Investment, the Corporate Tax Rate, and the Pricing of Franking Credits

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Abstract

In this paper I apply a new single-pass methodology for assessing systematic risk which indicates that securities which pay franking credits in Australia face far less systematic risk than do stocks that never pay franking credits because they represent overseas earnings. This reduction in systematic risk implies that, on an annual basis, franking credits are close to being fully priced. My findings might seem impossible since they appear to violate '*the law of one price'*, with Australian and non-imputation eligible foreign investors receiving differential returns on identical stocks. However, this is not the case. The Australian cost of capital corresponds to the world tax-free supply price and is thus below the return on unfranked dividends from overseas earnings which are effectively burdened by Australia's corporate tax rate. This is because, while overseas earnings do not directly pay Australian corporate tax and thus do not qualify for franking credits, additional personal tax equal in magnitude to the corporate tax rate is payable on these unfranked dividends making them tax disadvantaged.

The most plausible explanation for my findings is that foreign traders harvest imputation credits to eligible Australians. An efficient equilibrium is reached in which the marginal foreign investor pays little or no Australian corporate tax. This implies that investment in Australia is already close to its globally-efficient untaxed level with all investors, both local and foreign, receiving the tax-free foreign supply price of capital. Hence, the '*law of one price'* prevails, after all. Thus, even if the Australian corporate tax rate is reduced by 17% as proposed, from 30% to 25%, there should be negligible new foreign investment, but more Australians should invest offshore due to the lower personal tax impost as the benefits of franking credits are whittled away. Consequently, the tax cut plan would seem to be largely redundant with no billions of dollars' worth of desirable foreign investments left lying on the table.

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In the 2016–17 Budget, the Federal Government announced its Enterprise Tax Plan to progressively reduce the corporate tax rate from 30 per cent to 25 per cent to encourage more investment in the corporate sector at a cost to revenue of $65.4 billion over the next 10 years. This sizeable cost to revenue comes only from foreign investors as Australian investors effectively pay no corporate tax and, for existing foreign investors, it comes as a windfall gain.

I argue that it cannot meaningly increase foreign investment because foreign investment is already close to its globally-efficient level, free of the baneful influence of Australia's corporate tax rate. This follows from my finding that imputation credits are almost fully priced, that is, reduce the required annual return on investment by almost the 'grossing-up' cost of Australia's headline tax rate of 30%. Raising the marginal personal tax rate on Australian investors, essentially relying on bracket creep, to make up for lost revenue is likely to induce sizeable welfare losses and significantly discourage local investment by Australians. It will do little or nothing to encourage foreign investment since it is already at its efficient level, while it should encourage more off-shore investment by Australians as the benefits of the franking credit system are partially unwound.

In the 2017-2018 Budget, the Government argues that a lower corporate tax rate "promotes business investment by raising the return from investing in Australia", and that it will "raise productivity and real wages and permanently expand the economy by just over one per cent in the long term". Treasury modelling claims that the five-percentage point reduction from 30%, or about 17%, in the corporate tax rate which has a direct cost to revenue of around $13 (bn) annually[1] once the tax cuts are in place will so increase economic activity in Australia that there will be additional tax revenue generated of 45 cents in the dollar for each dollar of revenue loss (Henty *et al.*, 2017).

Parliament approved a reduction in the tax rate for small business enterprises to 27.5% for the 2016–17 income year (Treasury Laws Amendment (Enterprise Tax Plan) Act (2017)), but the remainder of the tax reduction policy (No. 2) has so far not passed the Senate. Since small businesses are largely Australian owned and unlisted, the reduction in their corporate tax

[1] The current revenue is about $77 (bn) annually, and if investment is unresponsive to tax cuts as I believe, then this is the consequence of a 17% tax cut. This figure ignores any offsetting reduction in the value of utilised franking credits.

should make no difference, nor, in theory, any significant cost to revenue[2], as corporate tax is simply a prepayment of personal tax for most of these investors.

The Treasury is also concerned that the now successful attempt by President Donald Trump to reduce the U.S. corporate tax rate from 35% to 21% (signed into law on December 22, 2017) might set off an investment boom in the U.S. and competitive reductions in corporate tax rates globally (see Henty *et al.*, 2017, and *The Australian*, November 20, 2017). This might put downward pressure on Australia's 30% headline corporate tax rate payable only by foreign investors, but our headline rate is not comparable with the U.S. since these investors, unlike Australia's, are double-taxed on corporate dividends.

A sizeable number of computable general equilibrium (GE) models of the proposed tax cuts have been produced. Rimmer *et al*. (2014), Cao *et al*. (2015), and Kouparitsas, Prihardini and Beames (2016), for the Australian Treasury, Murphy (2016), Dixon and Nassios (2016), Tran and Wende (2017), and Murphy (2018), model the incidence of Australia's corporate tax based on the assumption that price of corporate risk capital in Australia is determined by grossing up the assumed perfectly elastic supply of foreign risk capital by one minus the Australian corporate tax rate, currently yielding a huge margin of about 43% on the world supply price.

Putting aside the question of economic rents, which is a concern of Dixon and Nassios (2016), foreigners do not bear the incidence of Australia's corporate tax in these models due to an assumed perfectly elastic supply. If this is so, it would seem peculiar that Australia would attempt to tax foreigners at all since all we succeed in doing is restricting the supply and pushing up the domestic return artificially above the world tax-free cost of capital. This is the logic behind reducing the inefficient tax wedge that is especially the concern of Murphy (2018) who is the leading advocate of the proposed corporate tax cuts. Of course, a tax rate set to zero would entirely remove the wedge.

Gordon (1986) showed that if capital were perfectly mobile internationally then, in a small open economy such as Australia's, the incidence of the corporation tax falls entirely on labour income. Hence rather than create an additional distortion, the optimal tax on capital is zero, while it more efficient to tax labour income directly. I show that the way Australia's tax

[2] In reality, there is likely to be a significant cost to revenue due to the widening of the gap between the high personal tax rates borne by small business and the lowered corporate rate. Unless closely monitored, more labour income will be disguised as corporate income and paid out to small business as imputation credits as a cost to revenue.

imputation scheme actually operates already achieves the goal of a zero, or close to zero, marginal tax rate on capital.

Bond, Devereux, and Klemm (2007) investigate the effect of removing an imputation-related concession to U.K. pension funds with the value of a cash dividend paid by a U.K. firm to a pension fund falling by 20% while leaving in place the existing tax relationships for both U.K. and foreign taxpayers. Consistent with my model, the authors found that it had no effect on U.K. asset prices since it did not affect the totality of corporate tax arrangements, the entire tax system inclusive of both domestic and foreign investors.

Since I find that imputation credits are essentially fully priced, this rules out the existence of a pre-existing inefficient tax wedge which is the starting point for all the plethora of GE models. There are two possible mechanisms to explain my findings:

(i) There would seem to be few limitations on many imputation benefit recipients borrowing at the riskless world rate or with margin loans to purchase Australian equity.[3] Sufficient inflows of debt capital converted to equity could drive the marginal cost of capital down to the low tax-free world supply price.

(ii) Foreigners can exempt themselves from paying Australian corporate tax simply by recycling their otherwise valueless imputation credits to Australians eligible for imputation benefits, thus ensuring that the marginal investment in Australia is sufficient to drive the marginal product of capital down to the global tax-free supply price.

The first explanation is partial at best because foreigners do at least appear to make some investments and large-scale margin lending is problematic. Hence, I am left with the second and most plausible explanation. Both foreign and local investors in franking-credit stocks receive only close to the competitive tax-free global supply price of capital which has not been fully grossed-up by the Australian headline tax rate.

This is because foreign traders would appear to harvest just sufficient imputation credits to Australian imputation-eligible investors to eradicate the Australian corporate tax liability on their marginal investment. They can do this very simply by selling their imputation-rich shares 47 days prior to the ex-dividend date twice a year and repurchasing at the lower price

[3]In correspondence, Geoffrey Warren points out that there are some limitations on borrowing by superannuation funds. Funds are likely to have their own borrowing constraints. Moreover, any leverage needs to be housed in an external vehicle and be of the ‘non-recourse’ variety.

once the share is trading ex-dividend so as to generate a capital gain.[4] The '45 day rule', as it is known, was introduced in 1997 as a tax avoidance measure but it is virtually costless to evade or avoid by trading around the 47-day mark or earlier. Assuming that the cum-dividend stock price appreciates by approximately the same amount each day as the ex-dividend date approaches every six months, then the 45-day rule reduces the value of the tax harvest by about 25%, relative to the unfettered gain prior to 1997. Since Treasury believed that harvesting was profitable prior to their rule introduction and the costs of harvesting are exceedingly low for large portfolios, the introduction of the rule is unlikely to have altered behaviour by very much.

If franking credits are fully priced, then the return on franked Australian stocks is below the return on unfranked dividends paid for out of foreign earnings by the grossing-up margin of about 43%. This is because franked dividends are tax advantaged by this amount. Hence, unfranked dividends earned by Australian's investing off-shore have a required return which is 43% higher. No wonder most Australian firms prefer to invest domestically, apart from the fact that with only a few exceptions[5], most Australian companies investing offshore fail. While some might term this as 'home bias' due to the full pricing of imputation credits, the return on domestic investment is set perfectly efficiently, while Australia's corporate tax discourages locally-based foreign investors.

Nor is it true, as maintained by Murphy (2018), that all investors regardless of their origin, local or foreign, receive the tax grossed-up foreign supply price of capital with imputation credits unpriced. Australians are cast as unfairly receiving the grossing-up margin on their domestic investments while themselves being exempt from corporate tax. If this were true, Australian firms and investors would be indifferent at the margin between foreign and domestic investment as all investors, foreign investors and domestically-located Australians investing overseas, are required to earn the world cost of capital plus the corporate tax mark-up in Murphy's scenario since these investors receive only unfranked dividends and are thus liable for additional personal tax at the rate of 30%. This would eliminate the very 'home bias' in investment that Murphy (2018, p.13) identifies: "Subsidising locally-sourced

[4] Under the holding period rule an Australian investor is required to hold the stock "at risk" for at least 45 days prior to the stock going ex-dividend, unless a small investor with a fully franked dividend of $11, 666 or less. Since U.S. pension funds are tax-free, tax-harvesting is likely to be a profitable activity for these entities.

[5] Out of perhaps hundreds of billions of dollars invested offshore, successes are few and far between. These include News Corporation, Commonwealth Serum Laboratories, Westfield, Macquarie Bank, and to some limited extent, BHP Billiton. Typical of the numerous failures is the recent attempt by Wesfarmers to roll-out its Bunnings home-improvement franchise in the U.K.

dividends, but not foreign-sourced dividends, exacerbates home country bias in the share portfolios held by residents". Since in the Murphy model, Australian investors receive the grossed-up foreign supply price of capital while not paying any corporate tax themselves, there can be no distortion at the margin in the Murphy model.

<< Insert Figure 1 about here >>

My franking credit equilibrium is shown in Figure 1. The foreign tax-free supply price of risk capital is shown as the perfectly elastic horizontal line, K_F^S, and the parallel grossed-up supply price is shown as $K_S^F/(1-T)$, where T represents the Australian corporate tax rate of 30%. The perfectly efficient Australian franking credit equilibrium occurs at $K_S^D + K_S^D$, where the downward-sloping Australian marginal product (demand) schedule cuts the horizontal tax-free foreign supply schedule. The upward supply schedule for domestic risk capital, K_S^D, cuts both the low tax-free foreign supply schedule (at the equilibrium level of domestic investment) and the higher parallel tax-inclusive foreign supply price (at the equilibrium level of overseas investment by Australians).

Since this overseas investment does not pay Australian corporate tax, it does not qualify for franking credit tax relief and thus pays additional personal tax given by 43% gross-up of the foreign supply price, $K_S^F/(1-T)$. It is the inability of these Australia-based overseas investors to claim credits on their unfranked dividends that generates the far higher required return on their investments identified by my regression results discussed below. In Murphy's (2018) assumed equilibrium, also shown in Figure 1, both local Australian overseas investors and foreign investors in Australia have the high cost of capital shown by the horizontal line, $K_S^F/(1-T)$, since franking credits are assumed to be unpriced with Australian investors exempted from corporate tax unfairly benefiting from the grossing-up tax impost. The vertical Murphy intercept on the capital investment axis is shown to the left of the efficient foreign investment supply.

An obvious but incorrect interpretation of my finding is that Australian investors earn the low world tax-free supply price while foreigners are burdened by the technical requirement that they are not legally entitled to claim imputation benefits themselves. Hence for foreigners, cost of capital is the tax grossed-up world supply price. There would be two margins, with low-cost domestic and high-cost foreign supply. If so, I could not explain why there is any foreign investment since it would be unable to compete with low-cost domestic investment.[6]

Hence the simplest explanation for my peculiar findings is not the failure of '*the law of one price'*. It is *not* true that foreigners receive the high grossed-up foreign supply price of capital and Australians the low tax-free global cost of capital. This conclusion is incorrect since the level of foreign sourced, and domestic for that matter, investment is already at the global first-best, since no Australian corporate tax burden falls on either type of marginal investment. Hence the proposed tax cuts are redundant unless the aim is to encourage Australian firms to invest more off-shore. This does not appear to be the case, and nor should it be as almost all Australian investment offshore has failed.

Dixon and Nassios (2016) provides a dynamic GE analysis of the supposed distortion due to foreign investment being burdened by Australian corporate taxation that takes account of investment lags with assumptions that differ from Murphy (2018). Despite a modest rise in Gross Domestic Product, many of their scenarios yield a very sizeable reduction in Gross National Income of $1,600 per capita ($38.4 billion in aggregate).[7]

The starting point for Murphy's (2018) modelling is Fuest and Huber's (2000) model, which, on the basis that the foreigner requires a tax grossed-up return and is the marginal investor, concludes that tax imputation is undesirable. To the contrary, imputation is desirable because it eliminates the inefficient tax grossing up of the required return. From this starting point, it is unsurprising that Murphy is the strongest advocate of the proposed tax cut. Murphy (2018, Tables 8 and 10) finds a long-run budget loss from the proposed tax rate reduction of $4.7 (bn). Moreover, if this gap were to be partially filled by bracket creep, real after-tax wages would rise by a miniscule 0.29% and the level of employment would fall, although not by much. However, what I do find surprising is that supposedly consumers are better off by approximately the sizeable amount of the budget deficit but if they work then on an after-tax basis they are hardly any better off. This seems inconsistent. Moreover, the simulated increase in foreign investment is very low (only 2.5%). Hence, the character of his findings are not really all that different to Dixon and Nassios (2016) despite different

[6] I thank Jonathan Pincus for raising this question.

[7] The Treasurer rejects this argument made by J.M. Dixon and J. Nassios (2016), claiming loss of tax revenue has been factored to the plan to return to surplus. Nonetheless, the loss in tax revenue needs to be offset by either higher taxes or lower expenditure unless the deficit is simply allowed to go on growing indefinitely. Since the Dixon and Nassios (2016) study was released, the estimated cost to revenue has greatly increased, further increasing their estimate of welfare loss.

modelling assumptions. The proposed tax cuts are exceedingly hard to justify, even on the basis of the most optimistic modelling assumptions.

This combination of a combination of higher taxes and lower employment is hardly an appealing combination, but I indicate a far worse outcome. Since the level of investment is already driven to the globally efficient level by the foreign investor's ability to harvest imputation credits, no amount of tax cuts would be able to facilitate more portfolio investment but the effects on direct investment may be more problematic.[8]

In this paper, I simulate the cost of capital for franking and non-franking firms using the Capital Asset Pricing Model (CAPM) to show that the annual cost of capital is far higher for Australian non-franking firms that invest off-shore, pay no company tax in Australia, and are thus not eligible for franking credit offsets on their dividend distributions which are then fully taxed at the investor's personal tax rate. These firms are required to earn the equivalent of the world's tax-free cost of capital grossed-up for the impost of Australia's company tax when dividends are repatriated back to Australians since these dividends must compete with franked dividends which receive the franking rebate.

Hence, even before the proposed corporate tax reductions for foreign investors, the cost of capital for both foreign and eligible domestic investors is well below the tax grossed-up world cost of capital that remains the benchmark for Australian's investing offshore and not eligible for franking credit tax relief.

Since my data and the CAPM model are very little different to a conventional study finding no pricing of franking credits (Lajbcygier and Wheatley, 2012), why the sizeable discrepancy? Such conventional studies suffer two major drawbacks: 1) They implicitly assume that there is no relationship between the systematic risk borne by investors and tax status – franking, i.e., domestic, versus non-franking, i.e., overseas investments by Australians, and 2), one need not be concerned by the estimation efficiency loss from effectively discarding 92% of the observations to focus on just the stale annual observations of the dividend and imputation credit yield that are updated each month.

[8] Foreign direct investment may be more amenable to corporate taxation than foreign portfolio investment because security claims, at least initially, may not be tradeable and thus not amenable to franking credit recycling. This would not matter if both forms of investment were driven by the same factors as high levels of portfolio investment would drive down the available return on direct foreign investment to the same low level. But much foreign direct investment, for example, think of Google, is either driven by technological or by comparative multinational advantage, in which case it will not be particularly sensitive to differences in tax regimes in any case.

Hence, it makes little sense to combine the use of monthly return data when one could include the monthly freshly notified dividend observations but instead only sum the stale 12-month past dividend yields previously paid that have been updated each month. By contrast, my methodology allows the data to determine the allocation of systematic risk across securities facing different tax regimes (local versus overseas) in a single-pass, hence avoiding all the usual endogeneity and statistical issues of bias and inconsistency, whilst only attributing dividends and tax credits to the months in which the stocks actually go ex-dividend. In fact, it would be quite surprising if there were no difference in systematic risk between local and overseas investment by Australians given the quite different tax imposts.

1. How Tax Imputation Operates

Integration of personal and company taxes in Australia was promoted by the Campbell Committee of Enquiry into the Australian Financial System (see *Final Report* (1981) and Swan (1982a,b,c,d, 1983, 1984a,b) with some of its features described in Taylor (2005, 2006). Since its introduction in 1987 the Australian tax system has largely eliminated the double taxation of company tax and personal dividend payments for Australian resident taxpayers by providing a credit, termed a franking credit, representing company tax paid on behalf of investors liable for Australian personal tax on their dividends. This credit can be set against the investor's personal tax obligations, or even received as a cash contribution since July 2000 if the credit exceeds the institutional or personal tax liability, ensuring that Australian franking dividend payments represent no more than the pre-payment of personal tax obligations.

The franking scheme adopted by the Australian Government in 1987 and currently operating still falls short of the Campbell Committee (1981) and Swan (1982a,b,c,d) proposals for complete integration mostly due to a timing issue. Complete integration would enable all tax payments in a particular year to be credited but under the current franking scheme only franked dividends paid out are credited immediately. Hence, under the current scheme, the growing gap between the marginal personal tax rate and the company rate, exacerbated by the proposed company tax cuts, provides companies with an incentive to retain earnings to generate more lightly-taxed capital gains. Despite this incentive, we still find that about 70% of franking credits are paid out as dividends and this ratio is exceedingly high by world standards.

This development in 2000 was particularly significant as superannuation funds are taxed at 15%, ensuring that largely self-retiree funds receive a cash payment on top of the franked dividends they are entitled to. Since most industry funds are in growth-mode, they receive only limited cash rebates and are thus relatively better off with the Labor Party plan to cease cash payouts, announced in March 2018, once they gain office. The implication is that company tax in Australia has been abolished for all but foreign investors. These investors are supposedly not able to take advantage of the personal tax credits reserved for Australian taxpayers, but I show that this supposition must be false.

In turn, the Australian Government is considering either modifying or removing the system because it allegedly encourages domestic investors to invest too much at home and foreign investors to invest too little in Australia (*The Australian*, March 30, 2015, p.19) but it turns out that neither statement is correct. The Treasury is referring to the "home bias" identified by Murphy (2018) which only arises from the full pricing of imputation credits and the issue that most investment by Australians is local in nature, possibly forgoing diversification benefits.

But local investors are more informed than are distant or foreign investors, giving rise to differential returns. Lu, Swan, and Westerholm (2017) show that foreign investors transferred about EUR 20 billion to domestic Finnish investors over a 17-year period, indicating a 'home benefit' rather than a 'home bias'. As Treasury (2015) points out, imputation benefits paid to foreign investors reduce the liability for Australia's dividend withholding tax on foreign investors but, more importantly, the judicious timing of sale of stocks with imputation credits and repurchase of stock when it goes ex-dividend, enable foreign investors to avoid company tax almost altogether. It also encourages companies to pay as much tax in Australia as possible, protecting the tax base and discouraging firms from artificially shifting profits to offshore tax havens.[9]

It is not necessary for Australian companies to pay-out franked dividends to distribute these credits to investors who value them the most. These beneficiaries are generally superannuation subject to a 15% tax rate. With a 30% corporate tax rate, they receive a cash rebate of 15%. Yong, Brown, and Ho (2014) indicate how superannuation funds can buy stock when a discounted off-market buyback is announced and still make a profit after benefiting from the capital gains tax loss that the trade generates. Jun, Gallagher, and

[9] An exception seems to be the dispute between the ATO and BHP over BHP's 'marketing hub' set up in Singapore as a tax haven.

Partington (2011) show that institutional funds are overweight in stocks that pay fully-franked dividends. While there are anti-streaming provisions that discourage ineligible foreign investors from selling their imputation credits to benefitting domestic investors, strangely, there would appear to be no restrictions on using buy-backs, such as BHP Billiton's $6 billion buyback in 2011, to stream imputation credits to those who value them most within the class of domestic investors (Australian Taxation Office, 2017), but not to ineligible foreign investors. While the Commissioner of Taxation has various protections in place to prevent dividend streaming, it is not clear that they are being used as well as they should be to protect the tax base.[10]

Tran and Wende (2017) use a dynamic GE, overlapping generations model to argue that the marginal excess burden for the company income tax is incredibly high at 83 cents per dollar of tax revenue raised, compared to 34 cents and 24 cents for the personal income tax and consumption tax, respectively. However, Tran and Wende's findings are entirely due to their assumption that foreign investors pay the Australian tax grossing-up margin, in addition to the receipt of the world supply price of capital, and that Australian investors are the recipients of this grossing-up margin given their implicit assumption that franking credits are unpriced. Neither of these assumptions turns out to have any validity.

2. Literature Review

Davis (2015) reviews the Australian imputation system to conclude that it has merit. Ainsworth, Partington, and Warren (2016) provide a more agnostic review. Nicol (1992) showed that companies should pay out as much as possible of their imputation benefits to minimise personal tax, with a commitment of shareholders to reinvest if funds were required for additional investment. In a purely theoretical contribution, Monkhouse (1993) extended the after-tax CAPM model of Brennan (1970) to show how the value of imputation credits could be estimated using the CAPM model. He showed that the pricing of imputation credits is likely to reside between two extremes: (1) if all investors can fully utilise imputation

[10] ITAA 1997 Subdiv 204-D. This basically applies where a company streams one or more distributions or other benefits so that:

1. an imputation benefit is received by a member ('the favoured member') of a company as a result of a distribution;
2. the favoured member would derive greater benefits from franking credits than another member ('the disadvantaged member'); and
3. the disadvantaged member will receive lesser imputation benefits or will not receive any imputation benefits whether or not the disadvantaged member receives other benefits.

A company's buyback strategy might also fall foul of the ITAA 1936 s177EA (part of the general anti avoidance provision).

credits, regardless of whether distributed or retained, then the Australian cost of capital is independent of the Australian corporate tax rate and allowable tax deductions, and (2) if foreign investors ineligible for franking credits are the marginal investors then the Officer (1988) equilibrium will hold such that imputation credits are irrelevant and Australian assets will be valued by the after-company tax cash flows discounted by a risk-adjusted rate of return that is independent of imputation benefits.

Litzenberger and Ramaswamy (1979, 1980, 1982) report valuable extensions of the Brennan model in a U.S. context, together with empirical tests.[11] It is argued below that the Litzenberger and Ramaswamy (1979, 1980, 1982) methodology, requiring a two-pass estimation with the individual stock CAPM betas estimated in the first-pass, is potentially flawed since the individual stock returns used to estimate the set of firm betas in the first-pass may incorporate unmodeled tax effects.[12] In particular, if the tax treatment affects the distribution of the CAPM beta systematic risk then systematic risk is endogenous and findings are potentially biased and inconsistent, even though they show that their Maximum Likelihood estimation (MLE) overcomes the bias and inconsistency in standard OLS beta estimation, given their very strict assumptions.

Consistent with the preferences of short-term traders, Michaely (1991) estimates the dividend drop-off at the time of the abolition of the tax preference for capital gains in the U.S. to find that it did not alter.[13] Boyd and Jagannathan (1994) identify many issues and problems with both the theory and estimation of dividend drop-offs. The present paper applies a substantially generalised Brennan/Monkhouse methodology to the estimation of the effective imputation rate below using a single-pass methodology that reveals bias and inconsistency in the conventional two-pass methodology. Faff, Hillier, and Wood (2000) find strong empirical support for the Brennan/Monkhouse model with the introduction of imputation in Australia.

[11]Kalay and Michaely (2000) question whether the positive coefficient estimate for dividends found by Litzenberger and Ramaswamy (1979) really reflects the tax advantage of capital gains over dividends that persisted until 1986 when it was abolished. The reason for their concern arose in the U.S. context since the lower tax rate applicable to capital gains relative to dividends required the investor to hold the security for a minimum of a year and thus annual rather than monthly returns could have been more appropriate, but at what cost? In my view Litzenberger and Ramaswamy (1979) were correct to favour the much greater efficiency in estimation of monthly over annual observations. Black and Scholes (1974) used annual returns and, unlike Litzenberger and Ramaswamy (1979), found no evidence of a tax effect.

[12] Black and Scholes (1974) also use a two-pass method to estimate the betas but their estimates are confined to intermediate portfolios that may not be as subject to bias as individual stock beta estimates.

[13] Note that the dividend drop-off methodology does not require estimates of CAPM beta.

Commencing with Brown and Clarke (1993), who failed to find a sizeable increase in the dividend drop-off rate initially following the 1987 introduction of the scheme, most of the extensive literature surveyed utilises the dividend drop-off methodology addressed in more detail below. However, Bellamy (1994), Bruckner, Dews, and White (1984), Hathaway and Officer (2004), and Walker and Partington (1999a) found that franking credits are valuable. Walker and Partington (1999a) adopt a new methodology based on shares that trade simultaneously both cum- and ex-dividend to overcome some of the econometric issues in computing the dividend drop-off. Chu and Partington (2001) found evidence of a substantial premium of 50% for the same shares, with and without the imputation benefit. Anderson, Cahan, and Rose (2001) investigate taxable stock dividend announcements in New Zealand, which has a similar imputation system to Australia, to show that imputation benefits receive a sizeable premium.

McDonald (2001) finds that approximately one-half to two-thirds of the German dividend tax credit is reflected in the prices of German stocks. Harris, Hubbard, and Kemsley (2001) find that retained earnings are positively valued in Australia under imputation whereas in the U.S. with its classical system the opposite is the case. They attribute the positive coefficient in Australia to the effective negative tax rate on dividends for domestic institutional investors whom they regard as the marginal investors. Ricketts, and Wilkinson (2008) provide further supportive tests of the Harris, Hubbard, and Kemsley (2001) model both pre- and post-imputation in Australia.

By contrast, Cannavan, Finn, and Gray (2004) found only a small difference between derivatives without a franking credit and the underlying stock, with the difference disappearing after the introduction in July 1997 of the 45-day trading rule designed to discourage foreign investors from selling and repurchasing shares around the ex-dividend day. Gray and Hall (2006) point to two difficulties with Officer's (1994) CAPM treatment of imputation benefits which they resolve by arbitrarily setting the rate of these benefits to zero. However, Lally (2008) corrects logical flaws in this analysis so show that the Officer model and findings are quite consistent with sizeable imputation benefits. Beggs and Skeels (2006) find evidence that imputation credits were only significantly priced after the reform in 2000 which gave a cash rebate for unused franking credits, but Lajbcygier and Wheatley (2012) find no significant difference using a variety of models based on estimating expected returns while Siau, Sault, and Warren (2015) obtain similar findings based on examining price levels rather than returns. Issues in relation to Lajbcygier and Wheatley (2012) and Siau, Sault, and

Warren (2015) are discussed below. Cummings and Frino (2008) utilise futures contracts to show that these indicate similar significant pricing of imputation credits, as in Beggs` and Skeels (2006). Chu and Partington (2008) found using CRA's bonus issue that there was always an imputation premium which was sizeable away from the ex-dividend date but diminished as one got closer to the date. This could be because of the rule requiring foreign investors to sell approximately 47 days prior to the ex-dividend date. Dempsey and Partington (2008) discuss inconsistencies in the way imputation benefits have been measured. Feuerherdt, Gray, and Hall (2010) find no evidence that imputation credits contained in Australian hybrid securities are priced.

Jun, Alaganar, Partington, and Stevenson (2008) take advantage of the fact that franking credits, included in dividends paid by American Depository Receipts (ADRs) that are otherwise equivalent to Australian stocks, are of little value to United States (US) investors, other than to avoid dividend withholding tax on fully franked dividends. They find evidence of a higher dividend drop-off in Australian stocks consistent with dividend capture by tax-advantaged Australian resident investors and tax-motivated dividend-related trading. In a subsequent study, Jun and Partington (2014) find that a one-dollar ADR dividend in the US is valued as little as 36 cents whereas for Australian stocks the drop-off ratios are huge, consistent with a sizeable franking credit benefit. Minney (2010) finds some evidence that franking credits are priced. McKenzie and Partington (2010) survey the empirical methodology on the estimation of the value of imputation credits to conclude that one needs multiple approaches and data sources.

I now turn to estimates of the equity premium itself. Brailsford, Handley, and Maheswaran (2008) provide lower estimates of the long-term equity premium than previous estimates. They find that the equity premium relative to bills, assuming investors receive the full value of imputation credits, was 6.8% p.a. over 1883-2005, 7.6% p.a. over 1958-2005, and 7.2% p.a. over the imputation period, 1988-2005. Handley and Maheswaran (2008) find that the utilisation of distributed imputation credits increased to 81% over the period 2001-2004, indicating that the aim of eliminating double taxation of dividend income had largely been achieved. The equity premium averaged 7.0% p.a. over the pre-imputation period, 1958-1987, and declined to 5.1% over the post period, 1988-2005, if imputation credits are ignored, but to only 6.4% with the inclusion of credits.

Wood (1997) addresses the pricing of imputation credits in a simple model while Benge (1997, 1998) model's capital structure and investment policy under full imputation from a theory perspective. Callen, Morling, and Pleban (1992), Pattenden and Twite (2008), and Brown, Handley, and O'Day (2015) provide evidence of higher dividend payouts in response to imputation while Ainsworth, Partington, and Warren (2016) include a remarkable graph showing that pre-imputation Australian firms paid out the global average of 45% of earnings but since then has increased to about 70% with global payouts falling to about 40%. Hence imputation has created greater shareholder democracy with shareholders able to enjoy more say over whether earnings are reinvested. Many companies have automatic reinvestment plans that enable shareholders to pass back dividends to the company at shareholder discretion.

Twite (2001) finds evidence of many significant capital structure alterations that are predicted because of the introduction of Australian tax imputation in 1987. He finds that there was a decline in the aggregate level of total firm borrowings, a decrease in the proportion of capital raised via retained earnings due to increased dividend payouts, and an increase in the proportion of capital raised via new equity issues following the introduction of the imputation system. None of these findings are consistent with Treasury modelling in which foreign investors, as the marginal investor, dictate company policy on payouts, debt structure and equity raisings. But this is not surprising as foreign investors must recycle franking credits some 47 days prior to each franked dividend. Sizeable differences in capital structure have persisted. Fan, Titman, and Twite (2012) find that Australia has the lowest debt-to-equity ratio in the world due to tax imputation and a high debt maturity ratio at 8th in the world, indicating more trust in debt markets.

Coulton, Ruddock, and Taylor (2014) show that the earnings of franked dividend paying firms are more persistent than for other firms and, moreover, they assist in eliminating mispricing. Melia, Docherty, and Easton (2016) show that, following imputation, that there was a more negative relationship between new seasoned equity issuance and subsequent returns. This suggests that imputation allowed Australian firms to finance investment using equity when the cost of capital is low. Goldman Sachs (2015) argues that imputation has led to far higher dividend payouts, less debt, and far greater fiscal discipline. Akhtar (2017) shows that, while multinational firms generally pay lower dividends than domestic firms, those operating within an imputation system and common law regime pay significantly higher cash and total dividends than do their domestic firm counterparts. These dramatic capital structure effects indicate that imputation has led to fundamental changes consistent with placing domestic shareholders in the box seat as the major beneficiary of more investororientated company board policy since imputation and with franking credits largely being priced.

Recently, several researchers have argued that these franking credits are not priced and thus do not lower the required risk-adjusted cost of capital to Australian firms and hence raise the price of these stocks. If this were so then essentially the AUS $19 billion (46%) in credits distributed each year to Australian resident taxpayers simply raises the wellbeing of these resident taxpayers, while leaving the level of investment and cost of capital to be set entirely by foreign investors who presumably earn the supposed perfectly elastic supply price of foreign risk capital after grossing up for the Australian corporate tax. A further $10 billion (24%) is received and presumably retained by Australian companies and another $12 billion (29%) is paid to ineligible non-resident foreign taxpayers (see Treasury, 2015, and Australian Taxation Office, 2014).

What is most notable about these figures is the magnitude of these credits utilized or retained by Australian companies and relatively small distributions overseas. If one starts with the supposition that, as a small country, Australians possess only about 2% of the world's wealth and hence one might expect foreigners to constitute 98% of investment in Australia and to be allocated 98% of the franking credits. However, recycling of these credits to those who value them most could account for the pattern we observe. The reason they are supposedly not priced is because foreign investors, who are not eligible for the credits, are assumed to be unable to recycle franking credit benefits despite huge incentives to do so and weak rules discouraging them from recycling credits to avoid the tax.

The idea of the foreign investor as the exclusive marginal investor is of long duration with its antecedents going back to Gordon (1986) and Boadway and Bruce (1992), or even earlier. More recently, Sørensen (2014, pp.4-5) claims as a theoretical proposition that when all domestic bonds and shares are traded in fully integrated international capital markets and the domestic economy is negligibly small relative to the world economy then the return on domestic equity will be exogenously determined by foreign investors.[14] Hence, presumably, since these investors can profitably recycle franking credits, these credits will be fully priced. When franked and unfranked versions of the same stock trade simultaneously, as with BHP Billiton, the former will be higher priced.

[14]Sørensen (2014) also considers a model in which there is domestic unquoted equity. Antioch (2016) shows that, when errors in Sørensen's comparative statics are corrected, his propositions have to be modified.

Lajbcygier and Wheatley (2012) discount ex-dividend day imputation benefit studies showing imputation benefits to investors because price changes due to trading around ex-dividend days might lead to only temporary departures from the long-term price and thus may exaggerate the pricing of imputation credits estimated in such a manner. Their evidence for this is Poterba (1986) who utilises a single stock, Citizens Utilities, to find short-term differential pricing of dividends taxed as capital gains and as cash but no longer-term price differential. Sterk and Vandenberg (1990) revisit the Poterba study to examine the effect of removal of the U.S. tax advantage for capital gains over cash in 1986 where they show that, indeed, the two dividend classes were priced differentially prior to 1986.

Hubbard and Michaely (1997) also revisit the Poterba study to find that shares receiving cash dividends went up in value relative to shares with stock dividends in 1985-86 when the tax on cash dividends was reduced in 1986. This is consistent with the tax hypothesis, but when they extend their study they find that the differential was not maintained. Moreover, they are unable to find an explanation. Hence, this could be a weak reed to explain why the findings of Lajbcygier and Wheatley (2012) differ from dividend drop-off studies. Nonetheless, Lajbcygier and Wheatley (2012) may have a valid criticism of dividend drop-off studies since they simply indicate a differential price correction on the two ex-dividend days of the year out of the 250 trading days in a year. Tests using asset pricing models are essential to show that franking credits result in a substantial lowering of the required annual rate of return, not just on ex-dividend days.

Nonetheless, using a variety of pricing models including CAPM and its variants, Lajbcygier and Wheatley (2012) can find "no evidence that the provision of imputation tax credits lowers the returns investors require on equity." However, Lajbcygier and Wheatley (2012) adopt the two-stage empirical methodology of Litzenberger and Ramaswamy (1979, 1980, 1982) in which they estimate the CAPM betas of each stock individually using time series of individual and market return data (1979, p. 181) which ignores the tax status of company dividends. This methodology may be acceptable if the pricing of risk was unrelated to the particular tax regime that shareholders are subjected to, since they use MLE in an effort to overcome some of the well-known statistical problems arising from two-stage estimation.

Suppose, as I find below, that stocks currently paying franked dividends are low risk, with low CAPM betas requiring low returns, while beta risk and the required return increases considerably if its dividends alter such that dividends are no longer franked, most likely because there were no domestic earnings on which taxes were paid and they earned ineligible overseas profits. Any given stock can alternate between these regimes over the course of the Lajbcygier and Wheatley (2012) data sample. Standard beta estimation methods that they use with rolling 60-month windows will not capture these regime changes as a given company switches from one regime to another and then back again. Hence, I believe that it is this misspecification in the estimation of betas that then translates into the strange negative valuation of imputation credits which they report. However, in mitigation, these negative valuations are not statistically significant.

It is notable that the literature does not seem to have drawn attention to the endogeneity introduced by the two-pass methodology. Earlier studies which were not subject to this methodological issue, such as Harris, Hubbard, and Kemsley (2001) and Ricketts, and Wilkinson (2008), did find evidence of the pricing of Australian imputation credits.

What might explain my rejection of the findings of Lajbcygier and Wheatley (2012)? A nice aspect of their paper is a simple GE model of a domestic economy offering franking credits exclusively to local investors in which they show that a small tax credit can be sufficient to have just local investors in stocks with franking credits and with foreign investors specialising in non-franking stocks.

However, if the domestic market is sufficiently small relative to the foreign market, this bifurcated equilibrium can break down. Since there are in excess of two trillion dollars of compulsory Australian superannuation funds, much of which is targeted at franked Australian stocks, one would expect to see evidence of this bifurcation remaining in place. One example, which is discussed below, is the separation of BHP Billiton into its separate Australian- and UK-listed securities purely to better exploit franking credits. Australian investors tend to specialise in the ASX-listed stock and foreigners, the London-listed stock, as Lajbcygier and Wheatley's (2012) model predicts.

Moreover, the findings of Lajbcygier and Wheatley (2012) appear to be supported by Siau, Sault, and Warren (2015) using discounted cash flows (DFC), earnings yields, and additional methods to explain price levels rather than returns utilizing conventional asset pricing models. They also find that imputation credits "are not priced from the perspective of longer-term buy and hold investors." They do not include any relevant non-ASX listed stocks such as the London-listed BHP Billiton PLC, nor distinguish between stocks with predominantly Australian and foreign earnings. While they do incorporate CAPM beta coefficients as one of several risk controls in their analysis, this inclusion is unlikely to account for their findings as they are not attempting to estimate returns, unlike Lajbcygier and Wheatley (2012).

Moreover, their analysis also differs from Lajbcygier and Wheatley (2012) in that they include only one observation per stock each year when the stock goes ex-dividend at the end of the previous fiscal year. In my opinion, this is a better specification than a combination of monthly prices (returns in the case of Lajbcygier and Wheatley (2012)) with monthly updated annual dividend and imputation yields, although it inevitably reduces the number of observations and power of their tests. Annual sampling was made necessary by data availability.

In addition, Siau, Sault, and Warren (2015) identify high multi-collinearity between imputation credit yield and dividend yield of 57%, and between imputation credit yield and earnings per share of 72%, making it hard to distinguish the effect of imputation as distinct to either dividends or earnings within their price-level framework. These extreme degrees of multicollinearity could help explain why the statistical significance of franking credits was low in their framework. Recognising these limitations, Siau, Sault, and Warren (2015) also conduct portfolio sorts and double sorts to detect pricing premia, which they fail to find.

Gray, Hall, and Costello (2014) refer to these recent findings and note that "the dominant market practice is to make no adjustment in relation to imputation credits to cash flows or discount rates," but nonetheless estimate a basic model to obtain a positive estimate of the value of franking credits from the dividend drop-off when the stock goes ex-dividend. The Gray, Hall, and Costello (2011) dividend drop-off model is as follows:

$$\left(P_{i,t} - P_{i,t}^{*}\right)\Big/D_i = \delta + \theta\left(FC_i\big/P_{i,t-1}\right) + \varepsilon_i\,, \qquad (1)$$

where $P_{i,t}$ is the cum-dividend stock price for stock *i* at time $t, P_{i,t}^{*}$ is the ex-dividend stock price for stock *i* at time adjusted for market movements with $P_{i,t}^{*} = P_{i,t}\big/\left(1+r_{m,t}\right)$, where $P_{i,t}$ is the ex-dividend price on the day that the *i*th stock loses its dividend entitlement, $r_{m,t}$ is the return on the All Ordinaries market index on day t, D_i is the dividend paid by the *i*th stock in dollars, δ represents the constant term in the regression and should represent the estimated market value of cash dividends as a proportion of their face value, θ is the estimate of the market value as a proportion of the face value of the franking credit, FC_i, and ε_i is the normally distributed random error term.

Gray, Hall, and Costello (2011) include 3,107 dividend drop-off events in their study after commencing with a possible 11,292 events which they eliminate for various reasons including price sensitivity, i.e., possible outliers. Of the 3,107 dividend events only 545 represent unfranked dividends. Illiquidity, reflecting lack of trading around ex-dividend days, is a major problem with this methodology and may lead to bias.

Their OLS estimate of equation (1) is a 0.7964 estimate of the value of a cash dividend, meaning that a dividend of $1 is valued at 79.64 cents with the franking credit, θ, i.e., "theta", valued at 0.1640. However, using more sophisticated econometrics they come up with a point estimate for the dividend drop-off rate or theta of 0.35. They combine this with an estimate of the distribution rate $\left(F\right)$ which represents the ratio of the total franking credits distributed to shareholders in a given year to the notional or total franking credits created in a given year. They accept the recent Australian Competition Tribunal estimate of 0.7, making their overall value of franking credits, γ,

$$\gamma = F \times \theta = 0.7 \times 0.35 = 0.25. \tag{2}$$

Hence the claim is that on average Australian companies distribute 70 percent of the tax credits generated and of this distribution the benefit is at the rate of 35 percent, yielding an overall 25 percent imputation benefit. The Australian Energy Regulator (2015) has rejected this estimate of 0.25 in favour of a higher estimate of 0.4 based on evidence from several additional sources. Even this higher estimate of 0.4 is too low according to the findings in the present study.

I conclude from this sizeable and often apparently contradictory literature that dividend drop-off studies have largely shown evidence of a sizeable pricing of imputation credits but considerably less than full reflection of the benefit while recent asset pricing models have argued that imputation credits are largely unpriced. I have attempted to reconcile these two approaches by arguing that these recent asset pricing models attempt to estimate CAPM betas in their first stage on the (implicit) assumption that the company risk premium displayed in the market is independent of the particular tax regime faced by that company at a given time. I find that when I allow risk to be a function of the tax regime that imputation credits are sizeably if not almost fully priced.

In addition to the empirical literature, there is direct evidence that the tax benefit of imputation credits is priced from the pricing of dual-listed stock such as BHP Billiton PLC domiciled in the U.K. and BHP Billiton Ltd domiciled in Australia. The two separately listed arms of BHP are run as one company with a requirement that distributions paid to the separate groups of shareholders be the same. Hence, in the absence of the franking credit advantage to shareholders in the ASX listed arm, one would expect the prices of the two securities to be identical. Seeking Alpha (2013) shows that there has always been a substantial price premium for an Australian share listed on the ASX over its U.K. counterpart listed on the London Stock Exchange, with this premium peaking at 25% in 2011, indicating that the ASX market places a sizeable premium on the tax advantages of franked dividends.

The current premium is now lower, perhaps reflecting the campaign led by Elliott Advisors to force BHP to unite the two securities. Only Australian resident shareholders who presumably largely own the ASX listed shares, or do so shortly before they go ex-dividend, rather than the London listed shares, can benefit from franking credits.

Moreover, Australians, who overall are vastly overweight BHP Billiton due to the substantial weight on resource stocks in the Australian market compared to the 2% global weight on resource stocks, will not tend to value it as highly as they do non-resource stocks such as banks. These sector risk-return considerations could reduce the differential between the Australian and U.K. arms of BHP Billiton.

Elliott Advisors (2017a,b,c) argues that BHP shareholders are tax-disadvantaged by this dual structure but fails to recognise that under a unified structure imputation credits would be paid to non-Australian shareholders that cannot place a value on them. Hence, the dual-structure efficiently streams franking credits to those who value them while substantially lowering the cost of capital to the Australian arm of BHP.[15]

3. Imputation-Modified CAPM Model

I begin with the Monkhouse (1993, equation (7.2)) imputation-modified version of Brennan's (1970) CAPM dividend model that is expressed in Brennan's after-corporate tax but pre-personal tax specification:

$$E(r_i) = E\left[\left(p_{i,t} + D_{i,t} - p_{i,t-1}\right)/p_{i,t-1}\right] = r_f + \beta_i\left[E\left(R_m^{FC}\right) - r_f\right] - \gamma\left(FC_i/p_i\right), \qquad (3)$$

[15] Elliott's main recommendation is to abolish the dual structure and redistribute cash to investors via off-market share repurchases, but cash can be redistributed without abolishing the dual structure which is efficient from the point of view of segregating Australian resident taxpayers and foreign (non-eligible) shareholders. See Spry and Morrison (1999) for a discussion of dividend streaming.

where $E(r_i)$ is the expected equity rate of return on the *i*th stock before investor/personal taxes but after corporate tax, r_i is the return due to cash flow and thus does not explicitly include the value of franking credits, as measured by the price relative, $r_i \equiv \left(p_{i,t} + D_{i,t} - p_{i,t-1}\right) / p_{i,t-1}$, $p_{i,t}$ is the price of the *i*th stock at time *t*, $D_{i,t}$ is the cash dividend in dollars paid between dates $t-1$ and t, r_f is the riskless rate of return, β_i is the CAPM beta coefficient for the *i*th firm representing the covariance of the stock with the market return deflated by the variance of the market return, $\left[E\left(R_m^{FC}\right) - r_f\right]$ is the excess market return (risk premium) which, definitionally, reflects aggregate imputation benefits but contains no explicit inclusion of benefits, and R_m^{FC} is the market return implicitly inclusive of the value of aggregate franking credits, the γ coefficient (to be estimated) represents the valuation placed by the market on both franked dividends and retained franked dividends, FC_i is the *i*th firm's notional franking credit per share, and p_i is the *i*th firm's stock price. Hence, FC_i / p_i is the franking credit yield on the *i*th stock.

Given Monkhouse's (1993) assumptions, the individual firm CAPM betas are implausibly independent of the existence or otherwise of franking credits. It is implausible because unfranked dividends are likely to be earned overseas and franked dividends, locally, with vastly different risk-return trade-offs between the two markets. Moreover, the franked/unfranked dividend yield defining the estimated gamma (γ) coefficient is unlikely to be statistically significant after controlling for franking credits and systematic risk as, at best, it can only reflect some average tax regime in the cross-section. This is because neither foreign nor local domestic investors are likely to pay Australian corporate tax while Australians making overseas investments and receiving only unfranked dividends are likely to face higher systematic risk and adverse tax effects. But these are really empirical questions and cannot be answered by theory alone.

For simplicity of model presentation, I assume that all franking credits are complete, not partial, and where investors are eligible, paid out in full and not retained by the firm. Since only approximately 64% of franked dividends are fully franked and about 17% between 80% and 99% franked, the estimate of the degree of franking credit pricing will be exceedingly downward-biased. My estimates that are based on a generalised and single-pass version of the Monkhouse model show that franking credits reduce the required return on equity and thus raise asset values of companies delivering franking credits but largely via the medium of reduced beta systematic risk. The direct contribution of franking credits to a lower required return via a negative value for the Brennan/Monkhouse coefficient γ are far smaller in comparison unless one compares the expected return on franked versus unfranked dividends for the restricted category of securities that generally but not always provide franked dividends.

While in the literature the beta market risk coefficient is assumed to be independent of the stock's individual franking entitlement, it is possible that the market riskiness of the class of firms systematically paying franked dividends differs from non-franking credit firms. In particular, this systematic risk should be lower because franking credit firms tend to be the largest in the Australian market, to have very high monthly excess returns (0.0099035 as compared to -0.0060758 for non-franking firms) and to have a very low standard deviation of returns (0.1783084 as compared to 3.0954380 for non-franking firms) which is a remarkable 17.36 times higher.[16]

Hence, unlike earlier studies that all adopt a two-pass process that is fraught with both endogeneity and statistical difficulties, I adopt a single-pass approach in which the market beta estimate differs between franking and non-franking stocks and even for the same stock which oscillates between franking and non-franking status. My approach not only avoids contamination due to endogeneity and statistical bias and inconsistency in the two-stage methodology but, additionally, allows for systematic or market risk factors to differ between franked and unfranked stocks. This makes sense, as Australian taxpaying investors appear to set the risk premium on franked dividends and foreign investors, the risk premium on unfranked dividends, in a bifurcated market with very different risk premia.

At the personal investor level, the cash flow per share resulting from the receipt of a cash dividend, D_j, is increased by the cash amount, reduced by the personal tax liability at rate T^P on the company tax grossed-up amount $D_j/(1-T)$, and offset by the grossed-up value of the franking credit, $FC_j = T \times D_j/(1-T)$, where T is the corporate tax rate:

$$D_j - T^P \times D_j/(1-T) + T \times D_j/(1-T) \ . \qquad (4)$$

Thus, if the personal and corporate tax rates coincide, the grossed-up franking credit eliminates the personal tax liability. Moreover, since the current corporate tax rate is

[16] Monthly means and standard deviations are taken from Table 2 below.

$T = 30\%$ and has remained in place since July 1, 2001, the theoretical value of a dollar of franking credit is $\gamma^{Max} = T/(1-T) = 0.4286$, which, naturally, exceeds the corporate tax rate itself.

4. Data and Estimation of the Generalised Single-Pass Model

Replacing the expected returns in equation (3) with monthly realised returns and generalising my single-pass version of the Monkhouse model to allow for risk segmentation between franking and non-franking stocks, I obtain the estimable equation:

$$\tilde{R}_{it} - r_f = \gamma_0 + \beta_g \left[\tilde{R}_{mt}^{FC} - r_f \right] + \beta_v \left[\tilde{R}_{mt}^{FC} - r_f \right] D_{it}^v + \gamma_v D_{it}^v + \tilde{\varepsilon}_{it}, \quad (5)$$

where $\tilde{R}_{it}$ is the monthly realised return of security *i* in period *t*, $\tilde{R}_{it} - r_f$, is the monthly excess return, $\tilde{R}_{mt}^{FC} - r_f$, is the contemporaneous monthly excess market return, i.e., market return, in period *t* measured net of the riskless rate, coefficient γ_0 is the intercept, coefficient β_g is the general CAPM beta coefficient which is independent of each individual dividend type's systematic risk and is to be estimated across observations on every stock, D_{it}^v is a vector of zero-one security and dividend characteristics over the cross-section, indicated by *i*, and time series indicated by *t*, thus allowing for lagged dividend effects (franked, unfranked, etc) of six months and a year in duration due to market illiquidity, $\left[\tilde{R}_{mt}^{FC} - r_f \right] D_{it}^v$ is the vector of interaction terms between the contemporaneous excess market return and the vector of security characteristics with the vector of coefficients, β_v, capturing the various beta risk premia that modify the general coefficient β_g, the sum of coefficients, $\beta_g + \beta_v$, indicates the estimate of the market risk of each category of security, either franked or unfranked, coefficients γ_v represent the pricing of each class of security after controlling for CAPM beta risk, and $\tilde{\varepsilon}_{it}$ represents the vector of disturbance terms. Putting to one side my rejection of Monkhouse's two-pass approach, the Monkhouse model, equation (3), is precisely nested within my generalised Monkhouse model, equation (5), when the vector of beta interaction coefficients, β_v, are all zero such that the overall market beta, β_g, is approximately one, with only the contemporaneous coefficient, γ_t on franked dividends significant. Hence, my estimated generalised Monkhouse model will reveal the presence of bias and inconsistency in the conventional two-pass beta model adopted uniformly in the literature, or not, as the case may be.

It is important to note that this empirical specification is single-pass and thus does not purport to be able to estimate individual security betas independently of tax effects, unlike the extant literature. However, it does estimate systematic risk for each class of security and thus permits a relationship between systematic risk and dividend class that is the likely outcome of tax-induced risk-market segmentation between domestic and foreign investors, or more likely, between stocks that invest domestically and thus generally earn franking credits and those that never earn franking credits because these are Australian-listed companies with almost entirely overseas earnings that do not qualify for credits.

I now estimate the parameters of the generalised and single-pass version of Monkhouse (1993) model specified by equation (5) using the comprehensive monthly SIRCA Share Price and Price Relative Database (SPPR) for all stocks and for the period, July 2001 to December 2013, inclusive, for which the corporate tax rate has remained at 30%. SIRCA's SPPR data represents the 'gold standard' of reliability for Australian stocks and includes all listed equity stocks since 1974.

I use the SPPR value-weighted index that contains no explicit adjustment for the notional value of franking credits and the monthly individual stock price relatives that include the cash value of both franked and unfranked dividends but make no allowance for the notional value of franking credits. Price relatives containing SPPR error codes are removed. I use Ordinary Least Squares (OLS) to estimate the model over the entire cross-section, 13-year time-series dataset in a single pass.

For simplicity, I do not distinguish between fully franked and partially franked dividends and nor do I impute any particular value to franking credits but rather let the market data coefficient estimates speak for themselves. I thus attempt to overcome the main problem facing virtually all imputation credit analysis which is the very high correlation between imputation benefits and the dividends themselves that was identified in the study by Siau, Sault, and Warren (2015). In this paper, I consider the reaction to both franked and unfranked dividends over the entire dataset such that many permanently non-franking firms are included.

The pricing of imputation credits for this entire dataset are expected to be very substantial as franking firms should enjoy a virtually permanently lower cost of capital compared to never-franking firms with their much riskier and tax-disadvantaged dividends. When I restrict the analysis to the category of similar firms that generally but not always provide franked dividends, the annual imputation benefit should be lower as all firms in this group are expected to enjoy a low cost of capital because they largely pay Australian corporate tax on domestic earnings. I construct the various franking and non-franking dummy variables that form the basis for the vector of category variables and coefficients included in equation (5) and report them in Table 1.

My comprehensive dummy variable methodology has the advantage of being neutral with respect to the way franking credits affect returns, if indeed they do, as it enables one to test my generalised and estimable version of the simplified Monkhouse (1993) model, equation (5) above, by using a franking dummy to replace the franking dividend yield, FC_i/p_i, and to interact each type of dividend, franked and unfranked, and contemporaneous, lagged six months, and lagged 12 months dividend indicator, with the contemporaneous market excess return. These interaction effects reveal for the first time how systematic market risk is distributed between firms paying either franked or unfranked dividends.

<<Insert Table 1 about here>>

Table 2 displays the values for each of the dummy variable groups. 247,473 firm-months are included in the study of which 9,141 firm months, or 9.35% of total franking firm-months are franking months, and 2,862 are non-franking firm dividend months, making up 10.02% of all non-franking firm months. Hence, I investigate over twelve thousand dividend months compared with just 3,107 dividend months included in the Gray, Hall, and Costello (2011) dividend drop-off study. The dividend drop-off methodology faces the problem that for nearly three quarters of ASX listed stocks there is either no trading, or insufficient trading, around the day in which the stock goes ex-dividend to empirically register a dividend drop-off. Unobservable heterogeneity in transaction costs either distorts the recorded drop-off amount or, in most cases the drop-off fails to register at all. Hence the dividend drop-off methodology is potentially biased and inconsistent in that it is essentially confined to just relatively liquid stocks and even for these stocks measurement errors will be high and variable.

<<Insert Table 2 about here>>

5. Empirical Results

Annualising the monthly returns from Table 2 for all ASX stocks, the riskless return $r_f = 4.641\%$ p.a., the excess market return $Mean(r_i) - r_f = 10.32\%$ p.a., with a total return of $Mean(r_i) = 14.96\%$. Only 5.43% of the months in the sample are dividend-paying and of these 3.69% consist of franked dividends and the remainder, 1.74%, made up of unfranked dividends. Hence 94.57% of all months are non-dividend paying. As noted above, Kalay and Michaely (2000) found that dividend effects identified by Litzenberger and Ramaswamy (1979) in their monthly Fama and MacBeth (1973)-type tests disappeared if converted to an annual basis so as to suppress all the individual dividend announcement-surprise effects.

Notably, Lajbcygier and Wheatley (2012) also adopt this annual dividend and credit yield methodology in which these annual yields, found by summing over the previous 12 months and dividing by the current end-of-year price and updated each month, are included to explain monthly returns irrespective of whether or not an actual dividend occurred in that month. This I believe to be an added misspecification as it presumes that in the ten non-dividend months in the year investors will respond afresh to dividends and credits provided over the previous 12 months that they have already responded to previously on their announcement. Markets respond to new, not stale, information and expected yields cannot be proxied in this way. U.S. studies of dividend versus capital gains tax issues find no role for tax issues in securities pricing after implementing this annual dividend yield methodology.

This apparent absence of pricing seems implausible since institutional investors altered the timing of their asset sales to benefit from the halving of the capital gains tax rate (Fong, *el al*., 2009), indicating that the tax regime does dictate investment policy. The use of annual yields could conceivably be beneficial when examining the issue of dividends versus capital gains as capital gains status depends on owning the stock for more than 12 months, but this is not the case here. There is no minimum period length when facing the issue of pricing franked versus unfranked dividends. Moreover, use of annual dividend and yield data effectively discards 92% (eleven-twelfths) of the total number of observations while amalgamating all the dividend announcement effects which individually contain critical information on how dividends are priced.

Since I retain the non-dividend months uncontaminated by past or future dividend announcements and examine the returns for two types of dividend, franked and unfranked, the issue is: am I simply picking up short-term time-series effect of the two dividend types, or am I capturing the long-term cross-sectional effects of these differences in my one cross-sectional regression? It is the latter as my purely cross-sectional regression captures the difference between a franked-dividend relative to a no-dividend, and an unfranked dividend relative to a no-dividend, over the entire data period.

Unlike the U.S., stocks in Australia that pay dividends do so only twice per annum. Hence if all stocks paid dividends all the time, 16.67% of the sample would represent dividend-paying months. As it is, dividends are paid 32.6% of the time when dividends might be expected, or approximately one-third of the theoretical maximum. Franking securities represent 39.4% of the total sample months and made up 10.82% of all dividend paying months, but franking firms do not always provide franked dividends. These made up 9.35% of all months and hence franking securities normally delivered franked dividends but failed do so for 1.47% of the months in the sample. This lapse is important for some of my findings.

Securities that never franked made up 11.5% of the entire sample and these provided, as already noted, a sizeable 10.02% of all dividend-months. These non-franking securities also play an important role, especially as it is likely that their earnings are predominantly from overseas. A critical component of the summary statistics presented in this table is the contrast between the magnitude and sign of the mean excess market return in a franked dividend month of 11.07% p.a. (0.009225 per month) in the 9,141 such firm-months and the mean market excess return for a non-franking firm paying an unfranked dividend of – 2.87% p.a. (-0.0023874) in the 2,862 such firm-months in the dataset. A similar but less extreme differential pertains to franking firms, with an excess market return when such firms pay an unfranked rather than franked dividend now positive but still small at 3.75% (0.0031249).

<<Insert Table 3 about here>>

The main regression results are presented in Table 3. Column (1) of Table 3 presents the result from fitting a simple OLS single-pass CAPM regression model for all stocks over the entire database. The dependent variable in this regression, as in all subsequent regressions, consists simply of the excess stock returns, i.e., the gross individual monthly stock return measured net of the riskless rate. The independent variable in the first column is the excess market return, i.e., the overall value weighted market return measured net of the riskless rate, for which the estimated market beta is $\beta = \underset{(19.1662)}{0.9432^{***}}$, which, while close to 1, lies below 1. The annualised overall expected return for all stocks is the riskless rate of 4.641% p.a. (0.0038675 monthly) from Table 2, plus the overall market beta times the annual market premium of 10.32%, (0.0085963 monthly) which yields an expected CAPM equity risk premium of 7.93% p.a. Hence the overall expected return on all stocks is 12.57% p.a. over my data period.

Column (2) in Table 3 repeats the analysis of Column (1) of Table 3 for all firm-months but this time adds the contemporaneous franked dividend, six-month lagged franked dividend, and 12-month lagged franked dividend dummies, the same franked dividend dummies interacted with the excess market return for that contemporaneous dividend month, the same contemporaneous and lagged unfranked dividend-month dummies and these same dummies interacted with the contemporaneous excess market return for that dividend month. In column (2), the overall excess market return beta increases to $\beta = \underset{(62.4269)}{1.0557^{***}}$, while the coefficient for the contemporaneous franking dummy is both positive and significant at $\underset{(9.4539)}{0.0123^{***}}$ and lower by 32.5% than for the corresponding unfranked dividend dummy given by $\underset{(9.9863)}{0.0163^{***}}$ due to the capitalisation of franking credit benefits into the lower return for franked dividends relative to unfranked.

The beta coefficient market risks are significantly reduced contemporaneously and over the preceding twelve months. It might seem surprising this systematic risk reduction is even greater for unfranked dividend payments, but these unfranked dividend payments occur on average when the market excess return is negative, as noted above. Hence, the estimated systematic risk premium contribution for unfranked dividends is positive. These pricing effects are all measured relative to the omitted all firms, non-dividend paying months.

Columns (3) of Table 3 repeat the analysis of column (2) except that the dataset is confined to firms that have at some time paid franking dividends but do not need to have always paid franking dividends. These firms predominantly invest in the local economy and pay Australian corporate tax. All such firm-months are included, making the sample still large at 91,128 stock-months, although only 40.52% the size of the complete dataset. These firms are far more homogeneous than firms that have never paid a franked dividend nor in some cases, never paid a dividend of any sort. Also, these stocks make up the bulk of the Australian market, both in terms of market capitalisation and in terms of corporate tax payments.

The overall estimated beta coefficient on excess market returns in Column (2) is $\beta = \underset{(43.5375)}{0.7365^{***}}$, indicating that firms which either pay franking credits, or have paid such credits at one time, are regarded by the market as having lower systematic risk than are all firms which have an overall $\underset{(62.4269)}{\beta = 1.0557}$ (Column 2 of Table 3), many of which have never paid a dividend at all. The adjusted R-Squared of 6.7% in Column (3) is 19.1 times higher than for the conventional CAPM model presented in Column (1) of Table 3, indicating that accounting for the bifurcation of the Australian market between franking (local investing) and non-franking (overseas investing) stocks improves the explanatory power substantially.

The contemporaneous reaction to both a franked and unfranked dividend in Column (3) of Table 3 are both positive and highly statistically significant. Not only is the contemporaneous franked dividend coefficient 23% lower than for the corresponding unfranked dividend coefficient, but the exceedingly low excess market return corresponding to unfranked dividend payments further emphasises the sizeable tax benefit of franked relative to unfranked dividends and, doubtless, the sizeable impact of foreign investors who recycle their franking credits to Australian investors.

<< Insert Table 4 about here >>

Tables 4 and 5 analyse the regression coefficients from Columns (2) and Columns (3) of Table 3, respectively, in conjunction with the corresponding mean excess market return values from Table 2, to predict the changes in stock returns due to franking relative to non-franking dividends. Table 4 makes predictions for all stocks that have either paid a franked dividend or an unfranked dividend while Table 5 makes predictions for stocks that have a history of paying franked dividends at some point and have just paid a franked dividend, compared with the same set of generally franking stocks that did not just pay a franked dividend but rather paid an unfranked dividend. The strength of this methodology is that it compares like with like. All the stocks included in the analysis not only generally pay dividends but, mostly, they are franked because of their domestic orientation, but not always so.

Table 4 predicts a monthly return in a franked dividend-month which is lower than an unfranked dividend by a factor of 1.6 times the theoretical value of a franking credit of 42.86%. Since there are only two dividend months in a year and the return on a franking stock is only slightly lower than the return on non-franking stock in the ten non-dividend months, this translates into an annual return which is 61% of its theoretical level of underperformance of 42.86%.

While this is very substantial in its own right, much of the deviation between this estimated value and the theoretical maximum can be accounted for by the very sizeable overstatement of the extent of franking credits dictated by my methodology with only approximately 64% of franked dividends being fully franked. Hence, imputation credits are sizeably if not fully priced on the relevant annual return basis. It is far higher than the one-day point estimate by Gray, Hall, and Costello (2011) based on dividend drop-off and the Australian Competition Tribunal of 25% indicated by equation (2) above. If the lagged franked and unfranked dividend responses that are not statistically significant but, nonetheless, reflect six- and twelve-month responses from illiquid firms, are removed from the analysis then the overall response increases to 66%.

What is most interesting in the Table 4 comparison is that the annual imputation differential due to the Brennan/Monkhouse franking credit and unfranked category variables is negligible at less than one half a percent return p.a. but rather is dominated by a lower franking dividend benefit of 2.55% p.a. due entirely to the lower systematic risk enjoyed by franking securities. The standard two-pass CAPM beta methodology prevents detection of these systematic risk differentials. The observed mean return differential of 1.24% p.a. for the ten non-dividend months between franking and non-franking securities accounts for the remainder of the differential.

My main conclusion from the excess return simulations in Table 4 is very striking: the required excess over the riskless rate for firms with foreign earnings that cannot create franking credits is very high at about 14.82% p.a., whereas local earnings taxed in Australia require a much lower premium of only 10.99% p.a. Hence the non-franking premium over the franking premium is 34.78% p.a. Since the non-franking excess return represents the tax grossed-up supply cost of foreign capital to Australian firms with overseas earnings, Australian investments which earn franking credits have a far lower cost of capital and required return of only 10.99% p.a. Since, logically, it is impossible for the local supply price of capital to be far lower than the global cost, my findings imply that the foreign tax-free cost of capital is not grossed-up by the impost of Australian corporate tax. Instead, foreign investors escape the tax by actively recycling franking credits to Australian investors who, naturally, value them far higher than their close to zero value to foreign investors. Even after paying corporate tax at the lower proposed rate of 25%, the tax-inclusive supply price of foreign capital becomes 13.83% p.a. which is still way higher than the existing cost of capital for franking firms of 10.99% p.a., representing the foreign marginal cost of supply with franking credit eligibility.

<< Insert Table 5 about here >>

The findings from Table 5 indicate that imputation benefits are fully priced within the month that an imputation credit is awarded, compared with a stock that normally provides benefits but instead provided an unfranked dividend. However, as predicted, the annual cost of capital/return differential is far lower at 31% of the theoretical maximum, compared with 61% when the comparison is with never-franking stocks. This much weaker effect strongly supports my modelling approach as securities that ordinarily provide recyclable imputation benefits because of their domestic investment focus should have a far lower cost of capital than local firms investing overseas that never provide imputation benefits and thus must pay the tax grossed-up world cost of capital. If only significant coefficients are included, the annual imputation benefit falls to 25% of its theoretical maximum.

As one might expect, there is not a huge difference in systematic risk between stocks that generally provide franking credits but occasionally do not. Thus, breaking down the annual return differential displayed in Table 5, 1.5% p.a. is due to the Brennan/Monkhouse category dummies with only 0.34% p.a. due to systematic risk differentials. Moreover, in non-dividend months one cannot distinguish between the more consistent franking credit providers and those that occasionally lapse.

Conclusions

The first thing to note is that this study is that it is based essentially on a new methodology from the perspective of testing franking credit hypotheses that improves on the more traditional dividend drop-off methodology and the two-pass CAPM beta return methodology which assumes, counterfactually, that one cannot attribute differing degrees of systematic risk to securities according to the individual tax status, franking versus non-franking. When the betas are estimated in the first pass, researchers not only deliberately ignore tax status and the endogeneity that this omission introduces, but additionally assume that better known issues concerning bias and inconsistency can be overcome by more sophisticated econometric methods. Hence, while my conclusions may seem suggestive rather than conclusive to some, my single-pass methodology offers a whole host of benefits in terms of simultaneously overcoming endogeneity, bias, and inconsistency.

My main conclusion that imputation credits are nearly fully priced within the Australian context on a full-year basis has profound implications for all the Treasury and ATO modelling of corporate tax cuts which underlie perhaps the major economic initiative of the Turnbull LNC government to lower corporate tax rates applicable to foreign investors from 30% to 25%. This modelling takes it for granted that the required return on Australian equity investment is represented by the grossed-up global return on risk capital with the corollary that imputation benefits are entirely unpriced with the domestic supply of capital fixed. If the Treasury is correct, then foreign investors, as the marginal investor in the Australian corporate sector, are currently burdened by Australia's corporate tax imposts. Hence, reducing the tax rate will result in some capital deepening and additional investment that might offset some of the direct loss of tax revenue. However, these effects are noticeably very small in GE modelling to date.

My contribution is to demonstrate that the overall level of investment in Australia is already at its globally efficient, non-tax distorted level due to the lucky accident that global investors can effectively time their purchases and sales of Australian securities eligible for franking credit benefits to avoid the impost of the highly inefficient tax grossing-up of the low tax-free global cost of capital. Hence, adopting a plan to further reduce the headline rate of tax in an attempt to further raise investment makes no sense whatsoever.

When Gordon (1986) proposed that it was efficient for nations such as Australia to forego the taxing of corporate profits to maximise welfare, little did he know that Australia would achieve this objective within a year or so with the introduction of dividend imputation.

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Table 1: Dummy Variable Definitions

Dummy	Definition
Franked dummy	= 1 if a dividend is paid in a particular month AND that dividend is franked = 0 otherwise (i.e. if a dividend is not paid, or a dividend is paid but it is not franked)
Unfranked dummy	= 1 if a dividend is paid in a particular month AND that dividend is not franked = 0 otherwise (i.e., if a dividend is not paid, or a dividend is paid and is franked)
Dividend-month	= 1 if a dividend is paid in a particular month (= Franked dummy + Unfranked dummy, i.e. the union of Franked dummy and Unfranked dummy) = 0 otherwise (i.e., if a dividend is not paid)
Non-dividend-month	= 1 if a dividend is NOT paid in a particular month (i.e. = 1 - dividend month) = 0 otherwise (i.e. if a dividend is paid in a particular month)
Lag N...	= 1 if the dummy variable was equal to 1 at N months prior to a particular month (e.g., lag6_franked_dummy = 1 if a franked dividend was paid 6 months ago) = 0 otherwise (i.e., if the dummy variable was not equal to 1 at N months prior to the particular month) (e.g., lag6_franked_dummy = 0 if 6 months ago a franked dividend was not paid, either no dividend or an unfranked dividend was paid)
Franking firm dummy	= 1 if a firm ever paid a franked dividend in the data period (i.e. 2000 to 2013, inclusive) = 0 otherwise (i.e., if a firm never paid a franked dividend in the data period)
Non-Franking firm dummy	= 1 if a firm never paid a franked dividend in the data period (i.e. = 1 – Franking firm dummy) = 0 otherwise (i.e., if a firm ever paid a franked dividend in the data period)
Non-dividend-firm	= 1 if a firm never paid any dividends in the data period = 0 otherwise (i.e., if a firm ever paid any dividends, = Franking-firm dummy + Non-Franking firm dummy)

Table 2: Summary Statistics for Dummy Variable Groups (Monthly Returns)

Dummy Groups				Excess Stock Returns		Excess Market Returns		Risk Free Rate	
Firms	Firm-months	Number of Firm Months	Proportion of Firms Grouping (%)	Mean	Std Deviation	Mean	Std Deviation	Mean	Std Deviation
All	All	247,473	100	0.0065667	1.0771390	0.0085963	0.0674718	0.0038675	0.0010419
All	Dividend-Month = 1	13,445	5.43	-0.0203426	4.3178050	0.0060992	0.0649765		
All	Franked Dummy = 1	9,141	3.69	0.0180734	0.1046693	0.0092255	0.0657814		
All	Unfranked Dummy = 1	4,304	1.74	-0.1019320	7.6298910	-0.0005406	0.0627256		
All	Non-dividend month = 1	234,028	94.57	0.0081127	0.3947673	0.0087397	0.0676097		
Franking Firms	All	97,800	100.00	0.0099035	0.1783084	0.0096001	0.0663709	0.0039267	0.0010029
Franking Firms	Dividend-Month = 1	10,583	10.82	0.0177889	0.1037753	0.0083942	0.0656391		
Franking Firms	Franked Dummy = 1	9,141	9.35	0.0180734	0.1046693	0.0092255	0.0657814		
Franking Firms	Unfranked Dummy = 1	1,442	1.47	0.0159850	0.0979336	0.0031249	0.0645035		
Franking Firms	Non-dividend month = 1	87,217	89.18	0.0089467	0.1853017	0.0097464	0.0664580		
Non-Franking Firms	All	28,563	100.00	-0.0060758	3.0954380	0.0096430	0.0668054		
Non-Franking Firms	Dividend Month = 1	2,862	10.02	-0.1613438	9.3563610	-0.0023874	0.0617395		
Non-Franking Firms	Franked Dummy = 1	0	0.00	NA	NA	NA	NA		
Non-Franking Firms	Unfranked Dummy = 1	2,862	10.02	-0.1613438	9.356361	-0.0023874	0.0617395		
Non-Franking Firms	Non-dividend month = 1	25,701	89.98	0.0112145	0.9489027	0.0109826	0.0672139		

Table 3: Regression Estimates for CAPM Model utilising All Observations and Securities that have Paid Franking Credits

	(1)	(2)	(3)
Observations	All Observations		Franking Credits Only
Dependent Variable	Excess Stock Returns	Excess Stock Returns	Excess Stock Returns
Excess Market Returns (EMR)	0.9432***	1.0557***	0.7365***
	(19.1662)	(62.4269)	(43.5375)
Franked Dummy		0.0123***	0.0100***
		(9.4539)	(8.0267)
Lag 6 Franked Dummy		0.0018	-0.0004
		(1.2350)	(0.2844)
Lag 12 Franked Dummy		-0.0010	-0.0031**
		(0.7552)	(2.2976)
Franked Dummy*EMR		-0.3692***	-0.1242***
		(15.3802)	(5.5047)
Lag 6 Franked Dummy* EMR		-0.3476***	-0.1023***
		(12.0299)	(3.7280)
Lag 12 Franked Dummy* EMR		-0.3611***	-0.1226***
		(14.2390)	(5.1563)
Unfranked Dummy		0.0163***	0.0123***
		(9.9863)	(4.9025)
Lag 6 Unfranked Dummy		-0.0010	0.0012
		(0.4732)	(0.3880)
Lag 12 Unfranked Dummy		-0.0020	0.0005
		(0.9540)	(0.1375)
Unfranked Dummy* EMR		-0.4287***	-0.1365**
		(12.1924)	(2.4988)
Lag 6 Unfranked Dummy* EMR		-0.3394***	-0.1829***
		(6.4897)	(2.8280)
Lag 12 Unfranked Dummy* EMR		-0.4011***	-0.1606***
		(10.3061)	(2.8430)
Constant	-0.0015	-0.0005	0.0024***
	(1.3950)	(-0.5888)	(3.5269)
N	247,473	224,862	91,128
R-squared	0.0035	0.0296	0.0673

t statistics in parentheses = * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Firms	All	All	Franking firms
Firm-months	All	All	All
Period	July-2001 to 2013 (inclusive)	July-2001 to 2013 (inclusive)	July-2001 to 2013 (inclusive)
Base case	All firms, Non-dividend months	All firms, Non-dividend months	Franking firms, Unfranked dividend months

Mean of Dependent Variable (DP)	0.006567	0.009153	0.010000
Standard Deviation of DP	1.077139	0.3966701	0.180299
Minimum value of DP	-500.5024	-1.678462	-0.928390
Maximum value of DP	148.9967	148.9967	18.996740

Table 4: Pricing Franking Security Returns Relative to Unfranked for Dividend Month and for Entire 12 Month Period[a]

			Dividend Month %		12 Months %	
Model Parameter	Coeff[b]	Sampl Val[c]	Franked	Unfranked	Franked	Unfranked
Excess Mkt Retn (EMR)	1.0557	0.0086	0.9075	0.9075	1.8150	1.8150
Franked Dummy (FD)	0.0123	1	1.23		2.46	
Lag 6 FD	0.0018	1	0.18		0.36	
Lag 12 FD	-0.001	1	-0.1		-0.2	
FD*EMR	-0.3692	0.00923	-0.3406		-0.6812	
Lag 6 FD*EMR	-0.3476	0.00923	-0.3207		-0.6414	
Lag 12 FD*EMR	-0.3611	0.00923	-0.3331		-0.6663	
Unfranked Dummy (UD)	0.0163	1		1.63		3.26
Lag 6 UD	-0.001	1		-0.1		-0.2
Lag 12 UD	-0.002	1		-0.2		-0.4
Unfranked Dummy*EMR	-0.4287	-0.00239		0.1023		0.2047
Lag 6 UD*EMR	-0.3394	-0.00239		0.0810		0.1621
Lag 12 UD*EMR	-0.4011	-0.00239		0.0958		0.1915
Constant	-0.0005	1	-0.6	-0.6	-1.2	-1.2
10 Months Non-Dividend Return		0.0097464			9.7464	
10 Months Non-Dividend Return		0.0109826				10.983
Sum			0.62	1.92	10.99	14.82
Difference				-1.29		-3.82
Relative Difference				-0.67		-0.26
Theoretical Maximum				0.42		0.42
Estimate/Theoretical				**1.61**		**0.61**

[a]Firms which have a recent history of paying franking credits and which just paid a franking credit vs firms which have never paid a franking credit and which did just pay a non-franked dividend.

Source:

[b]Column 2 of Table 3.

[c]Mean Excess Market Returns from Table 2 for All Firms (All); Franking Firms, Franking Dummy = 1; and Non-Franking Firms, Unfranked Dummy = 1.

Table 5: Pricing Franking Credits for Franking Securities for Dividend Month and Entire 12 Month Period[a]

			Dividend Month %		12 Months %	
Model Parameter	Coefficient[b]	Sample Value[c]	Franked	Unfranked	Franked	Unfranked
Excess Mkt Retn (EMR)	0.7365	0.0096001	0.7070474	0.7070474	1.4140947	1.4140947
Franked Dummy (FD)	0.01	1	1		2	
Lag 6 FD	-0.0004	1	-0.04		-0.08	
Lag 12 FD	-0.0031	1	-0.31		-0.62	
FD*EMR	-0.1242	0.0092255	-0.114581		-0.229161	
Lag 6 FD*EMR	-0.1023	0.0092255	-0.094377		-0.188754	
Lag 12 FD*EMR	-0.1226	0.0092255	-0.113105		-0.226209	
Unfranked Dummy (UD)	0.0123	1		1.23		2.46
Lag 6 UD	0.0012	1		0.12		0.24
Lag 12 UD	0.0005	1		0.05		0.1
Unfranked Dummy*EMR	-0.1365	0.0031249		-0.042655		-0.08531
Lag 6 UD*EMR	-0.1829	0.0031249		-0.057154		-0.114309
Lag 12 UD*EMR	-0.1606	0.0031249		-0.050186		-0.100372
Constant	0.0024	1	0.24	0.24	0.48	0.48
10 Months Non-Dividend Return		0.0097464			9.7464	
10 Months Non-Dividend Return		0.0097464				9.7464
Sum			1.27	2.20	12.30	14.14
Difference			-0.92		-1.84	
Relative Difference			-0.4286		-0.13	
Theoretical Maximum			0.4286		0.4286	
Estimate/Theoretical			**1.00**		**0.31**	

[a]Firms which have a recent history of paying franking credits and which just paid a franking credit vs firms which have a recent history of paying franking credits and did not just pay a franked credit.

Source:

[b]Column 3 of Table 3.

[c]Mean Excess Market Returns from Table 2 for Franking Firms according to Franked Dummy, Unfranked Dummy, or Non-Dividend Month.

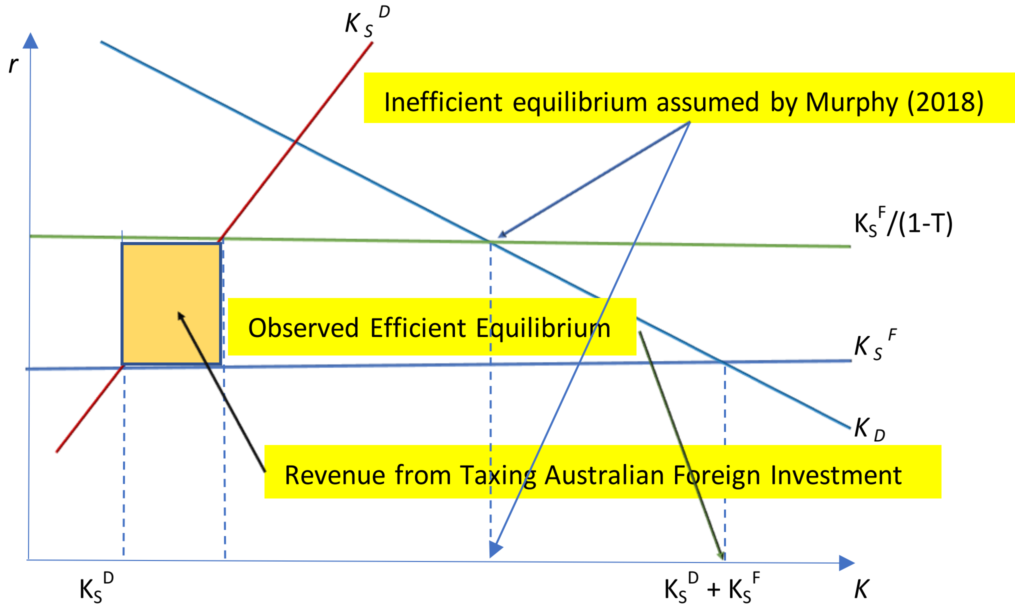

Figure 1: Tax Fanking Credit Equilibrium
Investment return is on the vertical axis and investment on the horizontal axis. Foreign investors pay no corporate tax due to recycling of franking credits but Australian foreign investors pay additional personal tax on their infranked dividend receipts given by the 42% gross-up of the foreign investor supply price represented by $K_S^F/(1-T)$.