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Dividend Imputation and the Equity Market Premium

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Abstract: Much uncertainty has existed over the impact of the imputation tax system on the size of the equity market premium in Australia. This paper presents a simple equilibrium model which answers that question under certain simplifying assumptions. The analysis implies that the introduction of imputation should have led to: a one off increase in Australian equity prices; a lasting decline in the equity premium in Australia; an increase in the dividend drop off rate relative to overseas; and a change in the trading patterns of foreign investors in the Australian equity market.

Introduction

Since the introduction of a dividend imputation system of taxation in Australia in 1987, there has been much debate about its consequences for the required rate of return on equity. One strand of debate has focused upon the appropriate form of asset pricing models for deriving required (or expected) rates of return on individual risky assets, such as the CAPM[1]. A second contentious issue has involved the appropriate size of the "equity premium" (the difference between the expected return on the equity market and the risk free interest rate) to be used in the CAPM model[2].

The objective of this paper is to provide some guidance on the second of these issues, utilising a simple aggregative model of the equity market in an international setting. While the relevance of a simple CAPM in an international market where investors are subject to differential tax treatment can be questioned, market participants do pay significant attention to the concept of the equity premium.

Section one provides a brief overview of the imputation tax system, focusing upon the differential tax treatment of domestic and foreign investors and upon alternative definitions of rates of return possible under the imputation tax system. Understanding those alternative definitions is important, because much confusion has emerged in the literature as a result of different authors using different

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[1] See, for example, VanHorne, Wachowicz, Davis and Lawriwsky (1994) and Monkhouse (1993). Bowers and Wood (1992) focus upon the bias induced in the composition of domestic and foreign investor portfolios and derive asset pricing equations. Wood (1995) utilises a mean-variance model to derive the value of franking credits under specific assumptions about the degree of integration of the Australian market with overseas.

[2] The issue of whether estimates of the risk premium based on historical figures are too large to be consistent with reasonable estimates of investor risk aversion is another question separate from, but relevant to, the issue considered in this paper. See, for example, Mehra and Prescott (1985), Scott (1992), Benartzi and Thaler (1995).

definitions[3]. In the purposes of clarity, it is stressed that the results derived in this paper relate to equity returns measured on a post-company but before investor-level tax, as is commonly done when a classical tax system is considered. (At an aggregate level that can be interpreted as the return measured by the percentage change in the All Ordinaries Accumulation Index). In this context, under an imputation tax system, company tax refers to tax paid by the company even though some part of that tax may be interpreted as a prepayment of investor-level tax[4].

Section two provides an overview of the previous literature, presenting conflicting views on the impact of imputation on the equity premium. Section three develops a simple model of domestic equity market equilibrium under very specific assumptions, in order to derive some base case results. Those assumptions relate to the nature of domestic and foreign demand for domestic equities, the possibilities available for short selling, and the particular form of equity returns. In particular, it is assumed that domestic equities involve a 100 per cent payout of earnings as franked dividends, although the discrete nature of dividend payouts means that investors selling equities cum-div can achieve returns in the form of capital gains. The argument illustrates how arbitrage activities will link the expected return on domestic and foreign equities. The results of this analysis can be summarised as Proposition 1.

> <u>Proposition 1</u>: If domestic investors regard domestic and foreign equities offering equal returns after all tax as perfect substitutes and can engage in unrestricted short selling of foreign equities, the introduction of imputation will have
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> [a] led to an increase in domestic equity prices, and
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> [b] reduced the required rate of return on domestic equity (after company tax, as conventionally defined) below that prevailing overseas.

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[3] See for example the debate in JASSA (Brailsford and Davis, 1995a, 1995b, Easton and Howard, 1995, Hathaway, 1995).

[4] Officer (1994), for example, has adopted an alternative approach in which company tax is defined as that part of tax paid by companies which is not offset by use of tax credits by Australian shareholders.

Section four then examines the role of domestic and foreign investors in the domestic equity market arising from the differential tax treatment of dividends and capital gains. Because dividends are paid at discrete intervals, equity prices will follow a saw tooth pattern involving a drop-off at ex dividend dates of a size dependent upon the tax system in place. It is thus possible for investors to time purchases and sales of equity to determine whether they receive realised returns in the form of dividends or capital gains. This timing option provides investors with a tax selection option which leads to Proposition 2.

> Proposition 2: After the introduction of imputation, foreign investors will purchase domestic equities ex div and sell cum div, and receive returns in the form of capital gains which gives them a rate of return after all tax equal to that received by them on foreign equities.

Section five provides some concluding comments and caveats involved in applying these results.

1. The Imputation Tax System and Rates of Return

As noted above, the dividend imputation tax system was introduced in Australia in 1987, after considerable discussion about future shape of the tax system arising from the September 1985 Tax Summit. Imputation replaced the previous "classical" tax treatment of dividend income which had involved "double taxation" of dividends arising from income generated by companies being taxed at the company tax rate and then again at the investor level when distributed as dividends[5].

Under the imputation tax system, Australian companies receive credits to a "Franking Account Balance (FAB)" when Australian company tax is paid. Dividends paid when the FAB is positive (and which diminish that balance) are deemed to be "franked" and carry with them certain tax

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[5] Various provisions for tax treatment of intercompany dividends, to avoid double taxation at the company level were in place.

implications for recipient shareholders. In particular, the taxable income of a recipient shareholder is "grossed up" by an amount equivalent to the company tax previously paid which enabled that franked dividend payment, and a tax credit of equivalent amount given to the shareholder.

Specifically, company income of \$1 taxed at a company tax rate of t_c leads to a FAB of $t_c/(1-t_c)$ and enables the company to pay a franked dividend of \$ $(1-t_c)$. The "grossed up" taxable income of the investor is equal to the cash amount of the dividend \$$(1-t_c)$ plus franking credits of amount \$$t_c$ giving a total of \$1. The tax payable on this income by the investor on personal tax rate t_p is \$$t_p$, but the amount remaining to be paid is reduced by the tax credit received of \$$t_c$ to an amount of \$$(t_p-t_c)$. Total tax thus paid on the original \$1 of company income is \$$t_p$, provided that the investor can utilise the tax credit available. Since Australian taxpayers can utilise franking credits against other income, even investors with personal tax rates below the company tax rate can gain full benefit from those tax credits, unless their marginal tax rate is zero and they have tax credits remaining unused.

For foreign investors, a different situation arises, because the Australian tax credits cannot be utilised to reduce personal tax payable in their home country. Thus for a foreign investor on personal tax rate of t_p , the dividend of \$$(1-t_c)$ will be subject to further tax at rate t_p giving an after all tax amount of \$$(1-t_c)(1-t_p)$. The return after all tax for a foreign investor recipient of a franked dividend is thus lower than that for a domestic investor with an equivalent personal tax rate.

The interaction between the company and personal tax systems created by the introduction of imputation has led to several alternative definitions of rates of return for investors. One possibility is to measure rates of return "grossed up", where the tax credits accompanying a franked dividend are included in the calculation[6]. Thus, an investor purchasing a share for price P_0 at date 0 and receiving a franked dividend of amount d and capital gain of amount ΔP would have a grossed up

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[6] Such an approach has gained some acceptability in broking circles where investors are often advised of grossed up dividend yields.

rate of return of amount $r^* = [d/(1-t_c) + \Delta P\ ] / P_0$. In essence, this is a measure of the investor's rate of return before company tax (which under imputation can be interpreted as a prepayment of investor tax). The benefits of such a definition are twofold. First, it involves comparable treatment of both components of return (dividends and capital gains) in terms of subsequent personal tax treatment. The after tax return can be calculated directly from r* using the investor's personal tax rate (although the taxation of real capital gains rather than nominal capital gains creates a complication for holding periods in excess of one year). Second, since equities paying unfranked dividends involve no grossing up, the grossed up rate of return can be compared directly to the return on an equity paying unfranked dividends. The disadvantages of such a definition are that grossing up is irrelevant for an important category of investors (foreigners), and that it involves a different terminology and method of calculation to that used in most foreign markets.

An alternative, and conventional, measure is to ignore franking credits in the calculation of rates of return, giving a rate of return measure of $r = [d + \Delta P\ ] / P_0$. This is a measure of return post company tax but pre investor-level tax, but ignores the impact of those company tax payments on investor-level tax remaining to be paid. In comparing returns on different equities, it is thus necessary to indicate the extent of franking attached to the dividend component[7].

Between these measures, several authors (Officer, 1994, Easton and Howard 1995 are examples) have suggested that what might be termed a "partially-grossed up" rate of return be used. The argument advanced in this case is that on average, only some part of tax credits paid out to investors are utilised. Some part of company tax can thus be viewed as a prepayment of personal tax and the remainder viewed as an impost additional to the personal tax system. If γ is the proportion of franking credits paid out which are utilised to reduce personal tax payments, and C is the amount of tax credits associated with the dividend d, the rate of return measure suggested is:

[7] More precisely, the return needs to be split up into its three components of franked dividends, unfranked dividends, and capital gains, since the tax treatment of each differs.

$$r^{\#} = [d+\gamma C+ \Delta P] / P_0.$$

For a share paying fully franked dividends, $C = d.t_c / (1-t_c)$. It can be seen that if $\gamma=1$, $r^{\#} = r^*$, and if $\gamma=0$, $r^{\#}=r$.

Those authors who have proposed using $r^{\#}$ have also tended to describe it as a return after company tax, relying on the argument that some part (γ) of tax paid by companies is a prepayment of personal tax, so that only the remainder should be called company tax. While, in principle, the argument is correct, its practical implications make this measure an unsatisfactory one. First, it involves using the term "company tax" in a way at variance with standard business and tax law practice, and thus can create confusion. Second, the measure is applicable to virtually no investors. Except for a small minority of Australian investors whose tax planning reduces tax payable to zero with some franking credits remaining unused (and whose utilisation rate is thus between zero and one), all other investors have a utilisation rate (γ) of either zero or unity. Third, if capital budgeting is to be undertaken using this measure of required return, cash flows need to be also adjusted to reflect some proportion of imputation credits[8], creating needless complications for such analysis.

2. Views on the Equity Premium

Before the introduction of the imputation tax system, typical estimates of the equity premium required by investors to hold equities rather than risk free assets were in the order of 6-8% p.a[9]. These estimates were based on rates of return measured in the conventional way, ie not involving any grossing up of returns for franking credits associated with dividends. An issue which has subsequently divided analysts is that of what can be expected to have happened to the size of that premium after the introduction of imputation. Imputation has changed the relative tax treatment of equity returns (measured in the conventional way) vis a vis risk free returns for Australian investors,

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[8] See Officer (1994)

[9] See, for example, Officer (1989).

but has not changed the relative tax treatment for foreign investors. Since investor demands for assets are ultimately dependent upon returns after all tax, these changes may have affected the pattern of demand and led to changes in relative prices and rates of return.

Debate on this topic has been somewhat confusing for two main reasons, First, different authors utilise different definitions of returns (as discussed in section 1) often without making the definition explicit. Second, some parts of the debates have focused on the question of the "value of imputation credits" and other parts on the question of the impact of imputation on the size of the equity premium. While these two questions are equivalent if the Australian equity market provided returns solely in the form of franked dividends, that is not in practice the case. Some part of return takes the form of capital gain, some part is franked dividends, and some part is unfranked dividends.

Officer has been a major contributor to the analysis of the impact of imputation (Officer 1987, 1988, 1994, Hathaway and Officer 1992). His views appear to have shifted over time. In Officer (1987) he appears to adopt the polar position (adopted also by Pierson, Bird, Brown and Howard (1990)), which argues that the equity premium, as conventionally measured, will be unchanged by the introduction of imputation. Underpinning that argument is the assertion that for a small country such as Australia the dominance of foreign investors will drive returns to equality across countries. Even though Australian equity returns will carry with them imputation credits, these will not be priced by foreigners to whom they are of no value. Thus, the introduction of imputation should not have affected the equity premium.

More recently, Officer (1988, 1994) has argued that if equity returns are measured on a "partially grossed up" basis, the equity premium (measured in this way) is unlikely to have changed - since this would leave relative returns after all tax unchanged. Thus, the equity premium as traditionally measured would have fallen with the introduction of imputation. This view, that the (traditionally measured) equity premium will have fallen also appears to have been advanced by McKinsey and Co. (Irvine, 1994).

How much the equity premium, conventionally measured, will have fallen is a matter of debate. Officer, arguing that on average imputation credits are only partially valued, and thus that it is "partially grossed up" returns which will not change, appears to imply that the equity premium would not fall by the full amount of imputation credits, even if the Australian market paid returns only in the form of franked dividends. While that is an empirical issue, on which Officer's view may be correct, it must be asked why imputation credits would be only partially valued in an open capital market. In such a situation, arbitrage activities should ensure that imputation credits are received by those who fully value them. To the extent that partial valuation results from impediments to international arbitrage activities by Australian or overseas investors, Officer's argument that the partially grossed up returns will remain unchanged following the introduction of imputation, due to arbitrage, must then be called into question.

The alternative polar position is that the equity premium in Australia will be lower than that overseas (or than in Australia pre-imputation) by the extent of the imputation credits available to domestic investors[10]. The argument for a lower domestic equity premium is based on recognising that only in these circumstances will the returns post-personal tax be the same on both domestic and foreign stocks for domestic investors. Likewise, the argument that the premium will have fallen vis a vis pre-imputation is based on recognising that this is necessary if the after-all-tax premium for domestic investors is to be unchanged and, it is argued, imputation should not have affected this.

According to this latter argument, a value for the equity premium post imputation can be calculated by noting that the after tax equity premium under classical taxation is:

$$(r_m-r_f)(1-t_p)$$

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[10] See, for example, Monkhouse (1993). Van Horne, Wachowicz, Davis and Lawriwsky (1994, pp 147-149) examine the implications of such an argument when Australian equity returns involve a mix of franked dividends, unfranked dividends, and capital gains.

whereas under imputation, the after tax equity premium is:

$$r_m(1-t_p)/(1-t_c) - r_f(1-t_p)$$

If, for example, the risk free interest rate was 6 per cent p.a. and the equity premium was 8 per cent p.a. under a classical tax system, an individual on a 40 per cent tax rate would receive an after tax risk free interest rate of 3.6 per cent p.a. and an after tax rate of return on equities of 8.4 per cent p.a.. The after tax equity premium is thus 4.8 per cent p.a. for such an individual. Under imputation, with a corporate tax rate of 33 per cent, an after tax equity return of 8.4 per cent requires a pre tax return of 9.38 per cent p.a.. The pre tax equity premium associated with an unchanged post tax premium of 4.8 per cent is thus 3.38 per cent p.a. Naturally, the precise value derived from such a calculation depends upon the risk free interest rate and historical equity premium assumed, as shown in Table 1.

Table 1

Equity Premium under Dividend Imputation*				
	historical premium $=(r_m^h - r_f)$			
rf	0.08	0.07	0.06	0.05
0.02	0.047	0.0403	0.0336	0.0269
0.04	0.0404	0.0337	0.027	0.0203
0.06	0.0338	0.0271	0.0204	0.0137
0.08	0.0272	0.0205	0.0138	0.0071
0.1	0.0206	0.0139	0.0072	0.0005

* The equity premium is calculated using the formula

$$r_m - r_f = (r_m^h - r_f)(1 - t_c) - t_c r_f$$

The following sections demonstrate, using a simple model, the critical assumptions involved in deriving these alternative results, and provide a formal analysis of the impact of imputation on the equity premium at an aggregative level.

3. The Model

In order to focus upon the effect of imputation alone, the model developed here makes some major simplifying assumptions. Some consequences of relaxing these assumptions are considered subsequently.

It is assumed that there are two countries in the world. The domestic country (D) is small and the analysis will focus upon a situation in which it switches from a classical to an imputation system of taxation. The foreign country (F) operates under a classical tax system. For simplicity we assume that the personal tax rate is the same in both countries ($t_p^D = t_p^F = t_p$), as is the company tax rate ($t_c^D = t_c^F = t_c$). Both dividends and capital gains are subject to tax at the personal tax rate in each country. There is a fixed exchange rate (assumed to be unity) between the two countries, zero inflation, and no withholding taxes or other barriers to capital flows. Under these assumptions, the risk free interest rate will be the same in both countries and without loss of generality can be assumed to be zero (in order to simplify the presentation).

There is assumed to be only one risky asset in each country, ownership of which is traded in the form of shares of one equity security (a market portfolio) on each country's stock market. The risky assets are infinitely lived and generate cash flows in the form of a risky perpetuity of expected amount $x per year. The cash flows of the domestic and foreign asset are perfectly correlated, and the quantity supplied of each is fixed. The cash flow stream of each risky asset is subject to company tax by the government of that country, and the remaining cash flow after company tax, given by $d = x(1-t_c)$, is distributed as dividends to shareholders.

Whereas cash flows generated by the risky asset are distributed once per year, trading in equities occurs continuously. Consequently, equity prices follow a saw-tooth pattern with a drop occurring when they go ex-div. We examine investor returns over two periods. One involves returns when an investor purchases a share when it goes ex-div and holds it until it again goes ex-div, so that returns take the form of franked dividends only. The second time period involves investors purchasing a share when it goes ex-div and selling it just before the ex-div date, so that returns take the form of capital gains only.

Because of the small country assumption, we can take the price of foreign country equities (P_F) as exogenous to the model, and equal to the present value of expected future dividends discounted at the discount rate (ρ_f) applicable for the marginal investor in that market. Since the comparative static analysis to be conducted later does not involve any changes impacting upon the foreign equity market, we do not need to examine any further the composition of investors in that market. The price of foreign equities will follow a saw tooth pattern, being equal to d/ρ_f when a share goes ex-div[11] and rising to $d/\rho_f + d$ immediately prior to going ex-div, when it drops again to d/ρ_f. (Because both capital gains and dividends are taxed at the same rate, the drop-off factor is unity). The rate of return after all tax from purchasing foreign equity ex-div and selling one year later (ex-div) is $d(1-t_p)/(d/\rho_f) = \rho_f(1-t_p)$, while the rate of return from buying ex-div and selling virtually one year later cum-div is also $(d/\rho_f + d - d/\rho_f)(1-t_p) / (d/\rho_f) = d(1-t_p) / (d/\rho_f) = \rho_f(1-t_p)$

Foreign investors are indifferent between foreign or domestic equities provided the after-all-tax returns are the same. Given the relative size of the foreign market, this implies an infinitely elastic demand for domestic equity by foreign investors at some price dependent on the nature of the tax

[11] This is given by the present value of a perpetuity of amount d discounted at a rate ρ_f

systems. A critical issue to be discussed below is the role which this infinitely elastic demand for domestic equities by foreigners plays in determining domestic equity prices under different tax regimes.

Likewise, domestic investors are indifferent between foreign or domestic equities provided the after-all-tax returns are the same. Domestic investors can purchase foreign equities ex div for a price P_F which will yield a rate of return of $\rho_f (1-t_p)$ after all tax. The implications of this for their demand for domestic equities depends upon the nature of the tax system and the distribution of required returns of domestic investors. Since it is important that we understand the nature of demand by domestic investors we examine the latter issue first.

We assume that the risk tolerances and thus discount rates of domestic investors range across a spectrum of values. In the absence of access to the foreign equity market, this would give rise to a downward sloping demand for domestic equities from domestic investors. In such a closed market, the equilibrium price for domestic equity ex-div would be equal to d/ρ_d, where ρ_d is the discount rate of the marginal investor. Figure 1 illustrates. Panel A shows the price which investors with different discount rates would be willing to pay for the domestic equity[12]. Panel B shows the total demand curve for domestic equity, which depends upon the (not shown) frequency distribution of discount rates, and equilibrium in the closed domestic equity market is given at price P_d. Only those investors with discount rates below ρ_d will invest in the domestic equity. Given the assumption of a zero risk free interest rate, ρ_d represents the equity premium in the domestic country (as does ρ_f for the foreign country).

Once we allow for integrated capital markets, the nature of the domestic demand for domestic equity and its role in price determination will depend upon the characteristics of the tax system - to which we now turn..

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[12] It is a rectangular hyperbola because $P = d/\rho$.

Classical tax systems

Under a regime of classical taxation in both countries, as assumed here, it is easy to demonstrate that equity returns should be the same in both countries. The reason lies in the fact that the tax treatment of equity returns for an investor does not depend upon the country from which those returns are derived[13]. Given the exogeneity of foreign equity returns, and the infinitely elastic demand for domestic equity by foreign investors at price P_f, we need only examine the demand by domestic investors for domestic equity.

First, we note that no investor will pay more than P_f for domestic equity, since a perfect substitute (in the form of foreign equity) is available. Thus the price cannot exceed P_f. Because of the infinitely elastic demand by foreigners at P_f, the price does not fall below this value. Hence, the price of domestic equity will also be P_f and the required rate of return ρ_f.

One imputation, one classical tax system.

Consider now the situation where the domestic country introduces an imputation tax system. This implies that for tax purposes the return on domestic equity to domestic investors is "grossed up" in reflection of company tax already paid. Assuming that the company tax rate is t_c, the return is grossed up by the factor $[1/(1-t_c)]$. Tax credits equal to the imputed income ensure that the after tax return equals that derived from applying the personal tax rate to the grossed up return.

Table 2 indicates the differences in “grossed up” returns, upon which personal tax is paid, for domestic and foreign investors for domestic shares offering a return of r_d and foreign shares offering a return of r_f. It is worth noting that foreign investors do not benefit from the grossing up of

[13] Company tax, at the same rate in both countries, is levied in the country of origin an personal tax then levied in the country of residence. (We assume no withholding taxes).

domestic equity returns, introducing an asymmetry into the payoff matrix. In effect, the domestic government is providing a subsidy to domestic investors who purchase domestic equities.

Table 2

"Grossed-up" returns

		Investors	
		Domestic	Foreign
Shares	Domestic	$r_d/(1-t_c)$	r_d
	Foreign	r_f	r_f

The impact of this change upon the domestic equity market is as follows. First, foreign investors will be unaffected, since the imputation credits are of zero value to them. They will still provide an infinitely elastic demand for domestic equity at an ex-div price of P_f Second, however, domestic investors may be willing to pay a price in excess of P_f, because of the differential tax implications of domestic equity returns vis a vis foreign equity returns. In particular, a domestic investor will be indifferent between foreign equity at a price of P_f with a yield after all tax of $\rho_f\,(1-t_p) = d(1-t_p)/P_f$ and domestic equity at a price of $P_d = P_f\,/(1-t_c)$, with a yield after all tax of $(1-t_p)(d/(1-t_c))/P_f/(1-t_c) = d(1-t_p)/P_f$ and will prefer domestic equity at any price below this.

Consequently, the total demand curve for domestic equity will have the shape depicted in Figure 2. No investor will be willing to pay above $P_f\,/(1-t_c)$. Domestic investors with low required rates of return (below $\rho^{/}$), and who in a closed market would be willing to pay higher prices for domestic equity will limit their offer price to $P_f\,/\,(1-t_c)$. Foreign demand will place a floor on the demand price of P_f, and domestic investors with discount rates above $\rho^{//}$ will be excluded from the market. Domestic investors with discount rates between $\rho^{/}$ and $\rho^{//}$ will have their demand reflected in the downward sloping component of the demand curve.

It can be seen from Figure 2 that three outcomes appear possible, depending on the size of the stock of domestic equities. First, domestic equity prices rise to P_f / (1-t_c) if supply is S^1. Second, domestic equity prices rise partially if supply is S^2. Third, there is no apparent effect on domestic equity prices if supply is S^3. It is important that we examine each separately, since some of these results only hold is short selling of foreign equities is restricted.

Case 1. Full adjustment of domestic equity prices.

This outcome occurs when the net wealth of domestic residents is sufficiently large vis a vis the stock of equities to support demand which exhausts supply. The differential between domestic and foreign equity prices is not exploitable by arbitrage by foreigners as shown in Table 3.

Table 3

Foreign Investor Arbitrage Bounds

Action	**Cash Flow Now**	**After tax Cash Flow Next Year**
Buy 1 foreign equity	$-P_f$	$P_f + d(1-t_p)$
Short sell 1-t_c domestic equity	$P_f = P_d\ (1-t_c)$	$-P_f - d(1-t_c)(1-t_p)/(1-t_c)$
		$= -P_f - d(1-t_p)$
Outcome	0	0

While foreign investors might attempt to short sell domestic equity and purchase foreign equity (since returns though risky are perfectly correlated) the cost of short selling involves recompensing domestic equity lenders for the franking credits given up. Thus the cash outflow next year associated with the short sale of domestic equity includes a grossed up dividend amount of $d/(1-t_c)$, on which personal tax relief is given, as well as the purchase price of the security.

Case 2. Partial adjustment occurs.

Provided that short selling of foreign equity by domestic investors is possible, this outcome is not sustainable. Suppose that the domestic share price increases to $P_d = P_f / (1-\beta t_c)$ where $0<\beta<1$. Arbitrage opportunities exist for domestic investors by purchasing domestic equity and short selling foreign equity, as Table 4 shows. This occurs because the personal tax remaining to be paid on a franked dividend from domestic equity is less than the tax deduction arising from the cost of short selling. The short seller receives tax relief on the dividend amount to be reimbursed to the lender of stock, but faces less tax to be paid on the franked dividend received.

Table 4

Domestic Investor Arbitrage Bounds

Action	**Cash Flow Now**	**Cash Flow Next Year**
Buy $(1-\beta t_c)$ domestic equities	$-P_d\ (1-\beta t_c)$	$P_d(1-\beta t_c) + d(1-\beta t_c)(1-t_p)/(1-t_c)$
Short sell 1 foreign equity	$P_f = P_d\ (1-\beta t_c)$	$-P_d\ (1-\beta t_c)- d(1-\beta t_c)(1-t_p)$
Outcome	0	$d(1-\beta t_c)(1-t_p)(t_c/(1-t_c)) >0$

These actions will drive the domestic equity price up until full adjustment as in Case 1 occurs. Hence Case 2 is not feasible in an open capital market.

Case 3. No adjustment occurs

As in case 2, this outcome is not possible if domestic investors are able to short sell foreign equities. The arbitrage opportunities can be seen by repeating the analysis in Table 4 with β set equal to 0.

Conclusion

The preceding analysis demonstrates that under the assumption of unlimited short selling opportunities in foreign equities for domestic residents, the domestic share price must increase following the introduction of imputation from $P_d = P_f$ to $P_d = P_f / (1-t_c)$. Since the return to shareholders after company tax but before investor-level tax is unchanged at \$d, the required return has thus fallen from $\rho_f = d/P_f$ to $\rho_d = d(1-t_c)/P_f$. No foreign investor will purchase domestic equities ex div and hold them until after the next dividend date, since the rate of return is less than that available from foreign equities. We summarise these results as:

> Proposition 1: If domestic investors regard domestic and foreign equities offering equal returns after all tax as perfect substitutes and can engage in unrestricted short selling of foreign equities, the introduction of imputation will have
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> [a] led to an increase in domestic equity prices, and
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> [b] reduced the required rate of return on domestic equity (after company tax as conventionally defined) below that prevailing overseas

4. Foreign Investor Participation in the Domestic Market

While foreign investors will be unwilling to purchase domestic equities if returns are to be received in the form of dividends, it is possible for them to engage in trading activities, buying ex-div and selling cum-div, which ensure that returns are received as capital gains. The question arises as to whether the rate of return received from such investments is sufficient to induce them to participate in the domestic market.

It is easy to demonstrate that the answer to this question is yes. Domestic equity prices will follow a saw tooth pattern, with a price ex-div of

$$P_d^{ex\ div} = P_f / (1-t_c)$$

rising to a maximum price cum-div of

$$P_d^{cum\ div} = P_f /(1-t_c) + d/(1-t_c).$$

The dividend drop off rate of $1/(1-t_c) = (P_d^{cum\ div} - P_d^{ex\ div})/d$ ensures that there is no arbitrage opportunities for domestic investors trading around ex-div dates. Purchasing cum-div and selling ex-div generates after tax capital losses of $(1-t_p)d/(1-t_c)$ and after tax dividend income of $(1-t_p)d/(1-t_c)$. Note that the dividend drop off exceeds that in the foreign country (where it is unity). Foreign investors purchasing ex-div and selling cum-div receive returns in the form of a (taxable) capital gain of $d/(1-t_c)$. The rate of return before investor-level tax is thus

$$\rho_f = [d/(1-t_c)]/[P_f/(1-t_c)] = d/P_f$$

which is the same rate of return as they can achieve from investing in foreign shares. Thus, in the absence of transactions costs etc., we are able to state:

> Proposition 2: After the introduction of imputation, foreign investors will purchase domestic equities ex div and sell cum div, and receive returns in the form of capital gains which gives them a rate of return after all tax equal to that received by them on foreign equities.

In practice, a similar outcome can be achieved by foreign investors engaging in scrip lending schemes around the ex div date. If foreign investors do sell cum div and buy ex div, their exposure to random fluctuations in equity prices between the two dates can be hedged by transactions in equity futures markets (if they exist) or by entering forward contracts with other investors.

5 Conclusion

The preceding analysis has demonstrated that, under certain simplifying assumptions, the introduction of the imputation tax system to Australia would have led to

[a] a one-off increase in the price of domestic equity relative to foreign equity

[b] a lasting decrease in the cost of equity capital for Australian firms, both after company tax (as traditionally defined) and before tax

[c] an increase in the dividend drop-off rate for Australian equities relative to that on foreign equities

[4] foreign investors in Australian equities selling cum-div in order to capture returns as capital gains before the dividend drop off in excess of unity reduces the rate of return they achieve.

In practice, of course, the conditions required to derive these results are unlikely to be met, creating problems for empirical testing. International differences in company tax rates and in personal tax scales, differences in the treatment of capital gains, existence of withholding taxes are all relevant factors. Imperfect correlation between domestic and foreign equity returns and exchange rate risk are also important. Transactions costs and other barriers to international investment will also affect the outcome. The failure of companies to pay-out 100% of earnings as franked dividends, and the existence of companies in non-taxpaying positions also complicate matters.

Over the longer run, it could also be expected that the incentive to domestic investment given by the effective removal of company tax would lead to expansion of the domestic physical capital stock and affect the productivity of returns on it vis a vis the rest of the world. More generally, in attempting to test those propositions, confounding factors arise in the form of the prior knowledge (speculation) about the forthcoming introduction of imputation, changes to the taxation treatment of major domestic investors in 1988, changes in domestic (corporate and personal) tax rates, introduction of capital gains tax in 1985, and changes occurring in tax systems in foreign countries.

Despite those complications, the analysis provides a useful basis for clarifying the impact of dividend imputation on the equity market premium and the cost of equity capital for Australian companies. Further research on the effect of the complications discussed above will enable better estimates of the equity market premium under imputation to be derived for use by financial market practitioners.

REFERENCES

Benartzi S and R H Thaler (1995) Myopic Loss Aversion and the Equity Premium Puzzle" Quarterly Journal of Economics, CX, 1, February, 73-92

Bowers J and J Wood "International Portfolio Investment with Dividend Imputation Taxes" Working Paper AGSM November 1992.

Brailsford T J and K T Davis (1995a) "What Imputation Means to the Cost of Capital" JASSA, March, 10-18

Brailsford T J and K T Davis (1995b) "Understanding Imputation" JASSA, December, 14-17

Easton S and P Howard (1995) "Struggling With Imputation" JASSA, September, 26-9

Hathaway N J (1995) "Another Voice" JASSA, December, 18-21

Irvine M (1991) "Clarifying the Link between the Cost of Capital and Australia's Competitiveness" McKinsey and Company, Melbourne

Mehra R and E C Prescott (1985) "The equity premium: a puzzle" Journal of Monetary Economics, 15

Monkhouse P H L (1993) "The Cost of Equity Under the Australian Dividend Imputation Tax System" Accounting and Finance, 33,2, November, 1-18

Officer R R (1994) "The Cost of Capital Under An Imputation Tax System" Accounting and Finance, 34, 1, May, 1-18

Officer R R (1988) “A Note on the Cost of Capital and Investment Evaluation for Companies Under the Imputation Tax” Accounting and Finance, 28, 2, November, 65-71

Officer R R `The Required Rate of Return and Tax Imputation: Estimating the Effect of the Imputation Tax on Investment Appraisal' Australian Tax Forum, 4, 3, 1987, 405-417

Pierson G., Bird R., Brown R., and P Howard (1990) Business Finance,

Scott M FG (1992) “The cost of equity capital and the risk premium on equities” Applied Financial Economics, 21, 21-32.

Van Horne J, Wachowicz J, Davis K, and M Lawriwrsky (1994) Financial Management and Policy in Australia (fourth edition), Prentice Hall Australia, Sydney.

Figure 1: Domestic Equity Equilibrium: Closed Economy

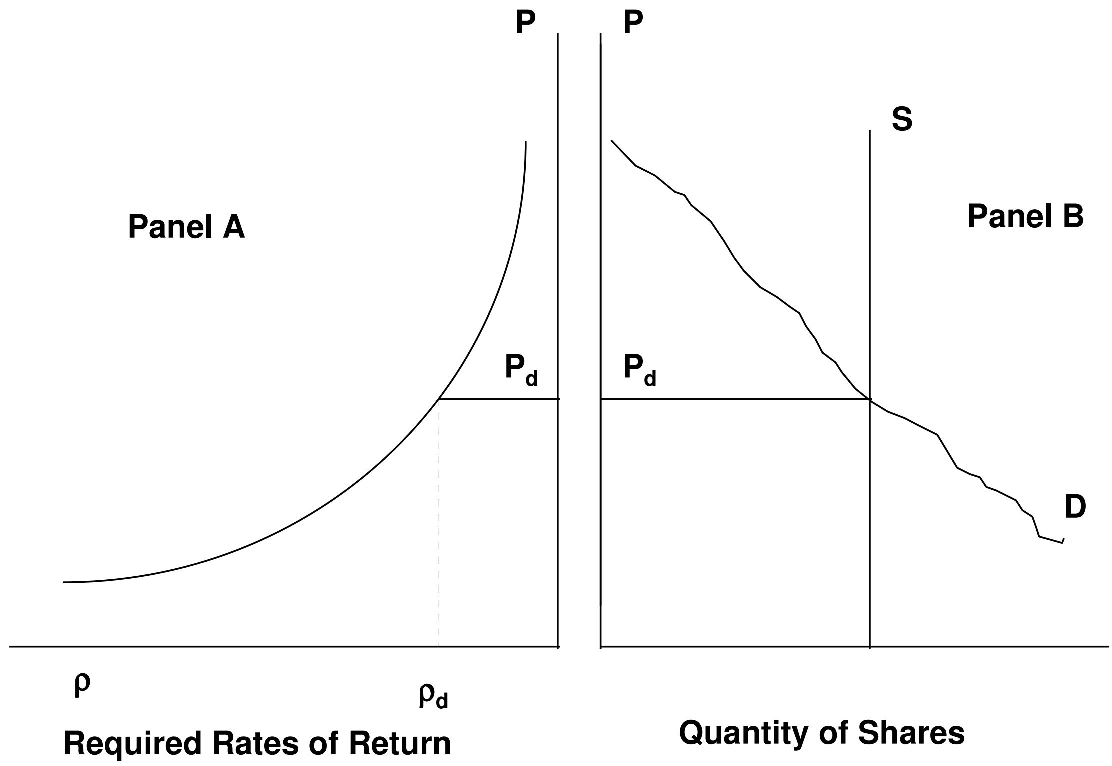

Figure 2: Domestic Equity Market Equilibrium: Arbitrage Prohibited