is modeled as a linear combination of the explanatory variables. For example, two explanatory variables (X_1 and X_2) might be used to explain the variation in a dependent variable Y. OLS regression then models Y as a linear combination of the explanatory variables: $Y=aX_1+bX_2+\varepsilon$. In this model, a and b are model parameters to be estimated (to tell us the degree to which Y depends on each of the explanatory variables) and ε is a residual to reflect the fact that the simple regression model will not perfectly explain all of the variation in Y.

They regress the drop-off (standardized by share price) on the standardized dividend and standardized face value of the franking credit.

Reported results

Their results suggest that distributed franking credits were worth 33.5 cents per dollar of face value in 1987-1990, but 68.5 cents per dollar of face value in 1990-1993. Note that these are estimates of the value of distributed franking credits for the average company in their sample.

Irrelevance of these results

There are at least four reasons why these results should receive little weight in any cost of capital calculation.

The confidence intervals are so wide as to render the results effectively uninterpretable.

Since only two observations are available each year for each company, the results are computed cross-sectionally over all companies. This produces an uninterpretable result. Gamma depends on the nature of the shareholder base and the rate at which the company distributes franking credits. Since both differ across companies, we would expect gamma to differ across companies. This methodology produces only a single point estimate – an unevenly-weighted conglomerate across all companies in the sample.

The data is based solely on the change in the stock price around the ex-dividend date. If trading around this period is dominated by short-term arbitrage traders, this technique will (at best) recover the value of franking credits for this special class of investors. For purposes of calculating the cost of capital, the value of imputation credits to longer-term investors (the providers of equity capital to the firm) is what is required.

The vast majority of dividends in the sample are fully franked and the corporate tax rate is approximately constant over the sample period. This means that the two right-hand side explanatory variables are effectively multiples of each other, which induces the well-known statistical problem of multicollinearity. The implication of multicollinearity is that the value of dividends and franking credits cannot be separately identified. I explain this in more detail below.

Multicollinearity

If dividends are fully franked and the corporate tax rate is 30%, every one dollar dividend has a 43 cent franking credit attached. This implies that $FC = 0.43 \times D$ so the regression equation in 14.2 becomes:

$$\Delta P = aD + b(0.43 \times D) + \varepsilon .$$

This means that the value of dividends (a) and franking credits (b) are not separately identifiable because the two right-hand side variables are linear transforms of each other – one is simply 0.43 times the other. There is an infinite number of combinations of a and b that produce exactly the same result.

Suppose, for example, that dividends and franking credits are estimated to be worth 80% and 50% of face value respectively. This implies that on average, the stock price falls by about one dollar whenever the firm pays a one dollar dividend and a 43 cent franking credit:

$$\begin{aligned} E[\Delta P] &= aD + bFC \\ &= 0.8 \times 1.00 + 0.5 \times 0.43 = 1.015. \end{aligned}$$

where $E[\Delta P]$ represents the expected change in stock price, on average.

Now note that we obtain exactly the same result for any combination of parameters a and b such that $a = 1.015 - 0.43 \times b$. For example, we could set $a = 1.015$ and $b = 0$ (so dividends are essentially fully valued and franking credits are not valued at all) to obtain:

$$\begin{aligned} E[\Delta P] &= aD + bFC \\ &= 1.015 \times 1.00 + 0.00 \times 0.43 = 1.015. \end{aligned}$$

Alternatively, we explain ex-day price changes just as well if we set $a = 0.585$ and $b = 1$ (so dividends are partially valued and franking credits are fully valued) to obtain:

$$\begin{aligned} E[\Delta P] &= aD + bFC \\ &= 0.585 \times 1.00 + 1.00 \times 0.43 = 1.015. \end{aligned}$$

That is, the fact that the two right-hand side variables (dividends and franking credits) are effectively multiples of each other means that one of the basic assumptions underlying OLS regression is violated and the parameter estimates (a and b) are not separately identified. There are many combinations of a and b that do equally well in fitting ex-day stock price changes. The separate estimates of a and b cannot be relied upon whatsoever.

This multicollinearity can still be a concern even if there are changes in the corporate tax rate and not all of the dividends in the sample are fully franked. If most of the dividends are fully franked and changes in the tax rate are small, the two right-hand side variables will be highly correlated. This violates one of the key assumptions that are required for statistical inference in OLS regression analysis.

When multicollinearity is present, parameter estimates tend to vary dramatically in different subsamples of the data and the relative values of parameters can differ dramatically from

expectations. In Bruckner, Dews and White (1994) the value of franking credits more than doubles from one period to the next. In their second sub-period, the value of cash dividends is found to be *lower* than the value of imputation credits. Given that franking credits can only be used by a subset of investors and receive the same tax treatment as dividends, it is hard to image any plausible scenario in which this is possible.

Conclusions

The results of Bruckner, Dews and White (1994) are so badly contaminated by the well-known statistical problem of multicollinearity that they are nonsensical and uninterpretable and must be rejected.

10.4. Hathaway and Officer (2002)

Dividend drop-off methodology

Hathaway and Officer (2002) perform a dividend drop-off analysis similar to Bruckner, Dews and White (1994).

Clear signs of multicollinearity

The effect of multicollinearity between the dividend amount and franking credits is also apparent in this paper. Hathaway and Officer separate their sample by size and sector, and report the following values for dividends and franking credits.

Table 4: Estimates of the value of dividends and franking credits from Hathaway and Officer (2002)

Sector	Small		Large		All	
	Div	FC	Div	FC	Div	FC
Industrials	0.86	0.17	0.80	0.49	0.83	0.30
Resources	0.55	0.70	0.72	0.44	0.61	0.61
All	0.71	0.41	0.77	0.49	0.74	0.44

Source: Hathaway and Officer (2002)

The results summarized in Table 4 suggest that a dollar of cash dividends is worth 55 cents if received from a small resources company, but 86 cents if received from a small industrial company. However, it is difficult to fathom any reason why investors would value franking credits so much more highly if distributed by resource firms than by industrial firms.

These results also suggest that investors in small resources companies value franking credits more than cash dividends. Again, it is difficult to fathom any scenario in which investors would value

franking credits more than cash since franking credits provide the opportunity for some investors to save tax in the future while cash dividends provide an immediate benefit to all shareholders.

These perverse results are, of course, driven by multicollinearity between dividends and franking credits. Since franking credits are essentially a multiple of dividends, it is very difficult to separately value these two components.

Consistent valuation of the package of dividend plus capital gain

It is, however, possible to robustly value the sum of dividends and franking credits. For example, the majority of observations in the Hathaway-Officer sample occur under a 39 percent corporate tax rate. Thus a $1 dividend is most commonly associated with a (0.39/1 – 0.39) = 64 cent franking credit. The top left cell of Table 4 suggests that a $1 dividend is worth 86 cents and that a 64 cent franking credit is worth 0.17×0.64=0.11. This implies that the package of a $1 dividend and the associated franking credit is worth 0.86+0.11=0.97. The value of the package of dividends and franking credits (relative to the dividend) can be re-calculated for all of the sub-samples in Hathaway and Officer as follows:

Table 5: Estimates of the value of dividends and franking credits from Hathaway and Officer (2002)

Sector	Small	Large	All
Industrials	0.97	1.11	1.02
Resources	1.00	1.00	1.00
All	0.97	1.08	1.02

Source: Hathaway and Officer (2002), SFGC analysis

These re-stated results suggest that a one dollar dividend and the accompanying franking credit are associated with a drop of around one dollar in the stock price. This is remarkably consistent across company size and sector. That is, the value of a one dollar dividend and the attached franking credit is worth a total value of (close to) one dollar in every sub-sample.

Of course, multicollinearity prevents us from being able to split this one dollar value between dividends and franking credits. This result is consistent with cash dividends being fully valued and franking credits being worthless, in the hands of the marginal investor. Moreover, there is a wealth of evidence from U.S. markets to suggest that cash dividends are fully valued[13].

However, a number of alternative interpretations exist. The value of the package of dividend and franking credit is also worth one dollar if dividends and franking credits are valued at 55% and 70% respectively (0.55×1.0 + 0.70×0.64 = 1.00). The same applies if one dollar if dividends and franking credits are valued at 72% and 44% respectively (0.72×1.0 + 0.44×0.64 = 1.00) or if both dividends

[13] See Barone-Adesi and Whaley (1986), Michaely (1991) and Boyd, J. and R. Jagannathan (1994).

and franking credits are valued at 61% of face value (0.61×1.0 + 0.61×0.64 = 1.00). There is any number of combinations that produce a value of $1 for the package of dividend and franking credits and the available statistical techniques cannot determine which is correct. Whereas we can reliably estimate the value of the package, it is impossible to separate this value into its component pieces.

In essence, these various interpretations are observationally equivalent and it is impossible to determine which is right, because the presence of multicollinearity makes inference of individual coefficients impossible. We can, however, say that one is consistent with commercial common sense and with numerous research papers on the value of cash dividends, and the others are not.

10.5. Bellamy and Gray (2004)

Dividend drop-off methodology

In a recent paper, Bellamy and Gray (2004) examine methodological and statistical issues relevant to the dividend drop-off methodology. The remainder of this section summarizes the key findings.

More robust statistical methodology

The precise econometric methodology that is employed to analyze stock price changes around ex-dividend dates can have a significant impact on results. The simple technique that has been used in past papers is not as robust as a generalized least squares (GLS) technique that places more weight on more informative observations. A standard OLS regression (see Section 14.2) gives equal weight to each observation in the sample. In some cases, a particular observation tells us little about the value of dividends and franking credits. Consider a company that pays a one cent dividend on a $25 stock. We would expect the stock price to decline by around one cent if dividends are valued but franking credits are not, or by around 1.43 cents if both dividends and franking credits are fully valued. However, it is not at all unusual for the prices of individual stocks to change by 1% on a daily basis for reasons completely unrelated to the dividend. That is, non-dividend related stock price movements can be 20 times greater than the dividend itself. Observing the ex-date stock price change for this stock tells us little about the value of dividends and franking credits. Alternatively, if a stock is more stable (daily volatility in its price is low) and has a high dividend yield, it is much more likely that the ex-date price change is associated with the dividend payment. The GLS technique, therefore, gives more weight to stocks that exhibit low volatility and have high dividend yields – it gives more weight to more informative observations. Bellamy and Gray also adjust for market returns on the ex-dividend day. If the stock goes ex-dividend on a day on which the broad market rose sharply, its price may increase. Therefore, it is necessary to measure the ex-date stock price change after adjusting for the movement in the broad market on that day.

Multicollinearity remains a problem

Even using this more robust technique, multicollinearity between dividends and franking credits remains a problem. It is difficult to separately estimate the value of each component. However, a single value for the package of dividends and franking credits can be reliably estimated.

When a $1 dividend and a 43c franking credit (at a corporate tax rate of 30 percent) are paid, stock prices fall, on average, by $1. This is consistent with dividends being fully valued and franking credits being worthless to the price-setting investor.

Other empirical work suggests that cash dividends are fully valued in other markets. Boyd and Jagannathan (1994), for example, conclude that "a one-for-one price drop has been a good rule of thumb for the last several decades".

Analysis of different tax regimes

Bellamy and Gray (2004) also show that when tax rates change, the amount of franking credits changes (43c at 30 percent, 51c at 34 percent, and 56c at 36 percent) but the value of the package of dividends plus franking credits does not. In the first regime a fully-franked dividend consists of $1 of cash and a 43 cent franking credit. This package is valued by the market at $1. In the second regime a fully-franked dividend consists of $1 of cash and a 51 cent franking credit. This package is valued by the market at $1. In the third regime a fully-franked dividend consists of $1 of cash and a 56 cent franking credit. This package is valued by the market at $1. This is inconsistent with franking credits being valued by the marginal price-setting investor. It is, however, straightforwardly consistent with the notion that a $1 cash dividend is worth $1.

A model constrained to fix the value of franking credits to zero performs as well as an unconstrained model

A constrained model in which dividends are fully valued and franking credits are not valued explains the data as well as any unconstrained model. That is, the same data that has been used as the basis for setting gamma equal to 0.5 cannot statistically reject the hypothesis that franking credits are worthless to the marginal price-setting investor.

Results sensitive to a few influential observations

Bellamy and Gray (2004) also show that even employing the simple empirical technique of past papers and in spite of multicollinearity issues, the estimate of the value of franking credits would be zero, if 30 of over 6,000 observations were removed. That is, even if multicollinearity issues were ignored, the apparent value of franking credits would disappear entirely if 30 influential observations were removed. That is, the result that franking credits have some value is not only statistically unreliable, it stems from a handful of outliers. If these few observations (less than half of one percent of the sample) were removed, the result disappears entirely in favor of an estimate of zero for the value of franking credits.

Conclusion

Bellamy and Gray (2004) conclude by noting that "the available data cannot reject the hypothesis that franking credits are not valued by the price-setting investor".

10.6. Brown and Clarke (1993)

Brown and Clarke (1993) use a dividend drop-off methodology similar to that of Hathaway and Officer (2002). They examine two sub-periods and report confidence intervals for the estimated value of distributed franking credits for each. The variability of share prices (for reasons completely unrelated to the payment of dividends) causes the sampling error of the estimates to be considerable. The 95% confidence interval for the value of distributed franking credits is -12.44% to 24.52% between 1987 and 1989 and 38.46% to 103.68% between 1989 and 1991.

They suggest a possible explanation for the large difference in the results between the two periods: "The marked increase in the value of the franking variable in the later period might reflect a greater ability of the market, on average, to access the value of tax credits." An alternate explanation is an increase in multicollinearity in the second period as tax rates are effectively constant and fully franked dividends dominate the sample.

It should also be noted that the entire sample period is prior to the 1997 introduction of the 45-day rule and therefore are not relevant for current purposes anyway.

10.7. Conclusion

The available data and the dividend drop-off methodology are unable to reject the hypothesis that franking credits are not valued by the marginal price-setting investor in the average Australian company. A coherent and consistent interpretation of the dividend drop-off results is that cash dividends are fully valued and franking credits are worthless in the hands of the marginal investor trading around dividend ex-dates. This implies that franking credits do not affect the cost of capital of the average Australian firm.

11. Using simultaneous prices of traded securities to estimate the value of franking credits

11.1. Overview of methodology

The third type of research methodology that has been used to estimate the value of franking credits is to compare simultaneous prices of different securities, one of which entitles the holder to dividends and franking credits, and one that does not.

11.2. Cannavan, Finn and Gray (2004)

The leading example of this methodology is Cannavan, Finn, and Gray (2004). This paper compares simultaneous prices of shares and futures contracts on those shares. If an investor buys the shares themselves, they are entitled to receive dividends and franking credits. The futures contract does not entitle the holder to any dividends or franking credits. Thus, the prices of these two securities will differ according to the value of dividends and franking credits.

Cannavan, Finn, and Gray report (p.192) that the difference between stock and futures prices implies that (i) cash dividends are fully valued, consistent with the range of U.S. evidence on this point; (ii) franking credits were valued at up to 50% of their face value prior to the 1997 introduction of the 45-day rule; and (iii) franking credits are not valued by the price-setting investor (and therefore do not affect the corporate cost of capital) after 1997. The authors conclude (p. 193) that "in a small open economy such as Australia, the company's cost of capital is not affected by the introduction of a dividend imputation system. The company must produce the same return for the marginal stockholder whether an imputation system exists or not if the marginal stockholder receives no value from imputation tax credits."

One limiting factor for this study is that futures contracts only trade on very large companies, so the result shouldn't be extrapolated to medium and small companies. Another consideration is that futures market participants might not be representative of the providers of long-term equity capital. Recall that we made a similar point about dividend drop-off studies—ex-date prices might be affected by tax-motivated trading that is not representative of providers of long-term equity.

The biggest advantage of the stock/futures methodology is that we have an observation every time there is a simultaneous trade of the stock and futures. This means that the results are based on thousands of observations each year for each company, rather than the two observations per year that are available with the dividend drop-off method. Also, many of these simultaneous trades occur more than a week before the dividend ex-date, so they are unlikely to be affected by short-term tax-motivated trading around the ex-dividend date.

11.3. Twite and Wood (2002)

Twite and Wood (2002) also examine individual share futures contracts using a similar methodology. Their sample period is small, and ends in 1995 – well before the introduction of the 45-day rule. Their results are consistent with those of Cannavan, Finn, and Gray (2004) in that they report a value of distributed franking credits of up to half the face value prior to 1997.

11.4. Chu and Partington (2001)

Another paper that attempts to infer the value of imputation credits from the prices of traded securities is Chu and Partington (2001). This paper compares the prices of shares with different dividend entitlements consequent to rights issues. The "old" shares are entitled to receive the dividend but the "new" shares are not.

The authors conclude that the value of imputation credits is higher than that reported by Cannavan, Finn, and Gray (2004). However, there are several reasons why these results should not be given significant weight:

The sample of Chu and Partington (2001) consists of only 26 rights issues over a 10-year period, of which 16 were banking or investment stocks.

The authors conclude that the implied value of the grossed-up dividend is 150 percent of the cash dividend, which means that imputation credits are almost fully valued. But the standard error is 97 percent, so this estimate is not statistically different from either 0 or 1. That is, we cannot reject the hypothesis that imputation credits are worthless, or even that cash dividends are worthless. Although the mean is 150 percent, the range is from –375 to 951 percent. Such imprecise estimates based on such a small sample should be interpreted with great caution.

The rights are in fixed supply and represent a small fraction of the total shares outstanding in any of the sample companies. This provides a mechanism for a type of dividend streaming – holders of the old shares received a fully-franked dividend and holders of the new shares receive no dividend and consequently the stock price is reduced. The result is likely to be a separation of ownership so that those who value dividends and imputation credits greatest will congregate in the old shares and those who cannot benefit from imputation credits will congregate in the new shares. This effect is likely to drive a greater difference between the two classes as the characteristics of the shareholder base of the old shares is temporarily altered by the ability to stream dividends.

In a similar vein, Chu, Lonergan, Partington, and Stewart (2001) examine a small sample of rights issues and make similar conclusions.

11.5. Walker and Partington (1999)

Walker and Partington (1999) examine a special market available at the ASX that allows investors to simultaneously trade shares with and without a dividend. Volumes traded through these special side markets are extremely small and the market exists only for a very small number of shares.

While the authors report that the value of franked dividends exceeds the face value of the dividend itself, on average, there is extremely wide variation in the estimates for different ex-dividend events. This is curious given that the shares trade with and without the dividend simultaneously. Such noise is expected in dividend drop-off studies as there are other reasons (new information) for prices to change between the cum- and ex-dividend dates. In this market, however, there is no reason other

than the dividend for the prices of the two securities to differ, yet there is wide variation in the implied values of dividends and franking credits. This seems to suggest that the trades may be structured to produce tax benefits between related parties and may not reflect competitive market forces.

12. Summary of empirical evidence

12.1. Aggregate tax statistics

Aggregate tax statistics indicate that only half of all franking credits that are created are ever redeemed, and that only 60% of credits that are actually distributed get redeemed. This implies that a very significant proportion of credits are distributed to investors who have no use for them. Since the marginal investor has the lowest valuation of all who end up buying the stock, it is likely that the marginal investor falls among this large group who are unable to use franking credits.

12.2. Ex-date dividend drop-offs

Dividend drop-off studies indicate that stock prices fall on the ex-date by about the size of the dividend, on average. If we believe that the cash dividend is fully valued, as it is in other markets, the implication is that franking credits are worthless to the marginal investor around the ex-dividend date.

12.3. Simultaneous prices of traded securities

When simultaneous prices of shares and futures contracts are compared, the implicit value of franking credits is close to zero.

12.4. Conclusion

All of these studies can be interpreted in a manner that is consistent with the marginal investor being a non-resident who is unable to use franking credits. This is particularly likely for large companies, and after the 45-day rule in 1997. This is also consistent with common sense. Australia is a small, open economy that is a net importer of capital. Australia needs foreign investment to finance all of its investment opportunities. So what sort of return will investors require? Since Australia is a small open economy that imports capital, required returns and cost of capital will be set in global capital markets. This won't be affected by Australian dividend imputation tax laws that affect only resident investors who collectively account for around 2% of all global capital.

In summary, the most comprehensive and persuasive empirical evidence suggests that for a number of large Australian companies with significant foreign ownership, imputation credits are effectively worthless to the marginal investor, at least since the introduction of the 45-day holding period rule made it more difficult to transfer these credits. In light of the totality of the conceptual arguments made above and the most recently available empirical evidence, it is difficult to justify using a value of gamma above zero.

Table 6: Summary of attributes of empirical research on the value of distributed franking credits

Paper	Data Post 1997	Method allows for franking credits to have different values in different types of firm.	Large number of observations	Published in Tier 1 Journal
Hathaway and Officer (2002)	No	No	Yes	No
Brown and Clarke (1993)	No	No	Yes	No
Bruckner, Dews, and White (1994)	No	No	No	No
Walker and Partington (1999)	No	No	No	No
Twite and Wood (2002)	No	Yes	No	No
Cannavan, Finn, and Gray (2004)	Yes	Yes	Yes	Yes
Chu and Partington (2001)	Yes	No	No	No
Chu, Lonergan, Partington, and Stewart (2001)	Yes	No	No	No
Bellamy and Gray (2004)	Yes	No	Yes	No

13. What value is assumed for franking credits in Australian corporate practice?

13.1. Surveys of expert valuation reports

The first survey of Australian corporate practice in relation to the valuation of franking credits is that of Lonergan (2001), who surveys expert valuation reports prepared in relation to takeovers.[14] Lonergan reports that of 122 reports reviewed only 48 (or 39%) provided support showing how they had arrived at the WACC used in their reports. Of these, 42 (or 88%) used the CAPM to compute the cost of equity capital and made no adjustment for dividend imputation. Only six reports made any sort of adjustment to reflect dividend imputation. Furthermore, of the few reports that did make an adjustment for the value of franking credits, for all but one the ultimate effect on the value of the company was negligible or zero. Importantly, nearly half of Lonergan's sample is from after the 1997 introduction of the 45-day rule that was introduced to prevent trading in franking credits, yet only one expert report from this period made any mention of the value of franking credits.

Lonergan (2001) also provides a list of conceptual grounds cited in reports for not adjusting for imputation credits, including:

- The value of franking credits is dependent on the tax position of each individual shareholder;
- There is no evidence that acquirers of businesses will pay additional value for surplus franking credits;
- There is little evidence that the value effects of dividend imputation are being included in valuations being undertaken by companies and investors or the broader market;
- Foreign shareholders are the marginal price-setters of the Australian market yet many such shareholders cannot avail themselves of the benefit of franking credits; and
- There is a lack of certainty about future dividend policies, the timing of taxation and dividend payments and consequently about franking credits.

13.2. Updated analysis

An updated analysis of expert valuation reports has recently been conducted as part of the Victorian Essential Service Commission's Electricity Distribution Price Review. A submission by KPMG, on behalf of the regulated distribution businesses[15], examines a sample of 118 independent expert reports on takeovers occurring between 1 January 2000 and 30 June 2005.

[14] See Lonergan, W., (2001), "The disappearing returns: Why imputation has not reduced the cost of capital," JASSA, Autumn, Issue 1, 1-17, especially Table 5 Page 13.

[15] KPMG. (August 2005). The Victorian Electricity Distribution Businesses Cost of Capital - Market practice in relation to imputation credits Victorian Electricity Distribution Price Review 2006-10.

KPMG conclude that of the reports that adopt the CAPM for estimating the cost of equity, "none made any adjustment for the value of imputation credits.[16]" They further conclude that, "based on these results, KPMG considers that the standard market practice in relation to estimating the cost of capital in Australia, as evidenced by independent expert reports relating to takeovers, is to assume a zero value for imputation credits.[17]"

13.3. Survey of corporate practice

Truong, Partington and Peat (2005)[18] survey 356 listed Australian firms about various corporate finance practices. All firms were included in the All Ordinaries Index in August 2004, were Australian, and were not in the finance sector. On the question of whether the company makes an adjustment for imputation credits in project evaluation, 83% indicated that they made no adjustment whatsoever--effectively setting gamma to zero. Then 13% of firms use a value of 0.5 or less, and 4% of firms use a value above 0.5[19].

The authors conclude that, "in general the companies surveyed have ignored the impact of imputation tax credits in the capital budgeting process. The majority of respondent companies said they did not adjust for imputation credits when estimating beta, or the market risk premium, or when they carry out project evaluations.[20]" Moreover, for those companies who did not make any adjustments, various reasons were given, the most frequently cited reasons were either, 'it is difficult to set an appropriate tax credit value for all investors' or ' it should have a very small impact on the evaluation result.[21]' Few firms indicated that, "the value of imputation credits was zero" for all investors. Thus, Australian corporate practice is entirely consistent with the view that franking credits are certainly of value to some investors (i.e., residents) but that they do not affect the corporate cost of capital.

13.4. Changing regulatory precedent

Historically, Australian regulatory precedent has been to set gamma to 0.5. However, two Australian regulators have recently proposed to use a range rather than a point estimate for this parameter. In both cases, the range extends to encompass lower values of gamma, such that the mid-point of the range is below 0.5. In particular, IPART has used a range of 0.3 – 0.5[22] and the ERA has used a range of 0.3 – 0.6[23]

[16] ibid., p. 16.
[17] ibid., p. 17.
[18] Truong, G., Partington, G. & Peat, M. (2005). Cost of Capital Estimation & Capital Budgeting Practice in Australia. Working Paper, University of Sydney & Conference Proceedings, AFAANZ 2005.
[19] ibid., Table 10, p. 27.
[20] ibid., pp. 12-13.
[21] ibid., p. 13.
[22] IPART, (2005), "Revised Access Arrangement for AGL Gas Networks," www.ipart.nsw.gov.au, p. 104.
[23] ERA, (2005), "Final Decision on the Proposed Access Arrangement for the Goldfields Gas Pipeline," www.era.wa.gov.au, p. 221.

Moreover, in its recent Electricity Distribution Draft Decision[24], the ESC has indicated that it may be appropriate to consider setting gamma to zero, consistent with market practice. The ESC has stated[25]:

> "The Commission does not consider that the current regulatory treatment of the value of franking credits necessarily can be considered the most appropriate. The identity referred to as gamma is not well defined in theory and probably more poorly estimated, and it is concerned that making explicit adjustments for the value of imputation credits may no longer reflect standard practice amongst finance practitioners, as the Commission accepted when it first considered the matter in 1998.
>
> The use of an approach to deriving a regulatory cost of capital that are based upon poorly defined and estimated parameters that is also not consistent with the standard practice of finance practitioners – and that also can have a material impact on the level of price controls – would not promote a stable, replicable and predictable regulatory regime."

The ESC concludes that, "the Commission intends to consider the issue of treatment of franking credits further prior to the release of its final decision."[26]

Consequently, Australian regulatory precedent is no longer firmly wedded to the regulatory precedent of setting gamma to 0.5. In recent times, a number of Australian regulators have adopted, or are considering the adoption of, values below 0.5. This is consistent with market practice and the most recent empirical developments. It also mitigates the mathematical inconsistency among parameters, where standard values for other parameters together with setting gamma to 0.5 requires unreasonably high dividend yields.

[24] Essential Services Commission. (June 2005). Electricity Distribution Price Review 2006-10 Draft Decision.
[25] ibid., pp. 342-3.
[26] ibid., p. 343.

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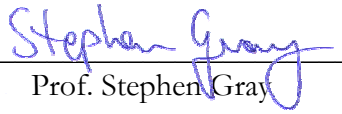

Prof. Stephen Gray

Tuesday, 4 October 2005
Date