Capital Structure Choices and Taxes: Evidence from the Australian Dividend Imputation Tax System*

GARRY TWITE
Australian Graduate School of Management, Universities of New South Wales and Sydney

ABSTRACT

The introduction in 1987 of a dividend imputation tax system in Australia represented a significant change to the tax framework. To the extent that tax incentives influence the use of debt financing, changes in tax laws that alter these incentives will lead to changes in corporate capital structures. This paper examines the changes in corporate capital structure around the introduction of a dividend imputation tax system. The introduction of dividend imputation provides an incentive for firms to (a) reduce the level of debt financing utilized where this incentive varies across firms depending on the firm’s effective corporate tax rate, and (b) increase the level of external equity financing. The results present evidence consistent with these incentives.

I. INTRODUCTION

The impact of taxes on corporate financial decision making has been the focus of extensive research since Modigliani and Miller (1963). In a world with only corporate taxes and no personal taxes, the tax deductibility of interest within the corporation creates a clear preference for debt in the corporate capital structure. With both corporate and personal taxes, the preference for debt is less obvious and will depend upon the rates of tax on interest, dividends and capital gains, as well as the tax rules governing tax arbitrage.

With the introduction of a dividend imputation tax system in July 1987, Australia has a tax system in which Australian corporate taxes are distributed to taxable resident shareholders as a tax credit with dividend payments. The tax

* The author wishes to thank Matt Benge, Bhagwan Chowdhry, Kerry Pattenden, Tom Smith, Sheridan Titman, Justin Wood and an anonymous referee for their helpful discussion and comments on this paper. This paper has benefited from the useful comments and suggestions provided by seminar participants at Monash University, the University of Adelaide, the University of New South Wales and the Asia Pacific Finance Association Conference.

1 See Haugen and Senbet (1986) for a review of the role of corporate and personal taxes on the investment, financing and dividend decisions of the firm.
credit can be offset against the other Australian taxes of resident taxable investors. Interest payments remain a tax deductible corporate expense. This paper examines the changes in corporate capital structure around the introduction of a dividend imputation tax system.

When all Australian corporate taxes are distributed as tax credits, both debt and equity income from Australian operating activities are taxed only at investor tax rates. This will provide a tax incentive to reduce the magnitude of debt in the firm’s capital structure. This incentive varies across firms depending on the effective corporate tax rate.

Dividend imputation systems are also in place in a number of other countries, including Canada, France, Germany, Italy, New Zealand and United Kingdom. The proportion of corporate tax available as a tax credit under these imputation systems varies from country to country. Only in Australia, Germany, Italy and New Zealand is the full amount of the corporate tax paid distributed as a tax credit.2

The empirical evidence on the influence of corporate taxes on capital structure choice is conflicting and inconclusive.3 Work by MacKie-Mason (1990) and Graham (1996) suggests that the failure of earlier studies (e.g. Bradley et al. 1984; Titman and Wessels 1988) to find a relationship between capital structure decisions and taxes can in part be attributed to the proxies used to estimate the firm’s marginal tax rate. Graham (1996) used simulated firm-specific marginal tax rates to examine the firm’s capital structure decision. He finds that high tax rate firms issue more debt than low tax rate firms. Stuerle (1990) and Bulow et al. (1990) provide evidence on changes in aggregate capital structures consistent with both the Economic Recovery Tax Act 1981 and the Tax Reform Act 1986 providing incentives to convert equity into debt. Givoly et al. (1992) examine the cross-sectional relationship between corporate taxes and capital structure changes around the Tax Reform Act 1986. They find evidence consistent with both corporate and personal taxes affecting capital structure decisions. In an international setting, Collins and Sekely (1983) find no significant relationship between the corporate tax rate and cross-country differences in capital structures. However, Sekely and Collins (1988) do find a significant country influence on capital structure.

Most prior studies have examined capital structure choice around changes in tax rates, which either increase or decrease the relative favourability of debt financing. The introduction of a dividend imputation tax system in Australia not only changes the relative attractiveness of debt over equity but potentially has resulted in a reversal of the tax bias. The consequence of dividend imputation is to reduce the preference for debt in the financing of Australian operations.

Our results indicate that subsequent to the introduction of a dividend imputation system:

2 For a description of these systems see Price Waterhouse, ‘Corporate Taxes: A World Wide Summary’.
3 For a review of the non-tax literature on capital structure choice see Harris and Raviv (1991).
the aggregate proportion of debt in corporate capital structures declined;
the extent of the incentive to substitute equity for debt financing is determined
by effective corporate tax rates – the higher the firm’s effective tax rate, the
lower is the reduction in the proportion of debt in the firm’s capital structure;
the proportion of capital raised via retained earnings decreased;
and concurrently the proportion of capital raised via new equity issues
increased.

The paper is organized as follows. Section II describes the Australian taxation
system. Section III examines the existence of tax induced preferences under
dividend imputation. Section IV introduces the empirical model. Section V
describes the data. Section VI presents the empirical results and Section VII draws
some conclusions.

II. THE AUSTRALIAN TAXATION SYSTEM

Several changes to the Australian tax system occurred over the sample period
1983–97. A capital gains tax was introduced on 19 September 1985, on 1 July
1987 a dividend imputation system was introduced and finally on 1 July 1988
pension funds which were previously tax-exempt were subject to a 15% tax rate.
Further, over the sample period, the top personal tax rate was reduced from 60 to
47% and the corporate tax rate was reduced from 46 to 36%.

Prior to 1 July 1987, a classical tax system existed in Australia, with dividend
payments taxed at both the corporate and personal levels. On the other hand,
interest payments, being a tax deductible corporate expense, were only taxed at
the personal level.

A. Dividend Imputation

Australia's dividend imputation system applies to dividends paid by Australian
resident companies to resident individual shareholders and a limited class of other
resident shareholders, including Australian pension funds. Australian corporate
taxes paid by companies are allocated to shareholders by way of imputation credits.
These credits are included in the taxable income of eligible shareholders, who are
then entitled to a tax rebate equal to the tax credit included in their income.

Dividends paid from earnings that have been taxed at the full Australian
corporate tax rate are termed franked dividends and include a tax credit equal to
\( \tau_c/(1 - \tau_c) \)% of the dividend amount, where the corporate tax rate, \( \tau_c \), has varied
between 36 and 49% over the sample period. Dividends paid from earnings on
which no Australian corporate tax has been paid are termed unfranked dividends
and do not include a tax credit. Dividends franked between zero and 100% are a
mixture of franked and unfranked dividends and are termed partially franked.

Non-resident foreign and tax exempt investors are not eligible for imputation
tax credits. Non-resident investors are subject to withholding taxes on unfranked
dividends received. Franked dividends are not subject to withholding tax. Typically this conveys only a timing advantage to taxable non-residents as they will be subject to tax in their home country on both unfranked and franked dividend income.

The effect of the foreign tax credit system is to make Australian corporations liable for Australian tax on all foreign sourced income and capital profits. However, a credit against Australian corporate tax is allowed for foreign taxes that are paid. Foreign corporate taxes do not give rise to franked dividends; instead such income will give rise to unfranked dividends.

In general, while corporations face the same statutory tax rate they can have different effective tax rate and levels of franking. This arises because (a) depreciation expenses and investment allowances are tax deductible and (b) any foreign income on which corporate tax has been paid in the foreign country is not part of the imputation system. Hence, it is the level of Australian corporate tax paid that determines the level of franked dividends and, conversely, the level of unfranked dividends.

In summary, a dividend imputation system, like the one operating in Australia for domestic investors, works as follows:

1 Corporate tax is paid by the firm.
2 Dividends are paid by the firm out of after-tax income. The dividends are either franked or unfranked.

**Example**

To illustrate, consider two Australian firms each earning A$1,000 before corporate tax. With a corporate tax rate of 36%, Ataxed Ltd pays $360 in Australian corporate taxes each year, while Utaxed Ltd (whose operations are solely in the US) pays A$360 in US corporate tax. As a result of the foreign tax credits system Utaxed pays no additional Australian corporate tax. Both firms have cash flow after corporate tax of A$640, which is available for domestic shareholders.

<table>
<thead>
<tr>
<th>Company calculation</th>
<th>Utaxed Ltd</th>
<th>Ataxed Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Australian tax operating cash flow</td>
<td>$640</td>
<td>$1,000</td>
</tr>
<tr>
<td>Less Australian corporate tax</td>
<td>0</td>
<td>$360</td>
</tr>
<tr>
<td>After-corporate tax cash flow</td>
<td>$640</td>
<td>$640</td>
</tr>
<tr>
<td>Cash dividend</td>
<td>$640</td>
<td>$640</td>
</tr>
</tbody>
</table>

Assuming a 100% dividend payout, Ataxed pays a franked dividend of $640 with an attached tax credit of $360. As the US corporate taxes paid by Utaxed cannot be passed on to Australian residents as an imputation tax credit Utaxed pays an unfranked dividend of $640.

4 Tax-exempt foreign funds can usually get an exemption from withholding taxes on unfranked dividends.
In general, it is the level of Australian corporate tax paid that determines the level of franked dividends and, conversely, the level of unfranked dividends. For each dollar of franked dividends received, the shareholder will be taxed on a grossed-up dividend comprising the cash dividend plus tax credit. The shareholder is allowed to apply the tax credit against any tax payable on the shareholder’s income from all sources, including, the grossed-up dividend.

**Example**

Again, consider the case of Ataxed and Utaxed Ltd, where the shareholders’ personal tax rate is 36%. The after-all-tax income available to the shareholder from each of these firms is:

<table>
<thead>
<tr>
<th>Shareholder Calculation</th>
<th>Utaxed Ltd</th>
<th>Ataxed Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash dividend</td>
<td>$640</td>
<td>$640</td>
</tr>
<tr>
<td>Imputation tax credit</td>
<td>0</td>
<td>$360</td>
</tr>
<tr>
<td>Taxable income</td>
<td>$640</td>
<td>$1,000</td>
</tr>
<tr>
<td>Shareholders’ tax liability (36%)</td>
<td>$230</td>
<td>$360</td>
</tr>
<tr>
<td>Less imputation tax credit</td>
<td>0</td>
<td>$360</td>
</tr>
<tr>
<td>2–2 4–4 Additional tax payable</td>
<td>$230</td>
<td>0</td>
</tr>
<tr>
<td>After-all-tax cash flow</td>
<td>$410</td>
<td>$640</td>
</tr>
</tbody>
</table>

From this example, we see that the after-all-tax cash flow to shareholders is equivalent to applying their personal tax rates to the before-Australian corporate tax cash flow. To illustrate, consider two shareholders in Ataxed Ltd with personal tax rates of 15 or 47%, respectively. With net operating income of $1,000 Ataxed pays all of its after corporate tax earnings as a fully franked dividend, where the corporate tax rate is 36%.

<table>
<thead>
<tr>
<th>Company calculation</th>
<th>Dividend tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-tax operating cash flow</td>
<td>15%</td>
</tr>
<tr>
<td>Less corporate tax</td>
<td></td>
</tr>
<tr>
<td>After-corporate tax cash flows</td>
<td>$640</td>
</tr>
<tr>
<td>Cash dividend</td>
<td>$640</td>
</tr>
</tbody>
</table>

Shareholder calculation

| Other income                        | $1,400       | $1,400       |
| Imputation tax credit               | $360         | $360         |
| Grossed-up dividend                 | $1,000       | $1,000       |
| = Dividend + tax credit             | $2,400       | $2,400       |
| Taxable income                      |              |              |
| Shareholder’s tax liability         | $360         | $1,128       |
| Less imputation tax credit          | $360         | $360         |
| Additional tax payable              | 0            | $768         |
| After-all-tax cash flow             | $2,040       | $1,272       |

© International Review of Finance Ltd. 2001
In the case of the shareholder whose personal tax rate is less than the corporate tax rate, the ‘surplus’ tax credit can be applied against the tax payable on other income.

The effect of this system is that dividends are only taxed at the personal level. As in the example, companies ‘collect’ a component of the personal tax and this is offset against the investor’s personal tax liability. In both cases the investor’s tax liability is their personal tax rate times their taxable income (that is, dividend plus tax credit and other income). While this example is a fully franked dividend, this outcome is unaffected by whether the dividend is fully franked, unfranked or partially franked. We refer to this as a fully integrated dividend imputation tax system. In this system personal and corporate taxes are integrated and the level of Australian corporate tax is irrelevant.

Corporate tax becomes relevant when the system is not fully integrated. By excluding certain classes of investors, the Australian dividend imputation tax system only partially integrates personal and corporate taxes. Non-resident foreign and tax exempt investors are not eligible for imputation tax credits. Further, any tax credits not used in the current tax year are lost (there is no carry forward of tax credits or cash refunds).

**B. Australian Capital Gains Tax**

Realized capital gains and losses are taxed at the investor’s statutory income tax rate. For assets held for 12 months or more, the cost base of the asset is inflation indexed for the purposes of calculating the capital gain (but not the capital loss) that arises on disposal. Capital losses in excess of capital gains cannot be offset against other income but can be carried forward to be offset against future capital gains. Non-resident portfolio investors are not subject to Australian capital gains taxes on gains and losses in Australian listed equities.

**C. Interest Payments**

Under the Australian tax system, interest payments arising from both domestic and foreign sourced debt are a tax deductible corporate expense. At the personal level, interest income is taxed at the investor’s statutory tax rate.

**III. TAX-INDUCED FINANCING PREFERENCES**

With both corporate and personal taxes the impact of the differential tax treatment of debt and equity on the capital structure choice will depend upon the tax rates on interest, dividends and capital gains. Table 1 identifies four alternative tax regimes over the sample period 1983–97. The first represents a classical tax system with no capital gains tax and tax exempt pension funds. The second introduces a capital gains tax at the investor’s statutory tax rate. The third
represents a change from a classical tax system to a dividend imputation system. The fourth introduces a 15% tax on pension funds.

Table 1 presents the corporate tax rate and the tax rates on interest income, dividend income and capital gains for the highest personal taxpayer and pension funds; assuming that all taxes are paid at the statutory rate and capital gains are realized. From these tax rates, we compute the after-tax value of a dollar of pre-Australian corporate tax earnings as it flows to an investor through different routes: interest, dividends or capital gains. The first value applies to the top personal tax rate and the second to pension funds.

The table presents the after-all-tax value of a dollar of pre-Australian corporate tax earnings as it flows to an investor through different routes: interest, dividends or capital gains. The first value applies to the top personal tax rate and the second to pension funds. When distributed via interest it is computed as \( \text{earnings} \times (1 - \text{interest tax rate}) \). When distributed via dividends it is computed as \( \text{earnings} \times (1 - \text{corporate tax rate})(1 + \text{imputation tax credit})(1 - \text{dividend tax rate}) \). When retained it is computed as \( \text{earnings} \times (1 - \text{corporate tax rate})(1 - \text{capital gains tax rate}) \). The imputation tax credit is \( \frac{\text{dividend}}{\text{corporate tax rate}} \times (1 - \text{corporate tax rate})(1 - \text{capital gains tax rate}) \). We assume that all taxes are paid at the statutory rate and capital gains are realized. Franked dividends are paid from earnings that have been taxed at the full Australian corporate tax and include an imputation tax credit. Unfranked dividends are paid from earnings on which no Australian corporate tax has been paid and do not include a tax credit.

Assuming that any one class of investors can hold both debt and equity, we use the after-tax value of a dollar of interest, dividends and capital gains income to infer the existence of tax preferences for different securities.

From Table 1 we infer that prior to September 1985, individual investors exhibited a tax preference for debt over equity distributed via dividend income. That is, the value of $1 of debt income dominates the value of $1 of dividend income. Assuming an observed dividend payout of 50.03% of net profit, the inclusion of capital gains implies that $1 of debt income with an after-all-tax value of $0.40 weakly dominates $1 of equity income distributed via dividends and capital gains, with an after-all-tax value of $0.38. For pension funds, debt is tax-preferred to equity, independent of the form in which equity is distributed.

The introduction in September 1985 of a capital gains tax at the investor's statutory tax rate strengthened the tax preference for debt. For all investors, the value of $1 of debt income dominates the value of $1 of equity income, independent of the form in which equity is distributed.

For individual investors, the introduction in July 1987 of a dividend imputation tax system establishes a tax-preferred dividend distribution policy, since the distribution of franked dividends provides investors with access to imputation tax credits. From Table 1, we infer that it is tax-preferred to distribute rather than retain franked dividends. In addition, the structure of the capital gains tax establishes a preference for the retention of unfranked dividends. Since only realized capital gains and losses are taxed, then the 'effective' capital gains tax rate is less than the statutory tax rate on dividend payments. The implication is that an individual investor would prefer unfranked dividends to be retained providing a capital gain. Assuming that the firm adopts an optimal dividend distribution policy of distributing franked dividends and retaining unfranked dividends, then the value of $1 of equity income distributed via franked dividends and capital gains dominates $1 of debt income. Hence, the introduction of a dividend imputation tax system reverses debt/equity tax preferences, leading to the tax preference for equity financing over debt financing for individual domestic investors. For pension funds, debt remains tax-preferred to equity, independent of the form in which equity is distributed.

Domestic pension funds exhibited a tax preference for debt over equity prior to the introduction of a tax on pension funds in July 1988. After this date all domestic investor groups exhibit a tax preference for equity financing over debt financing. With the taxing of pension funds all domestic investors have a tax preference for the distribution of franked dividends and the retention of unfranked dividends.

In summary, for all investors, the introduction of a dividend imputation tax system (a) reverses debt/equity tax preferences, leading to the tax preference for equity financing over debt financing, and (b) establishes a tax preference for the distribution of franked dividends and the retention of unfranked dividends.

---

5 This represents the median dividend payout for the sample firms over the period 1982–5.
IV. EMPIRICAL IMPLICATIONS

A. Dividend Imputation System

The reversal of debt/equity tax preferences following the introduction of a dividend imputation tax system suggests the following time series behaviour in the firm’s capital structure.\(^6\)

With the introduction of dividend imputation, firms have a tax incentive to reduce the proportion of debt in their capital structure. The aggregate proportion of debt in corporate capital structures will decrease after the introduction of dividend imputation.

We hypothesize that, ceteris paribus, leverage will decrease for all firms following the introduction of dividend imputation. We consider two alternative definitions of firm leverage, the proportion of total debt to total capitalization, \((\text{total debt})/(\text{total capital})\), and the proportion of total debt to total equity, \((\text{total debt})/(\text{total equity})\).

The existence of investor tax preferences for the distribution of franked dividends and the retention of unfranked dividends following the introduction of a dividend imputation tax system suggests the following time series behaviour in the firm’s equity financing choice.

With the introduction of dividend imputation, firms have a tax incentive to alter the mix of equity financing in their capital structure.

- The proportion of capital raised via retained earnings will decrease after the introduction of dividend imputation;
- and concurrently the proportion of capital raised via new equity issues will increase after the introduction of dividend imputation.

For all firms, we hypothesize that, ceteris paribus, the proportion of capital raised via retained earnings, \((\text{retained earnings})/(\text{total capital})\), will fall and the proportion of new equity issues, \((\text{ordinary shares})/(\text{total capital})\), will rise following the introduction of dividend imputation.

B. Effective Corporate Tax Rate

The inclusion of both franked and unfranked dividends within the dividend imputation tax system suggests the following cross-sectional relationship between the firm’s effective corporate tax rate and changes in capital structure.

The preceding analysis suggests that the taxing of realized capital gains and losses, where the ‘effective’ capital gains tax rate is less than the statutory tax rate on both interest and dividend payments, leads investors to prefer unfranked dividends to be retained providing a capital gain. The use of equity financing

---

\(^6\) The ability to infer time series behaviour in the firm’s capital structure from the existence of tax preferences is limited by both the actions of investors forming clienteles by security type – investors don’t hold both debt and equity – and the actions of firms to alter their asset allocations rather than capital structure in response to changes in the tax regime.
allows investors to elect to defer capital gains rather than receive unfranked dividends or interest income. Hence, all investors will prefer equity rather than debt to finance earnings that are expected to generate unfranked dividends. It follows that the higher the proportion of unfranked dividends, the greater the tax preference for equity financing, and hence the greater the reduction in the proportion of debt in the firm’s capital structure.

The level of Australian corporate tax paid determines the level of franked dividends, and conversely the level of unfranked dividends. That is, the lower the firm’s effective tax rate, the lower the proportion of income available as franked dividends; conversely, the higher the proportion of income available as unfranked dividends. Given the association between the level of unfranked dividends and a tax preference for equity financing. It follows that the lower the firm’s effective tax rate, the greater the reduction in the proportion of debt in the firm’s capital structure. This suggests the following cross-sectional relationship in firm capital structures.

With the introduction of dividend imputation, firms with a high effective corporate tax rate will have a higher proportion of debt in their corporate capital structure than firms with a low effective corporate tax rate.

We hypothesize that, ceteris paribus, following the introduction of dividend imputation, leverage will be positively correlated with the firm’s effective corporate tax rate, \( \frac{\text{tax paid}}{\text{pre-tax income}} \).

C. Estimation

i. Dividend imputation
The time series behaviour of firm capital structure is analysed using the following time-series cross-sectional regression equation:

\[
DP_{it} = \beta_1 D + \varepsilon_{it}
\]  

where the dependent variable \( DP_{it} \) is defined to be one of the following measures of leverage or equity financing.

- Model 1: leverage. The dependent variable is firm i’s leverage in period t. We consider two alternative definitions of firm leverage, the proportion of total debt to total capitalization, \( TD/TC_{it} \), and the proportion of total debt to total equity, \( TD/TE_{it} \).
- Model 2: retained earnings. The dependent variable for firm i is the ratio of retained earnings to total capitalization in period t, \( RE/TC_{it} \).
- Model 3: new equity issues. The dependent variable for firm i is the ratio of ordinary share capital to total capitalization in period t, \( OC/TC_{it} \).

We use a dummy variable to examine the changes in both leverage and equity financing around the introduction of the dividend imputation tax system. \( D \) is the imputation dummy, taking a value of one under an imputation system and zero otherwise.
ii. Effective corporate tax rate

The cross-sectional relationship between leverage and effective corporate tax is analysed by extending equation (1) to include the firm’s effective corporate tax rate as an explanatory variable.

\[
\text{Leverage}_{it} = \hat{\beta}_1 D + \hat{\beta}_2 \text{ETR}_i + \hat{\beta}_3 D \times \text{ETR}_i + \varepsilon_{it}
\]  

\( \text{ETR}_i \) is firm \( i \)'s effective corporate tax rate, measured as the proportion of tax paid to pre-tax income, \( \frac{\text{tax paid}}{\text{pre-tax income}} \). We include an interaction effect between the imputation dummy variable and firm \( i \)'s effective tax rate, \( D \times \text{ETR}_i \), to examine the cross-sectional relationship between the firm’s effective corporate tax rate and changes in leverage after the introduction of dividend imputation.

V. DATA DESCRIPTION

The sample period is from January 1982 to December 1997. It encompasses the period of change to the Australian tax regimes with the introduction of a capital gains tax on 19 September 1985 and a dividend imputation system on 1 July 1987.

The sample consists of all firms selected from Global Vantage that were incorporated in Australia with a fiscal year end month up to and including June and accounting data available over the sample period.\(^7\) The sample comprises 230 firms across all industrial sectors. We exclude banks, gold mining companies, finance companies and insurance companies from the sample because their operations and leverage are quite different from industrial companies and the impact of government regulation may make them idiosyncratic to the country in which they operate. Australian firms are included in Global Vantage if they are part of the Australian Stock Exchange All Ordinaries Share Price Index. The index comprises approximately 270 listed firms. The market value of the shares of all firms comprising the index is approximately 90% of the market value of all shares traded on the Australian Stock Exchange. Therefore, the sample is biased towards large publicly listed companies, but is not unrepresentative.

Accounting numbers were extracted from the Global Vantage for all companies. For each company and each year, we extracted its issued ordinary share capital, total debt (defined as short and long term interest bearing debt), total liabilities (defined as total debt plus deferred taxes), total equity (defined as ordinary share capital plus retained earnings and reserves), total capitalization (defined as total debt plus total equity), total assets, net operating income before taxes, depreciation expense, total tax paid, total dividends and interest expense.

Equity and debt values may be measured in terms of book values or market value. While the use of market values is justified theoretically, under this definition changes in leverage are observed whenever share prices change and do not necessarily reflect decisions initiated by management. Over the long run

\(^7\) It was not necessary for accounting data to be available for all years in the sample period.
these changes must equate with the optimal leverage level, but within any sample period, some of the change in share prices will result in unintentional changes in leverage. Since we are examining managerially initiated changes, we analyse changes in capital structure brought about by activities including new issues of equity and debt and redemptions of previously issued debt, using book-value based measures.

VI. RESULTS

A. Leverage and Equity Financing

We consider the time series behaviour of firm leverage by examining two alternative definitions of leverage, the proportion of total debt to total capitalization and the proportion of total debt to total equity. We also consider the time series behaviour of firm equity raisings by examining the proportion of retained earnings to total capitalization, and the proportion of issued ordinary share capital to total capitalization.

Table 2 shows the median values for these definitions of leverage and capital raising. All companies with a fiscal year end prior to 1 July 1982 are classified as 1982 companies. All those with a fiscal year end subsequent to 1 July 1982 are classified as 1983 companies; similarly for 1983–97.

Care should be taken in defining leverage. Hence, we include alternative measures of leverage in Table 2. These measures include using total liabilities as the measure of the firm’s debt obligations, total assets as a measure of firm value and interest coverage, \((\text{net operating income before interest, taxes and depreciation})/(\text{interest payments})\).

From Table 2 we observe that, for all measures of leverage considered, changes in the level of debt in corporate capital structures are variable. First, the median level of leverage increases in 1986 with the introduction of a capital gains tax, consistent with debt becoming a tax-preferred choice. Second, leverage continues to vary after the introduction of dividend imputation in 1987. In general, post-1988, leverage ratios decline, consistent with a reduction in the preference for debt.8

We next consider the time series behaviour of the proportion of capital raised via retained earnings, as hypothesized dividend payout increases with the introduction of dividend imputation. The median dividend payout for the sample firms over the period 1982–6 was 49.14%, rising to 57.37% over the period 1988–97. From Table 2, the proportion of retained earnings to total capitalization declines after the introduction of dividend imputation in 1987. Finally, we

8 During 1988 accounting rules were changed to require the inclusion of the capitalized value of financial leases in the firm’s balance sheet. This would have resulted in an increase in leverage levels. This increase is proportionally higher for leverage ratios defined relative to equity rather than total capitalization. However, the inclusion of financial leases offers no explanation for the decline in leverage ratios subsequent to the introduction of dividend imputation.
Table 2: Median Leverage and Equity Values 1982–1997

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of companies</th>
<th>Total debt/ total capital</th>
<th>Total liabilities/ total capital</th>
<th>Total debt/ total equity</th>
<th>Total liabilities/ total equity</th>
<th>Total debt/ total assets</th>
<th>Total liabilities/ total assets</th>
<th>NOIBITD/ interest payments</th>
<th>Retained earnings/ total capital</th>
<th>Ordinary shares/ total capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>73</td>
<td>0.334</td>
<td>0.764</td>
<td>0.501</td>
<td>1.164</td>
<td>0.212</td>
<td>0.538</td>
<td>0.210</td>
<td>0.193</td>
<td>0.192</td>
</tr>
<tr>
<td>1983</td>
<td>90</td>
<td>0.317</td>
<td>0.737</td>
<td>0.485</td>
<td>1.082</td>
<td>0.207</td>
<td>0.520</td>
<td>0.289</td>
<td>0.184</td>
<td>0.195</td>
</tr>
<tr>
<td>1984</td>
<td>95</td>
<td>0.320</td>
<td>0.749</td>
<td>0.470</td>
<td>1.103</td>
<td>0.221</td>
<td>0.524</td>
<td>0.230</td>
<td>0.172</td>
<td>0.189</td>
</tr>
<tr>
<td>1985</td>
<td>100</td>
<td>0.342</td>
<td>0.771</td>
<td>0.521</td>
<td>1.122</td>
<td>0.230</td>
<td>0.529</td>
<td>0.264</td>
<td>0.178</td>
<td>0.166</td>
</tr>
<tr>
<td>1986</td>
<td>111</td>
<td>0.342</td>
<td>0.747</td>
<td>0.520</td>
<td>1.184</td>
<td>0.226</td>
<td>0.542</td>
<td>0.284</td>
<td>0.161</td>
<td>0.182</td>
</tr>
<tr>
<td>1987</td>
<td>115</td>
<td>0.320</td>
<td>0.737</td>
<td>0.505</td>
<td>1.173</td>
<td>0.226</td>
<td>0.540</td>
<td>0.249</td>
<td>0.137</td>
<td>0.209</td>
</tr>
<tr>
<td>1988</td>
<td>112</td>
<td>0.360</td>
<td>0.794</td>
<td>0.568</td>
<td>1.226</td>
<td>0.254</td>
<td>0.551</td>
<td>0.241</td>
<td>0.139</td>
<td>0.193</td>
</tr>
<tr>
<td>1989</td>
<td>108</td>
<td>0.342</td>
<td>0.751</td>
<td>0.496</td>
<td>1.103</td>
<td>0.237</td>
<td>0.529</td>
<td>0.304</td>
<td>0.118</td>
<td>0.195</td>
</tr>
<tr>
<td>1990</td>
<td>108</td>
<td>0.342</td>
<td>0.700</td>
<td>0.508</td>
<td>1.117</td>
<td>0.247</td>
<td>0.536</td>
<td>0.250</td>
<td>0.123</td>
<td>0.191</td>
</tr>
<tr>
<td>1991</td>
<td>135</td>
<td>0.333</td>
<td>0.686</td>
<td>0.434</td>
<td>1.074</td>
<td>0.232</td>
<td>0.524</td>
<td>0.278</td>
<td>0.120</td>
<td>0.207</td>
</tr>
<tr>
<td>1992</td>
<td>139</td>
<td>0.300</td>
<td>0.684</td>
<td>0.366</td>
<td>0.931</td>
<td>0.212</td>
<td>0.499</td>
<td>0.197</td>
<td>0.111</td>
<td>0.220</td>
</tr>
<tr>
<td>1993</td>
<td>127</td>
<td>0.302</td>
<td>0.676</td>
<td>0.413</td>
<td>0.936</td>
<td>0.226</td>
<td>0.488</td>
<td>0.172</td>
<td>0.125</td>
<td>0.206</td>
</tr>
<tr>
<td>1994</td>
<td>158</td>
<td>0.246</td>
<td>0.639</td>
<td>0.291</td>
<td>0.904</td>
<td>0.167</td>
<td>0.485</td>
<td>0.150</td>
<td>0.104</td>
<td>0.238</td>
</tr>
<tr>
<td>1995</td>
<td>163</td>
<td>0.251</td>
<td>0.692</td>
<td>0.310</td>
<td>0.934</td>
<td>0.171</td>
<td>0.504</td>
<td>0.123</td>
<td>0.105</td>
<td>0.206</td>
</tr>
<tr>
<td>1996</td>
<td>170</td>
<td>0.263</td>
<td>0.673</td>
<td>0.354</td>
<td>0.939</td>
<td>0.167</td>
<td>0.488</td>
<td>0.147</td>
<td>0.115</td>
<td>0.204</td>
</tr>
<tr>
<td>1997</td>
<td>187</td>
<td>0.281</td>
<td>0.679</td>
<td>0.385</td>
<td>1.004</td>
<td>0.192</td>
<td>0.503</td>
<td>0.144</td>
<td>0.099</td>
<td>0.206</td>
</tr>
</tbody>
</table>

The table provides the median value for various definitions of leverage and capital raising for industrial companies over the sample period 1982–97. Leverage measures are defined using both total debt and total liabilities as measures of the firm’s debt obligations; with total capitalization and total assets as measures of firm value. Total debt is short-term plus long-term interest-bearing debt and total liabilities is total debt plus deferred taxes. Total equity is ordinary share capital plus retained earnings and reserves. Total capitalization is total debt plus total equity. Interest coverage is net operating income before interest, taxes and depreciation divided by interest payments. The proportion of capital raised via retained earnings is measured as retained earnings divided by total capitalization and the proportion of new capital raised via equity issues is measured by issued ordinary share capital divided by total capitalization.
consider the time series behaviour of the proportion of new capital raised via equity issues. We observe that the proportion of issued ordinary share capital to total capitalization varies over the sample period. However, in general the changes are consistent with the change in leverage, decreasing in 1985 when debt is the tax-preferred choice and increasing with the introduction of dividend imputation.

Overall, the variation in aggregate leverage and equity financing provides support for the substitution of equity for debt in corporate capital structures after the introduction of dividend imputation, where equity financing is via new equity issues.

Following from Table 2, we estimate equation (1) for each dependent variable over the full sample period.

Existing empirical evidence (see Harris and Raviv 1991) on the determinants of corporate capital structure suggest an association between the firm’s capital structure choice and its scale, proportion of tangible assets, profitability and market-to-book ratio. Size, profitability, tangible assets and market-to-book variables are introduced into equation (1) to control for the potential influence of these cross-sectional variations. Firm size is measured as the natural logarithm of the denominator in the leverage variable. The proportion of tangible assets is measured as the ratio of fixed assets to the book value of the firm’s total assets. As a measure of the firm’s profitability, we use its return on assets calculated as \((\text{net income})/(\text{total assets})\). Market-to-book is measured as \((\text{market value of equity} + \text{book value of total debt})/(\text{total assets})\). Given the panel nature of our sample we control for firm fixed effects. The regression equation is:

\[
DP_{it} = \beta_1 D + \beta_2 \text{SIZE}_{it} + \beta_3 \text{TAN}_{it} + \beta_4 \text{PFT}_{it} + \beta_5 M/B_{it} + \epsilon_{it}
\]  

where for firm \(i\) the dependent variable \(DP_{it}\) is defined to be the proportion of total debt to total capitalization in period \(t\), \(TD/TC_{it}\), the ratio of retained earnings to total capitalization in period \(t\), \(RE/TC_{it}\), or the ratio of ordinary share capital to total capitalization in period \(t\), \(OC/TC_{it}\). Total debt is used as the measure of the firm’s debt obligations and total capitalization as the measure of the total firm value in defining these variable.\(^9\) \(D\) is the imputation dummy variable taking the value of 1 for financial years 1988–97 and zero elsewhere. \(\text{SIZE}_{it}\) is the natural logarithm of firm \(i\)’s total capitalization in period \(t\). \(\text{TAN}_{it}\) is proportion of fixed assets to total assets for firm \(i\) in period \(t\). \(\text{PFT}_{it}\) is firm \(i\)’s profitability in period \(t\). \(M/B_{it}\) is firm \(i\)’s market-to-book ratio in period \(t\). The years 1987 and 1988 are excluded to allow for changeover effects to diminish and to allow the impact of pension fund taxation to take effect.

\(^9\) The results presented are substantially unchanged if leverage is defined to be ratio of total debt to total equity.

\(^{10}\) The results presented are substantially unchanged if total liabilities are used to measure the firm’s debt obligations and total firm value is defined to be total assets.
For model 1, leverage, we hypothesize that $\beta_1$ is negative. For model 2, retained earnings, we hypothesize that $\beta_1$ is negative. For model 3, new equity issues, we hypothesize that $\beta_1$ is positive.

Table 3 presents the estimated coefficients for the regression. With respect to change in leverage (model 1), the statistically significant negative coefficient for the imputation dummy indicates a decline in the aggregate proportion of debt in corporate capital structures subsequent to the introduction of dividend imputation. We next examine changes in the proportion of capital raisings represented by retained earnings (model 2). The statistically significant negative coefficient for the imputation dummy indicates a decrease in the proportion of capital raised via retained earnings subsequent to the introduction of dividend imputation. Finally, we examine changes in the proportion of capital raisings represented by the issue of ordinary share capital (model 3). Consistent with the hypothesized relationship, the statistically significant positive coefficient for the imputation dummy indicates an increase in the proportion of new capital raised via equity issues subsequent to the introduction of dividend imputation. The signs of the coefficients on size, profitability, tangible assets and market-to-book are consistent with the existing empirical evidence (see Harris and Raviv 1991).

**B. Leverage and Effective Corporate Tax**

We next consider the cross-sectional relationship between the change in the level of corporate leverage and the firm’s effective corporate tax rate.

We estimate equation (2) over the full sample period. Leverage is defined to be the proportion of total debt to total capitalization in period $t$, $TD/TC_{it}$. As a measure of the firm’s effective corporate tax rate we use the mean of the firm’s expost annual effective corporate tax rates, $(tax\ paid_{it})/(pre-tax\ income_{it})$, over the period 1988–97. Size, profitability, tangible assets and market-to-book variables are introduced into equation (2) to control for the potential influence of these cross-sectional variations. Given the panel nature of our sample we control for firm fixed effects. The regression equation is:

$$
\frac{TD}{TC_{it}} = \hat{\beta}_1 D + \hat{\beta}_2 ETR_i + \hat{\beta}_3 D \times ETR_i + \hat{\beta}_4 SIZE_{it} + \hat{\beta}_5 TAN_{it} + \hat{\beta}_6 PFT_{it} + \hat{\beta}_7 M/B_{it} + \varepsilon_{it}
$$

(4)

$ETR_i$ is firm $i$’s effective corporate tax rate. $D \times ETR_i$ is the interaction effect between the imputation dummy variable and firm $i$’s effective tax rate. The remaining variables are as previously defined. We hypothesize that $\hat{\beta}_1$ is negative and $\hat{\beta}_3$ is positive.

Table 4 presents the estimated coefficients for the regression. Consistent with the results presented in Table 3, the negative coefficient on the imputation dummy is statistically significant. The statistically significant positive

---

11 The results presented are substantially unchanged if leverage is defined to be ratio of total debt to total equity.
relationship between leverage and the effective corporate tax rate post-1987 is consistent with cross-sectional differences in the substitution of equity for debt in the firm’s capital structure subsequent to the introduction of dividend imputation. The higher the firm’s effective tax rate, the lower is the decrease in the proportion of debt in its capital structure. The results are consistent with the existence of tax incentives to substitute equity for debt financing where the extent of the incentive is determined by effective corporate tax rates.

### VII. SUMMARY AND CONCLUSION

The introduction of the Australian dividend imputation tax system represents a significant change to the tax framework. To the extent that tax incentives exist to use debt financing, if significant changes to the tax framework occur that alter
these incentives then we would expect to observe a change in corporate capital structures around the change in the tax framework. This paper examines changes in corporate capital structure around the introduction of dividend imputation tax system.

We argue that, in general, with the introduction of dividend imputation the firm has an incentive to alter its capital structure. Any incentive to substitute equity for debt in the firm’s capital structure varies across firms, conditioned on the firm’s effective corporate tax rate. The results indicate: (a) a decline in the aggregate level of total borrowings; (b) the extent of the decline in the level of total borrowing is determined by effective corporate tax rates (the higher the firm’s effective tax rate the lower is the decrease in the level of debt in its capital structure); (c) a decrease in the proportion of capital raised via retained earnings; and (d) an increase in the proportion of capital raised via new equity issues subsequent to the introduction of dividend imputation.

Garry Twite
Australian Graduate School of Management
University of New South Wales
NSW 2052
Australia
gtwite@agsm.edu.au

Table 4 Leverage and Effective Corporate Tax

<table>
<thead>
<tr>
<th>Imputation dummy ($\beta_1$)</th>
<th>Effective corporate tax rate ($\beta_2$)</th>
<th>Post-1987 effective corporate tax rate ($\beta_3$)</th>
<th>Size ($\beta_4$)</th>
<th>Tangible assets ($\beta_5$)</th>
<th>Profitability ($\beta_6$)</th>
<th>Market to book ($\beta_7$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-0.0400)</td>
<td>(-0.2929)</td>
<td>(0.0835)</td>
<td>(0.0513)</td>
<td>(-0.1129)</td>
<td>(-0.0116)</td>
<td>(-0.0067)</td>
</tr>
<tr>
<td>((0.0173)***)</td>
<td>((0.0588)***)</td>
<td>((0.0390)***)</td>
<td>((0.0060)***)</td>
<td>((0.0212)***)</td>
<td>((0.0049)***)</td>
<td>((0.0053))</td>
</tr>
</tbody>
</table>

The table provides estimated coefficients from the regression model in equation (4). The dependent variable is defined to be firm $i$’s leverage in period $t$, measured as the proportion of total debt to total capitalization $TD/TC_i$. The imputation dummy variable ($D$) takes a value of 1 for financial years 1988 to 1997, and zero otherwise. The firm’s effective corporate tax rate ($ETR_i$) is the average of the proportionate tax paid by the firm over the period 1988–97. $D \times ETR_i$ is the interaction effect between the imputation dummy variable and firm’s effective corporate tax rate. Firm size ($SIZE_i$) is the natural logarithm of the firm’s total capitalisation in period $t$. Tangible assets ($TAN_i$) is the proportion of the firm’s fixed assets to total assets in period $t$. Profitability ($PFT_i$) is the firm’s return on assets in period $t$, measured as net income over total assets. The firm’s market-to-book ratio in period $t$ ($M/Book_i$) is measured as market value of equity plus book value of total debt over total assets. Total debt is short-term plus long-term interest-bearing debt, total equity is ordinary share capital plus retained earnings and reserves, and total capitalization is total debt plus total equity. The years 1987 and 1988 are excluded to allow for changeover effects to diminish and to allow the impact of pension fund taxation to take effect. Given the panel nature of our sample we control for firm fixed effects. Standard errors are given in parentheses.

*,**, and ***, significant at the 10, 5 and 1% levels, respectively.
REFERENCES


