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Effects of Tax Policy on Corporate Financing Decisions: Integration of the Corporate and Personal Income Tax

October 1994

By Keith F. Sellers, D.B.A., Deborah W. Thomas, J.D.,
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Table of Contents

Executive Summary 1

Introduction 3

Integration in New Zealand, Canada, and Australia 3

Theoretical Effects of Taxes on Capital Structure 5

Research on the Effect of Taxes on Capital Structure 5

Research on the Effects of Tax Integration 6

Hypothesized Effects of Integration and Capital Gains Tax on Corporate Capital Structure 7

Variable Description 9

Table 1A: Mean Values of Porfolio Defining Variables Over Pre-Integration Period—Canada 12

Table 1B: Mean Values of Porfolio Defining Variables Over Pre-Integration Period—Australia 12

Description Statistics 13

Methodology 13

Table 2: Mean Levels of Variables Over Post-Integration Periods 14

Figure 1: Mean Debt/Equity Ratios—New Zealand 15

Figure 2: Mean Debt/Equity Ratios—Canada 17

Figure 3: Mean Debt/Equity Ratios—Australia 18

Table 3A: Regression Results for New Zealand 20

Table 3B: Regression Results for Canada 21

Conclusion 24

Table 3C: Regression Results for Australia 24

Table 4: Summary of Results 26

Executive Summary

In January, 1992, the United States Department of Treasury released its report, *Integration of the Individual and Corporate Tax Systems: Taxing Business Income Only Once*, recommending that the U.S. adopt an integrated tax system to eliminate double taxation of corporate profits. In December of that same year, the American Institute of Certified Public Accountants joined the Treasury in advocating the adoption of integration. In each case, one of the goals of integration was to reduce the economic distortion of the existing classical corporate and personal income tax systems in favor of debt financing over equity financing of corporate investment. A second bias that integration was intended to alleviate was the tax-incentive for corporations to retain earnings.

This study examines whether the adoption of an integrated tax system in New Zealand, Canada, and Australia altered corporate financing decisions. In each case, the country had previously used a classical tax system similar to that employed in the U.S., and in each case the country integrated its corporate and personal income taxes so as to eliminate the double taxation of corporate earnings.

This study examines a group of firms in each country before and after the country integrated its tax system. By looking at the same firms over the period of the change it is possible to distinguish the effect of the change in tax law on corporate financing decisions from many of the myriad of other influences affecting these decisions.

The two key decisions with which this study deals is the choice of equity versus debt financing and the level of retained earnings of firms in these countries. The classical tax system creates a bias in favor of debt financing over new-issue equity that arises through the deductibility of interest expense at the corporate level while dividend distributions remain non-deductible.

A classical income tax system can also create an incentive for corporations to retain more earnings than they would if no corporate income tax were imposed. The incentive to retain earnings arises because dividend distributions are subject to individual income tax. Alternatively, retained earnings produce capital gains which may be offset by capital losses from other sources, may be subject to a preferential rate of tax, or may be deferred until death at which time they may be excluded from tax through the estate tax exclusion. In New Zealand, integration was adopted without any change in the taxation of capital gains. In Australia and Canada, a capital gains tax on realized stock gains was adopted at the same time integration was adopted.

The results of this study support the assertion that adoption of an integrated tax system reduces corporate financial leverage. Evidence from both New Zealand and Canada indicate that tax integration is a significant determinant of corporate capital structure and contributed to decreased levels of financial leverage. In Australia, no link could be established between the adoption of integration and the debt-to-equity ratios of domestic firms.

In New Zealand, where no significant change was made in the taxation of capital gains, the average debt-to-equity ratio of the firms studied fell from 2.69 prior to integration to 1.40 after integration, so that corporate leverage was 56 percent

lower after integration than it would have otherwise been.

In Canada, the effects of integration were intermingled with reactions to the introduction of capital gains taxes. Since the average firm should react to both changes, the study concentrated on firms believed to be affected by only one or the other of the changes. In response to the new capital gains tax, it was expected that high growth firms (those most likely to retain earnings to finance additional investment) would increase their debt. The results indicate that high-growth Canadian firms had debt-to-equity ratios which were 21 percent higher than expected in the absence of integration and capital gains.

These results contrast sharply with Canada's high-dividend firms. These firms, which were most influenced by integration, reported debt-to-equity ratios 25 percent lower than predicted in the absence of integration and capital gains. These results support the findings with respect to New Zealand and extend the research by confirming that the "benefits" of tax integration may be offset by changes in capital gains taxes. These results also indicate that firms should not be considered homogeneous in their reactions to tax policy changes.

In Australia, no sample or sub-sample reacted as expected to the passage of integration. The two portfolios of interest, high growth and high dividend firms, experienced no significant change in leverage in response to either tax integration or capital gains taxes. If Australian firms reacted to integration by reducing leverage, it was apparently offset by other tax changes, including the capital gains tax increase.

As the differences between Canada and Australia show, one must use caution in generalizing the results of this study to other countries. Graham and Bromson (1992) determined that there exist significant country-specific influences on corporate leverage. Such country-specific influences, believed to arise from differing state-finance-industry relationships, probably explain much of the observed difference between average debt-to-equity ratios of the samples in the three countries both before and after integration. Furthermore, the adoption of integration in any country may differ by a multitude of factors such as time, political climate, and economic environment.

Despite these limitations, the findings in this paper provide empirical support for the argument that integrating the corporate and personal income taxes can reduce corporate financial leverage. The findings also indicate that this favorable effect is diminished by increased taxes on gains realized through stock appreciation. These are important conclusions for the United States, which is considering both integration and the reintroduction of preferential tax treatment of capital gains.

Introduction

In January, 1992, the United States Department of Treasury released its report, "Integration of the Individual and Corporate Tax Systems: Taxing Business Income Only Once," recommending that the U.S. adopt an integrated tax system to eliminate double taxation of corporate profits (U.S. Treasury 1992). The Treasury report discussed and evaluated several alternatives for implementing integration, stating:

Despite their differences, the methods of integration studied in this report reflect a common goal: where practical, fundamental economic considerations, rather than tax considerations, should guide business investment, organization, and financing decisions (U.S. Treasury 1992, 1).

One of the economic distortions addressed by the Treasury study was the bias created for corporate debt financing rather than equity.[1] Under a classical double tax system, earnings distributed to debtholders in the form of interest escape tax at the corporate level, favoring the use of debt financing.

In December, 1992, the American Institute of Certified Public Accountants (AICPA) joined the Treasury Department in advocating the adoption of integration (AICPA 1992). While the AICPA's analysis of integration methods contrasted sharply with that of the Treasury report, the AICPA also cites "a reduction in the tax bias favoring debt financing" as one of the basic objectives of an integrated system (AICPA 1992, 12). Clearly, both the Treasury and the AICPA have accepted the concept of a tax induced bias on corporate capital structure that should be addressed through tax legislation.

The purpose of this research is to examine the validity of the assumptions underlying the assertions of the Treasury and the AICPA. That is, can adoption of an integrated tax system affect corporate financing decisions? This project focuses on corporate financing behavior in three countries which have adopted integrated tax systems, New Zealand, Canada, and Australia. In New Zealand, integration was adopted without any change in the taxation of capital gains. In Australia and Canada, a capital gains tax on realized stock gains was adopted at the same time integration was implemented. Evaluation of the experiences of these countries should provide evidence on the relative effect of tax integration and capital gains taxes on corporate financing decisions.[2]

Integration In New Zealand, Canada, and Australia

The Imputation Credit Method of Integration

All three countries under investigation adopted the most popular integration method, the imputation (or shareholder) credit method, which provides relief from double taxation at the shareholder level. While variations exist among countries, the basic attributes of the credit method are the same. Corporations continue to pay corporate income taxes, recording the amount of tax paid. When dividends are distributed, shareholders include in taxable income the amount of the dividend, "grossed-up" for the corporate tax paid. After computing their individual tax, the shareholders receive a credit in the amount of the tax paid at the corporate level.[3]

New Zealand

In his Statement on Taxation and Benefit Reform 1985, New Zealand's Minister of Finance announced the intention of the Government to adopt corporate tax integration. Reasons cited for elimination of the double taxation of dividends included the need to remove the bias to retain earnings rather than distribute dividends and the bias for debt financing over equity capital, leading to heavier indebtedness.

After study by the government and the legislature, an imputation credit system was placed in operation on April 1, 1988, retroactive for the entire year. The tax reform package adopted in New Zealand also reduced tax rates.[4] In contrast to the U.S. and Canada, New Zealand does not tax gains realized on the sale of corporate stock held for investment.

Canada

Canada's consideration of integration began in 1962, when a Royal Commission on Taxation (the Carter Commission) was appointed. The report later issued by this Commission advocated full integration. Canada's adoption of a partial imputation credit system became effective in January, 1972.

Along with the implementation of integration, a tax on the sale of stock held for investment was introduced for the first time.[5] One-half of realized capital gains became taxed at ordinary income tax rates. Thus, gains arising from stock appreciation still received a tax preference, but a significantly smaller one than before. Like New Zealand, Canada reduced both corporate and individual tax rates as part of its tax reform.

Australia

Australia adopted the imputation credit method of integration as part of the Taxation Laws Amendment (Company Distributions) Act of 1987, effective after June 30, 1987. Australia's move to an integrated tax system specifically targeted the inequitable tax treatment of debt and equity. In the Second Reading Speech of the Bill, the Treasurer stated that the new tax regime would "restore the position of the stock market as the mobilizer of investment funds and reduce the previous bias in favor of corporate debt finance over equity," and "provide increased incentives for all Australians to participate in the ownership of Australian companies by significantly reducing taxes on dividend income."[6] As a part of Australia's imputation credit system, corporate tax rates were equated to the maximum individual rate of 49 percent. An individual with the maximum marginal tax rate should exactly offset individual taxes on dividends with the imputation credit.

During the period under investigation, Australia also made changes in its taxation of gains realized upon the sale of corporate stocks. Announced and made effective in September, 1985, Australia imposed tax at ordinary rates on shares acquired after that date.[7] If holding period requirements are satisfied, the stock is considered to be a capital asset, and the basis may be indexed for inflation. However, there are no preferential tax rates for capital gains.

Theoretical Effects of Taxes on Capital Structure

A fundamental assumption made by advocates of tax integration is that taxes play an important role in determining corporate capital structure. Because of the differing tax treatment of distributions made on debt and on equity, it is widely held that a double tax system favors the use of debt over equity (Peel 1985, Thuronyi 1983 and McLure 1975). Despite the intuitive appeal of this conclusion, there continues to be a surprising lack of consensus among both theoreticians and empiricists as to the actual impact of corporate and individual taxes on corporate capital structure decisions.

Modigliani and Miller (1958, 1963) demonstrated that in the absence of taxes, a firm's value is unaffected by its capital structure since it is irrelevant how its cash flows are partitioned. However, by recognizing the deductibility of interest payments in a corporate income tax environment the value of a firm can be expressed as

$$V_L = V_U + T_C D \qquad (1)$$

where V_L is the value of the firm with debt, V_U is the value of the same firm without debt, and $T_C D$ is the tax subsidy provided through financial leverage. Since the value of the firm is maximized by maximizing the tax subsidy, this model indicates that corporate activities should be financed entirely through debt.

By adding personal income taxes and their effects on pre-tax required rates of return on stocks and bonds, Miller (1977) advanced the analysis by demonstrating that the benefits of leverage decrease as pre-tax returns to bonds are "grossed-up" for their less favorable treatment in the hands of individual investors. Equilibrium is established and the tax benefits of additional leverage vanish completely where the following relationship holds:

$$(1 - T_{pD}) = (1 - T_C)(1 - T_{pS}) \qquad (2)$$

where T_{pD} is the individual tax rate on income from bonds, T_C is the corporate tax rate, and T_{pS} is the individual tax rate on income received from holding shares of stock. Assuming T_{pS} to be zero and T_C to be constant across firms, Miller demonstrates that there is an equilibrium amount of outstanding debt in an economy, and that this equilibrium is dependent on the individual and corporate tax rates.

Research on the Effect of Taxes on Capital Structure

Extensive research has attempted to measure the effect of taxes on capital structure. Numerous studies, including Titman and Wessels (1988), Fisher, Heinkel, and Zechner (1989), Long and Malitz (1985) and Bradley, Jarrell, and Kim (1984) failed to detect any association between taxes and capital structure. On the other hand, DeAngelo and Masulis (1980), Pozdena (1987), MacKie-Mason (1990), Dhaliwal, Trezevant, and Wang (1992) and Givoly et al. (1992) find evidence that taxes can affect capital structure. The difference in findings is likely due to the confounding effects of non-tax determinants of capital structure, as well as firm-specific differences in tax position.

Non-tax factors that are believed to affect capital structure range from corporate financial distress to management signalling. For example, Marsh (1982) determined that firms appear to have a "target" capital structure, and that firm size, risk of bankruptcy and asset composition were all associated with this target. Jensen (1986) proposes that certain agency costs are also determinants of capital structure. He argues that debt can reduce agency costs associated with shareholder and management conflict over dividend policies. Dividends are discretionary, and management resists their payment since it reduces the resources, and thus power of management. Under Jensen's "control hypothesis," debt acts as a form of guaranteed dividend, insuring payouts to investors and reducing the amount of discretionary cash flows available to management.

The marginal tax rate of a firm may also limit the impact of taxes on its capital structure. Interest payments represent only one of a variety of available tax shields. If a firm utilizes sufficient tax shields from depreciation, net operating loss carry-forwards, etc. to reduce taxable income to zero, debt may yield no additional tax benefit, and capital structure decisions will be based strictly on non-tax considerations.

Research on the Effects of Tax Integration

Corporate tax integration has been adopted by many countries in pursuit of a variety of economic objectives. Prior empirical research on integration has focused primarily on the impact of integration on capital markets and dividend policy.

Gourevitch (1977) reviewed the objectives of European countries in adopting an integrated tax system. In 1965, France adopted an imputation credit method of integration to stimulate the depressed French stock market. Similarly, Germany introduced a split-rate system in 1953 with the objective of reviving Germany's post-war stock market. In 1976, Germany also implemented an imputation credit to reduce the tax biases in favor of debt over equity and in favor of the non-corporate over the corporate form of business organization. The United Kingdom adopted its version of a shareholder credit system in 1972 to remove discrimination between retained and distributed profits and promote new equity capital.

Reviewing the economic evidence of the effects of integration in these countries, Gourevitch (1977) reported that payment of dividends did not increase in either France or the United Kingdom. In the U.K., however, the government's anti-inflationary policies, introduced simultaneously with integration, probably negated any benefits arising from integration.[8] In Germany, total dividends did appear to increase significantly after the adoption of integration. This increase may also have been influenced by the tremendous increase in earnings experienced by German firms after World War II. Actual financing behavior did not appear to change since Germany, like France, experienced no increase in the proportion of corporate capital financed with new equity.

Amoako-Adu (1983) and Amoako-Adu, Rashid and Stebbins (1992) investigated the effects of Canadian tax reform, which

included both integration and a new tax on capital gains, on stock prices. Results indicated that high-dividend stocks increased significantly in value, while no significant change was found in low-dividend stocks. With integration, the after-tax value of a dividend to an individual shareholder increases by $1/(1-T_{PD})$, where T_{PD} is the individual tax rate on ordinary income. Thus, high dividend corporations should be able to reduce dividends while maintaining or even increasing returns to shareholders, lowering the cost of equity financing. On the other hand, low dividend firms obtain little direct benefit from integration, since they provide a return to shareholders through stock appreciation. The results of Amoako-Adu (1983) and Amoako-Adu, Rashid and Stebbins (1992) support the hypothesis that the effects of integration and capital gains taxes on corporate capital structure depends on the relative return provided to shareholders from dividends and stock appreciation. However, the actual impact on corporate financing decisions was not addressed in that study.

Poterba and Summers (1985) investigated the effects of the U.K.'s changes in the taxation of dividends on security returns, dividend payout rates, and corporate investment. They determined that integration in the U.K. significantly reduced the premium required to induce investors to receive returns in dividend form. While the study did not address the issue of capital structure, the findings indicate that the cost of equity capital should decrease as the required pre-tax dividend yield drops.

Using econometric models, researchers such as Feldstein and Frisch (1977) and Gravelle (1992), have attempted to project the impact of proposed integration alternatives in the U.S. Nadeau and Strauss (1993) simulated the effects a revenue neutral plan of integration on the United States economy, offsetting the estimated revenue loss caused by a shareholder credit with corporate tax increases. The simulation model was constructed from estimates of the responsiveness of debt-to-equity ratios, investment, and dividend payout to other variables including tax rates on corporations, capital gains rates, interest income, and dividend income. The simulations indicate that partial integration would lead to an economy-wide decrease in debt-to-equity ratios approximately proportional to the degree to which individual taxes are offset by integration. Grubert and Mutti (1994) simulated the effects of integration in an international setting, concluding that the type of integration method has an effect on the direction of international capital flows.

Prior empirical research on the effects of tax integration is neither extensive nor conclusive. While integrated systems have generally been adopted in pursuit of specific economic objectives, the ability of integration to achieve these objectives remains unresolved.

Hypothesized Effects of Integration and Capital Gains Tax on Corporate Capital Structure

One of the primary reasons cited for adopting integration is to reduce the effect of taxes on corporate capital structure. In a traditional corporate tax system, interest payments are deductible

while dividend payments are not. This should encourage corporations to finance investment by borrowing, leading to higher levels of leverage than might otherwise be desirable. If this bias exists, and if integration is effective in equating the tax burden on income derived from corporate debt and equity holdings, then the capital structure of firms should shift following its adoption resulting in lower debt to equity ratios.

Investors in corporate equity receive profits in the form of dividends, stock appreciation, or both. Return on equity investment is affected by the interaction of a number of tax rates. The cumulative tax is a function of the individual tax rate on dividends and on capital gains realized on stock sales, as well as corporate tax rates and policies on the distribution of earnings. Through their impact on the corporate cost of capital, changes in the tax rate on dividends, capital gains, and corporate earnings should result in adjustments to the equilibrium debt-to-equity ratio of individual firms.

The shareholder credit method of integration reduces or eliminates the individual tax rate on corporate dividends. For a shareholder in a positive tax position, integration should enhance the after-tax value of a constant dividend payment.[9] Equities with strong prospective dividend returns should experience an immediate increase in value at no additional cost to the corporation. Assuming that corporations attempt to minimize their cost of capital, the increased stock values should allow firms to replace debt with relatively cheaper equity, resulting in a new debt to equity equilibrium.

This reaction to the adoption of integration can be expected only for dividend-paying firms. Many corporations choose to pay lower dividends and enhance growth through retained earnings. Investors in the equity securities of these corporations receive their return in the form of stock appreciation. These firms receive very little direct benefit from integration, but are more seriously affected by capital gains taxes.

When a capital gains tax is first implemented on realized stock gains, the expected after-tax return to shareholders who invest in low dividend paying, high-growth stocks decreases, resulting in a decline in stock value. As stock values decrease, corporations should find it less attractive to issue new equity or retain earnings and may, in fact, replace existing equity with debt.

To determine the effects of integration on corporate capital structure, this study investigates the reaction of firms to the implementation of an imputation credit in New Zealand, Canada, and Australia. If the adoption of integration is effective in reducing the bias in favor of debt financing, a reduction in the debt-to-equity ratios of firms in these three countries should be observed.

In New Zealand, integration was the only significant tax change which should affect corporate financing decisions. In Canada and Australia, however, a capital gains tax on the sale of corporate stock was implemented at about the time integration was adopted. While integration was designed to reduce debt-to-equity ratios, an increase in the capital gains tax should have the opposite effect. To the extent that the return on equity is realized through appreciation of share value, a tax

on the sale of stock should reduce the value of shares, making debt more attractive. The cumulative result on the capital structure of Canadian and Australian firms depends upon whether corporate financing decisions are more sensitive to the tax preferences for dividends or the penalty of the capital gains tax. Relying upon the theory, discussed above, that high dividend firms are affected by integration while low dividend paying growth stocks will react to capital gains tax changes, further testing will isolate the effect of these two tax changes on the capital structure of these two groups of firms.

Variable Description

To test the reaction of firms to these tax changes, a pooled cross-section time-series regression model is formulated in which the dependent variable, corporate leverage, is regressed on several tax variables, firm-specific variables, and economic variables believed to impact capital structure.

Dependent Variable

Debt-to-Equity Ratios. To measure corporate leverage (LEV), values for total debt and total equity are calculated for each corporation for each year examined. In this study, total debt is measured as the total book value of assets less the book value of common and preferred equity. Total equity, as used in the debt-to-equity ratio, is measured as the total book value of common and preferred equity. Although the market values of debt and stock are important in the security markets' evaluation of a firm's degree of financial leverage, market values were unavailable to the authors. However, for this study, book values offer equal if not superior measures for several reasons. Bowman (1980) and Mulford (1985) determined that the accounting measures of debt are nearly perfectly correlated with market measures, and that leverage ratios utilizing the debt book values are equally useful in the evaluation of capital structure.

Except for earnings, the book value of equity is affected only by corporate financing and dividend decisions. Studies such as Amoako-Adu, Rashid and Stebbins (1992) and Amoako-Adu (1983) have determined that Canadian equity securities experienced significant reactions to the 1972 tax integration legislation. Thus, the use of market values in the denominator of the ratio would incorporate price variances arising from the tax legislation being studied, as well as other extraneous economic events affecting security values.

Tax Variables

Tax Integration (TINT). The variable of primary interest is the presence of an integrated tax system, which is indicated by a dummy variable. In reality, the dummy variable should capture the effect of all tax reform changes enacted simultaneously with integration. Further testing, explained below, isolates the effects of integration and capital gains taxes.

Capital Gains Taxes (CAPTAX). The second tax variable, included only in the Australian model, indicates the presence of a capital gains tax on realized stock gains. This variable is unnecessary for New Zealand because no capital gains tax exists and for Canada because a capital gains tax was adopted simultaneously

with integration. For Canada, the CAPTAX variable is identical to the TINT variable (perfectly collinear) so that TINT captures the effect of both tax integration and the introduction of a capital gains tax in Canada. Further testing is utilized to isolate the effects of integration and capital gains taxes in Canada.

Tax rates (CTAX). The final tax variable reflects changes in income tax rates. During the years surrounding the adoption of integration, each country significantly reduced corporate and individual income tax rates. As corporate tax rates fall, the value to the corporation of an interest deduction relative to a nondeductible dividend distribution should decrease. Similarly, shareholder preferences for certain types of income decrease as individual rates drop. For this study, tax rate (CTAX) is defined as the maximum federal corporate tax rate.[10]

Firm-specific variables

Independent and sorting variables specific for each firm are defined. The independent variables, size and debt securability, are included in the model as attributes of firms which could affect capital structure. The sorting variables are added to the analysis only for Canada and Australia. As described below, these sorting variables are used to identify the types of firms which should react more strongly to the two tax changes, integration and capital gains taxes, enacted in the two countries during the time period under investigation.

Independent variable: Size (SIZE). Due to economies of scale, the cost of restructuring capital is believed to be less restrictive to larger firms. Prior research has determined size to be a significant determinant of capital structure (Givoly et al. 1992). A size variable, computed as the natural log of the total assets of each firm, is incorporated into the model.

Independent variable: Debt securability (DSEC). The second firm-specific variable included in the model is the debt securability of the firm. Several studies, including Myers (1977) and Givoly et al. (1992) address the concept of collateralization and the ability of a firm to obtain debt financing. Collateral decreases the risk to debt-holders, resulting in a lower risk premium and lower cost of debt capital. A debt securability variable, measured as the ratio of fixed assets to total assets, indicates the ability of the firm to collateralize loans with tangible assets.

Sorting variable: Tax shields (NOL). Increased debt financing reduces tax liability only if the firm can take advantage of additional interest deductions. Prior research indicates that firms with net operating losses (NOL) may not respond to tax changes since these firms are effectively tax exempt, at least in the short run. Relying on Auerbach and Poterba's (1986) demonstration of a strong relationship between NOL carry-forwards and the probability of having a zero tax rate in the future, MacKie-Mason (1990) found that as the probability of incurring an NOL increases, the effects of tax changes decrease. All three countries under investigation allow carryover of NOL deductions. A firm that has experienced a loss during the time period examined in the study is defined to be an NOL firm and is treated as a separate group or portfolio.

Sorting variables: High-dividend yield or High-growth yield. Taxes which affect

corporate capital structure include both the rates on dividends and on capital gains. New Zealand adopted only integration, reducing the tax rate on dividends, without changing the taxation of capital gains. In Canada and Australia, both the rate on dividends and capital gains were altered during the period under investigation, requiring two additional variables in the models for Canadian and Australian firms.

As discussed above, firms most likely to benefit from integration are those that pay high dividends (Amoako-Adu 1983 and Amoako-Adu, et.al. 1992). Companies most likely to react to capital gains are growth firms which offer significant returns to shareholders in the form of stock appreciation. Hereafter, these two groups are referred to as high-dividend firms and high-growth firms. To isolate the relative effects of integration and capital gains, variables identifying high-dividend firms and high-growth firms are added to the model.

Firms are classified into these two groups using the following procedure: The mean return from dividends and growth in retained earnings over the pre-integration period was calculated for each firm.[11] Firms were then rank ordered according to each measure. A firm was classified as a high-growth firm if it 1) was not an NOL firm, 2) had a retained earnings growth rank above the median growth rank, *and* 3) had a return on dividends ranking below the median dividends rank. Similarly, a firm was classified as a high dividend firm if it 1) was not an NOL firm, 2) had a return on dividends ranking above the median dividends rank, *and* 3) had a retained earnings growth rank below the median earnings rank. The remaining firms consisted of all NOL firms, as well as firms that granted relatively equal returns from dividends and stock appreciation. Mean values for the return from dividends and growth in retained earnings over the pre-integration period for the resulting four portfolio subsamples are provided in Table 1A and 1B.[12]

Economic Variables

Corporate leverage may also be sensitive to economic factors which could confound the effects of tax changes. During the years investigated in this paper, all three countries experienced notable economic changes. To determine the effects of these changes on corporate capital structure, several indicators of economic activity were examined. The economic variables for each country were obtained from the International Monetary Fund's International Financial Statistics (IMF 1991).

Unexpected Inflation (INFL). Generally, debt financing becomes more attractive as inflation increases because repayment of the debt can be made with currency of lesser value. Obviously, lenders are equally aware of this phenomena, and incorporate expected inflation into the required rate of return on debt. If projections of future inflation change, the required return, and thus cost of debt and equity financing should also change to reflect the new projections. Thus, an annual measure of unexpected inflation is included to detect the effects of inflation on capital structure decisions. This measure is developed from a simple adaptive expectations model in which the annual

Table 1.A
Mean Values of Portfolio Defining Variables Over Pre-Integration Period
Canada

Group	Return from Dividends	Growth in Retained Earnings	N
NOL	0.018 (0.024)	0.046 (0.283)	96
High Growth	0.013 (0.018)	0.321 (0.212)	108
High Dividend	0.070 (0.073)	0.113 (0.069)	120
All Others	0.053 (0.046)	0.199 (0.135)	324

(Standard errors in parentheses.)

Table 1.B
Mean Values of Portfolio Defining Variables Over Pre-Integration Period
Australia

Group	Return from Dividends	Growth in Retained Earnings	N
NOL	0.050 (0.034)	0.162 (0.174)	104
High Growth	0.044 (0.016)	0.299 (0.090)	36
High Dividend	0.066 (0.015)	0.153 (0.048)	24
All Others	0.059 (0.031)	0.230 (0.125)	116

(Standard errors in parentheses.)

rate of inflation is regressed on the lagged rate of inflation and a time trend. INFL is then defined to be the least squares residuals from this regression.

Stock market index (STK). Stock market values have been determined to affect corporate financing decisions. When stock prices rise, the cost of issuing equity decreases and corporations favor equity financing (Marsh 1982, Myers and Majluf 1984). When stock values are depressed, corporations prefer debt financing, and will even finance stock repurchases with new debt issues. Thus, a stock market index was added to the model.

Descriptive Statistics

Table 2 presents the mean values of the debt-to-equity ratios and the independent variables over the pre-integration and post-integration periods, along with tests of whether the means are equal across the two periods. For Canada and Australia, additional statistics are presented for the four subsets, or portfolios, of firms defined as NOL firms, high-growth firms, high-dividend firms, and all others. Note that for the New Zealand sample, overall mean debt-to-equity ratios fell from 2.69 to 1.40 between the pre-integration and post integration periods; a 48 percent decrease. However, the overall mean debt-to-equity ratios for the Canadian and Australian samples *increased* by 22 percent and 13 percent, respectively. As will be discussed shortly, after controlling for the effects of the independent variables described above, only a portion of the decrease in New Zealand debt-to-equity ratios can be attributed to tax integration while the increase in mean debt-to-equity ratios in Canada would have been larger in the absence of integration.

Methodology

[This section discusses relatively technical issues of methodology. The reader may wish to skip to page 19 for the presentation of results.]

To investigate the effects of tax integration (and the introduction of capital gains taxes in Canada and Australia) on firms' debt-equity decisions, pooled time-series cross-sectional regression techniques are employed. While changes in a firm's capital structure take place over time in response to general macroeconomic variables, individual firm characteristics also influence financing decisions. Pooled time-series cross-sectional regression analysis, which will control for the independence of each firm's decisions and situation, is the appropriate tool for the purposes of this investigation. As Hsiao (1985, pp. 122-123) notes:

"[P]anel data allow economists and other social scientists to analyze, in depth, complex economic and related issues which could not be treated with equal rigor using time-series or cross-sectional data alone. Like cross-sectional data, panel data describes each of a number of individuals. Like time-series data, it describes changes through time. By blending characteristics of both cross-sectional and time-series data, more reliable research methods can be used in order to investigate phenomena that otherwise could not have been dealt with."

To capture the advantages of pooled data, it is necessary to begin with a 'least restricted' model, namely time-series regression on individual firms, and 'test down' to the more restricted pooled model.[13]

Table 2
Mean Levels of Variables Over Pre-Integration and Post-Integration Periods

New Zealand								
Group	Period	N	LEV	SIZE	DSEC	CTAX	STK	INFL
All Firms	1982-1987	72	2.69	5.88	0.44	45.50	109.50	0.60
	1988-1991	48	1.40*	6.65*	0.42	35.50*	120.25	-0.89
Non-NOL	1982-1987	60	3.05	6.01	0.41			
	1988-1991	40	1.51*	6.85*	0.38			
NOL	1982-1987	12	0.92	5.23	0.58			
	1988-1991	8	0.84	5.62	0.60			

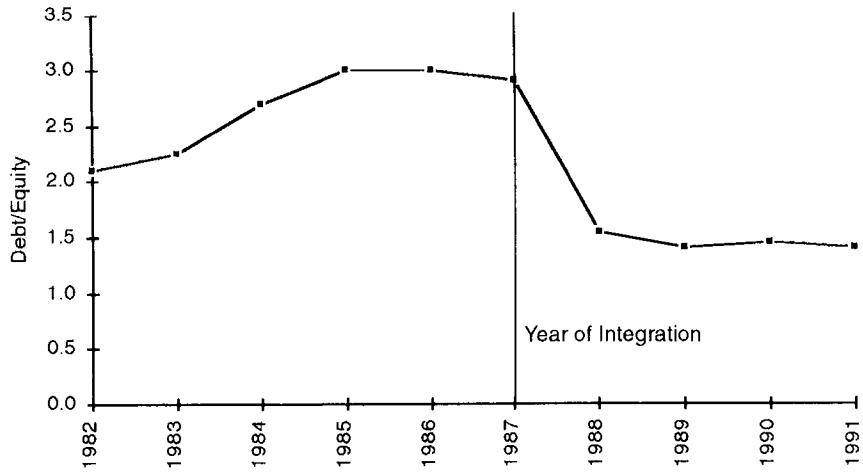
Canada								
Group	Period	N	LEV	SIZE	DSEC	CTAX	STK	INFL
All Firms	1967-1971	648	1.35	4.09	0.45	49.01	35.45	-1.45
	1972-1977	972	1.65*	4.69*	0.43*	47.63	39.43*	0.78
NOL Firms	1967-1971	188	1.33	3.58	0.4			
	1972-1977	282	1.81*	3.94*	0.36*			
High Growth	1967-1971	92	2.01	3.24	0.45			
Firms	1972-1977	138	2.46	4.28*	0.43			
High Dividend	1967-1971	104	0.87	4.9	0.54			
Firms	1972-1977	156	1.11*	5.37*	0.51			
All Other	1967-1971	264	1.32	4.44	0.44			
Firms	1972-1977	396	1.47	5.09*	0.44			

Australia								
Group	Period	N	LEV	SIZE	DSEC	CTAX	STK	INFL
All Firms	1982-1987	420	1.33	5.86	0.58	46.5	105.87	-0.13
	1988-1991	280	1.56*	6.68*	0.62*	41.50*	168.93*	0.19
NOL Firms	1982-1987	156	1.51	5.99	0.61			
	1988-1991	104	2.03*	6.74*	0.65			
High Growth	1982-1987	42	1.77	5.78	0.59			
Firms	1988-1991	28	1.75	6.89*	0.66			
High Dividend	1982-1987	36	1.06	5.69	0.58			
Firms	1988-1991	24	1.00	6.29	0.62			
All Other	1982-1987	186	1.14	5.8	0.55			
Firms	1988-1991	124	1.23	6.66*	0.59*			

An asterisk (*) indicates that the mean of the variable over the post-integration period is significantly different from the mean over the pre-integration period at a 5% level of significance.

The sample sizes for the macroeconomic variables (CTAX, STK, and INFL) in New Zealand and Australia are 6 and 4 years for pre-integration and post-integration periods, respectively. These sample sizes are reversed in the Canadian data.

Figure 1
Mean Debt/Equity Ratios: New Zealand



New Zealand

Financial statement information for New Zealand corporations was obtained from the Compustat Global Vantage database. These tapes include data from 1982 through 1991, allowing several years to be observed both before and after integration. The methodology requires that data be available for each company in each year examined, so only those firms present in the database for all years are included. The resulting New Zealand sample consisted of twelve firms with ten yearly observations (1982-1991) on each firm, or 120 total observations used for estimation.[14] The mean debt-to-equity ratios for the New Zealand companies examined in this study are plotted in Figure 1.

The first step in the estimation process was to estimate the 'least restricted' model by ordinary least squares (OLS) for each firm:

$$LEV_{it} = \alpha_i + \beta_1 TINT_t + \beta_{2i} CTAX_t + \beta_{3i} SIZE_{it} + \beta_{4i} DSEC_{it} + \beta_{5i} STK_t + \beta_{6i} INFL_t + \varepsilon_{it} \quad (3)$$

where i=1,...,12 indexes firms and t=1982,...,1991 indexes years. Note that for a given time period, the TINT, CTAX, STK and INFL variables are identical for all firms.[15] Firms were then divided into two portfolios based on their NOL status. As described above, a firm was defined as an NOL firm if it had a loss on income before taxes during any year in the ten year sample period. Two firms were identified as NOL firms, leaving ten firms in the second portfolio.

A pooled version of the model was then estimated using OLS for each separate portfolio and the entire sample of twelve firms. All marginal effects (the ß's) in these pooled models were restricted to be the same across firms while the intercepts were allowed to vary (a pooled one-way fixed effects model).[16] Based on the sum of squared errors (SSE) from the pooled and individual regressions, pooling tests were conducted for each of the three pooled models. The form of this test is given by

$$\frac{(SSE_R - \sum_i SSE_{Ui})/J}{\sum_i (SSE_{Ui})/DF_U} \qquad (4)$$

where SSE_R is the SSE from the pooled (restricted) models, $\_SSE_{Ui}$ is the sum of SSE's from the individual regressions for the firms included in a particular portfolio, J is the number of restrictions (6 for the NOL portfolio, 54 for the non-NOL portfolio, and 66 for the entire sample) and DF_U is the degrees of freedom for the (combined) individual regressions (8 for the NOL group, 40 for the non-NOL group, and 48 for the entire sample). The statistic has an F distribution with J and DF_U degrees of freedom. For each test, pooling could not be rejected at the 5% level of significance. Among other things, this implies that NOL firms in the New Zealand sample respond to the tax, firm specific, and macroeconomic variables no differently than non-NOL firms.

A final specification test was conducted to test whether the individual firm intercepts were jointly equal to one another. Using the same type of testing procedure as that outlined above, a test of the null hypothesis that individual firm intercepts were jointly equal to one another was easily rejected at the 5% level of significance. The final model for purposes of inference is then given by:

$$LEV_{it} = \alpha_i + \beta_1 TINT_t + \beta_2 CTAX_t + \beta_3 SIZE_{it} + \beta_4 DSEC_{it} + \beta_5 STK_t + \beta_6 INFL_t + \varepsilon_{it} \qquad (5)$$

which implies identical marginal effects across firms while individual firm intercepts are allowed to vary.

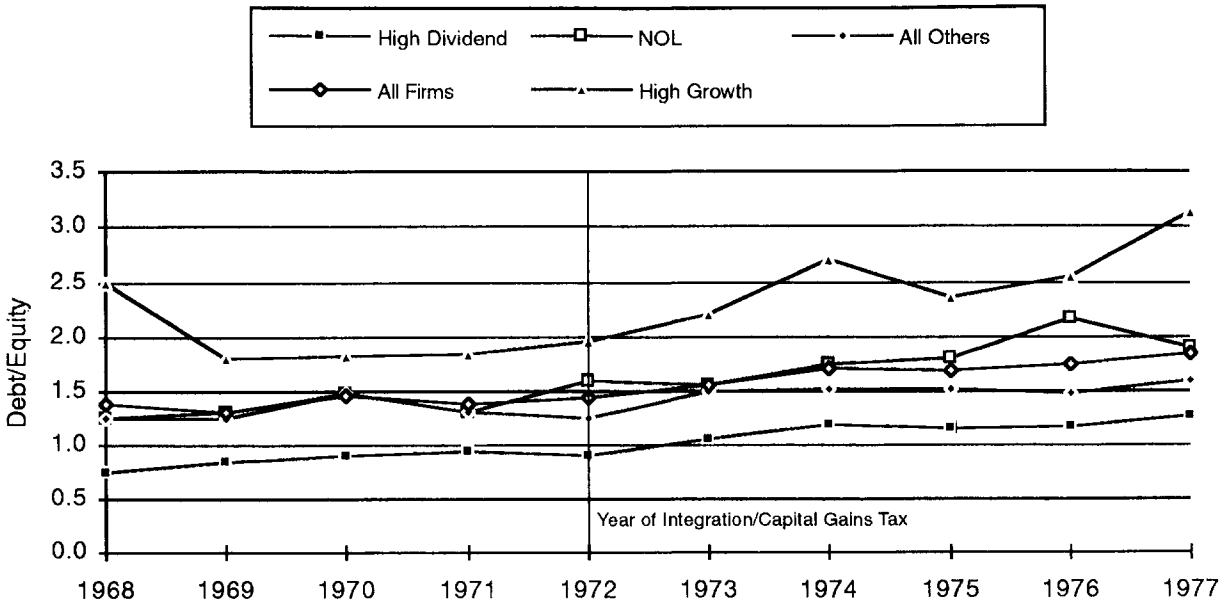
Canada

The Canadian sample consisted of 184 firms with ten yearly observations (1968-1977) on each firm. For firms with very small or very large debt-to-equity ratios, a small fluctuation in either debt or equity could result in a dramatic change in the ratio, confounding the results of the test. Therefore, a total of 21 firms which had a mean debt/equity of less than 0.05 (debt close to zero relative to equity) or greater than 20 (equity close to zero relative to debt) were dropped from the sample as outliers.[17] This resulted in a sample of 162 firms, or 1,620 total observations to be used for estimation. Figure 2 illustrates mean debt-to-equity ratios for the examined Canadian companies.

Equation (3), above (with i=1,...,162 and t=1968,...,1977) was estimated using OLS for each firm individually and tested for autocorrelation and heteroskedasticity, both of which were rejected at the 5% level of significance. The division of the Canadian sample into its portfolios resulted in 47 NOL firms, 23 high growth-low dividend firms, and 26 high dividend-low growth firms. Portfolio 4 consisted of the other 66 firms which did not meet the criteria of the other portfolio designations.

Pooled regressions on each portfolio and the entire sample were estimated to determine the advisability of pooling within each portfolio sub-sample. Pooling could not be rejected at the 5% level within each portfolio. However, pooling of the entire sample was rejected. This implies that while firms within each portfolio respond no differently to changes in the independent variables, there is a significant difference in firms' responses

Figure 2
Mean Debt/Equity Ratios: Canada



across portfolios. In particular, the responses of high growth and high dividend firms were found to be statistically different from one another as well as the responses of the 'average' and NOL firms.[18]

Since the null hypothesis for the test of pooling the entire sample restricts the marginal effects of *all* independent variables to be jointly equal across portfolios, it is possible to reject this hypothesis and still have the effects of some subset of the independent variables be equal across portfolios. Of particular interest is the possibility that the effect of the tax integration/capital gains tax variable, TINT, could be the same across two or more of the four portfolios while the effects of the remaining variables differ. Results of these tests are presented below.

Australia

The initial sample of data for Australia consisted of 79 firms with 10 yearly observations (1982-1991) for each firm. As with the Canadian sample, nine firms were dropped from the sample as outliers. This resulted in 70 firms, or 700 total observations available for estimation purposes. The mean debt-to-equity ratios for the Australian firms are plotted in Figure 3.

A portfolio selection and estimation procedure identical to that used for the Canadian sample (with the addition of the CAPTAX variable) resulted in 26 NOL firms, seven high growth firms, six high dividend paying firms, and 31 'average' firms, Portfolios 1-4, respectively.[19] With regard to pooling tests, except for the tax integration variable, pooling could not be rejected for the entire sample. This indicates that except for their response to tax integration, firms in the Australian sample do not respond differently to changes in the independent variables. Therefore, one model, with tax integration specified

for each portfolio, is appropriate.

The final model for estimation purposes was therefore given by:

$$LEV_{it} = \alpha_i + \beta_{1_1} TINT_{NOL_t} + \beta_{1_2} TINT_{HG_t} + \beta_{1_3} TINT_{HD_t} + \beta_{1_4} TINT_{AO_t} + \beta_2 CAPTAX_t + \beta_3 CTAX_t + \beta_4 SIZE_{it} + \beta_5 DSEC_{it} + \beta_6 PINDEX_t + \beta_7 INFL_t^* + \varepsilon_{it} \quad (6)$$

where $TINT_{NOL}$ is equal to TINT if firm i is part of the NOL portfolio and zero otherwise; $TINT_{HG}$, $TINT_{HD}$, and $TINT_{AO}$ are defined similarly for the high growth, high dividend, and all other groups, respectively.

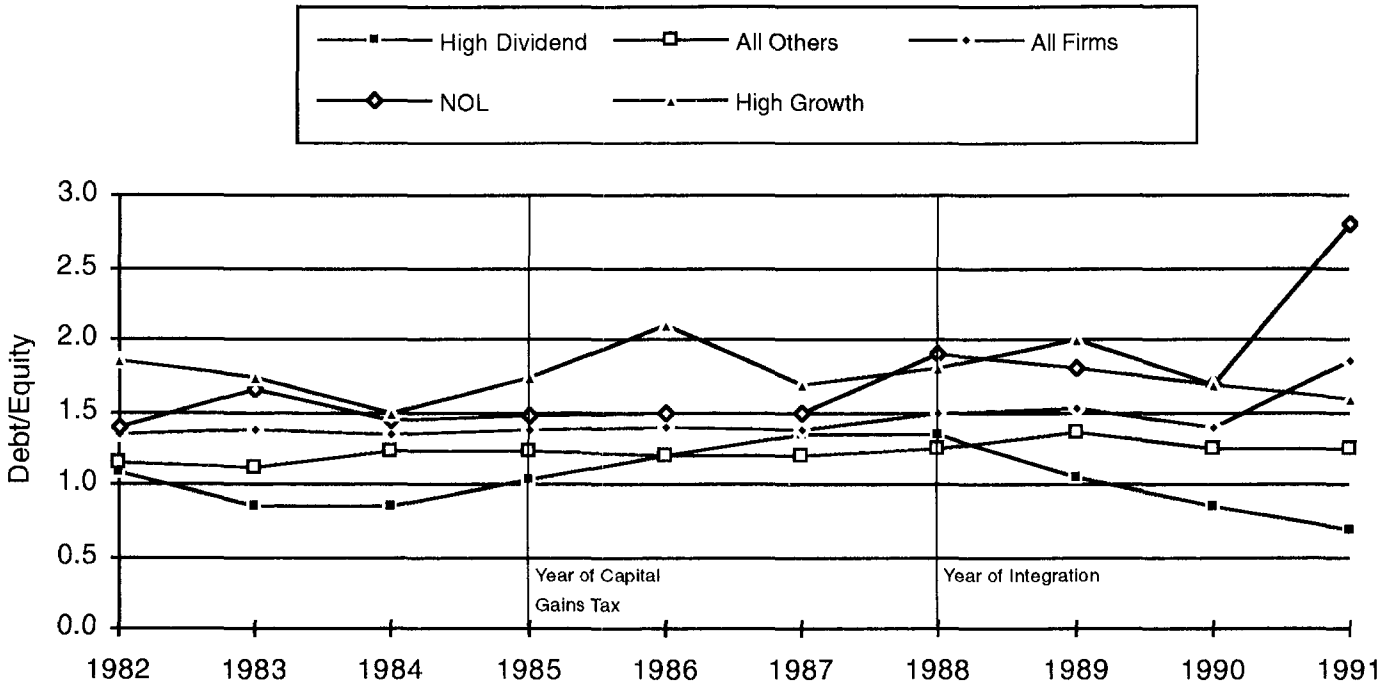
Regression Results

New Zealand

The results of the regression for New Zealand are presented in Table 3.A.[20] The results indicate that four independent variables significantly affect corporate leverage.

Tax integration (TINT). The coefficient for tax integration (TINT), which is negative and significant at the .01 level, indicates that the presence of an integrated tax system in New Zealand is a significant determinant of corporate tax structure. As noted above, overall mean debt-to-equity ratios decreased in New Zealand by 47.8 percent between the pre-integration and post-integration periods. The estimated coefficient for TINT implies a 56 percent decrease in average debt-to-equity ratios.[21] In other words, the data indicates that debt-to-equity ratios in New Zealand would have actually increased

Figure 3
Mean Debt/Equity Ratios: Australia



without the adoption of an integrated tax system.

Other significant variables: Size, Debt Securability, and Stock Market Index. Three additional variables proved to be significant for the New Zealand model. As hypothesized and consistent with the previous research on taxes and capital structure, firm size (SIZE) and debt securability (DSEC) have a positive effect on leverage, indicating that larger and better collateralized firms tend to be more heavily leveraged. The stock market index (STK) is significantly and negatively related to corporate leverage. This is consistent with prior research indicating that firms prefer to issue stock when it is "overpriced" and to issue debt when the stock is a bargain.

In summary, variables from each of the three categories, — tax, firm-specific and macro-economic — proved to be significant. The F-value for the model is 21.608—significant at the .01 level—indicating that the equation is well specified.

Insignificant Variables: Tax rates, Unexpected Inflation The other tax variable, tax rates (CTAX), was insignificant. This is in contrast to Mackie-Mason (1990) and Givoly, et.al. (1992), who examined tax rate changes in the U.S. stemming from the Tax Reform Act (TRA) of 1986. One explanation may be that the TRA tended to increase the importance of rates by repealing or reducing numerous tax shields whereas integration tends to reduce the importance of rates.

The measure for unexpected changes in the rate of inflation (INFL) was also insignificant. This could be due to the fact that deviations from the trend rate of inflation over the sample period were quite small, or to the inability of either debt issuers or debt purchasers to achieve a consistent advantage in predicting inflation.

Canada

The results for the Canadian sample, presented in Table 3.B, are much more varied as compared to those of the New Zealand sample, as would be expected given the simultaneous introduction of a tax on capital gains along with integration. Consider each of the four portfolio groups in turn.

NOL firms. Three variables were found to be significant for the group of NOL firms. As with the New Zealand sample, firm size (SIZE) and debt securability (DSEC) have a positive effect on leverage. However, the coefficient for tax integration, TINT, is positive and significant at the 0.1 level.[22] This implies that in addition to the positive effect of SIZE, which increased after integration (see Table 2), NOL firms became more leveraged after integration. Since, other things equal, there is a positive correlation between equity and earnings—implying that operating losses lead to reductions in equity—this result can be explained by the timing of losses if a majority of the losses occurred after integration. Of the 470 firm-year observations in the NOL group, 118 represented loss years; 66, or 56 percent of which occurred after integration. Moreover, the post-integration losses tended to be larger than those incurred prior to integration. Thus, the positive coefficient for TINT could be due to the fact that after integration, this group of firms incurred larger and more frequent losses, thereby de-

Table 3.A
Regression Results for New Zealand

Variable	Estimate	t-Statistic
INTERCEPT	-7.672	
TINT	-1.792	-3.763*
CTAX	0.015	0.513
SIZE	1.197	3.718*
DSEC	7.609	5.861*
STK	-0.006	-1.435**
INFL	0.041	0.897
N	120	
F-statistic	21.608*	

No portfolio separation required.
Value for INTERCEPT is average of firm specific intercepts.
All t-tests are one tailed.
* - Significant at 5% level of significance.
** - Significant at 10% level of significance.

Table 3.B
Regression Results for Canada

	NOL		High Growth	
Variable	Estimate	t-Statistic	Estimate	t-Statistic
INTERCEPT	-2.271		-6.907	
TINT	0.366	1.639**	0.430	1.354**
CTAX	-0.007	-0.179	0.208	3.780*
SIZE	0.950	5.130*	0.878	4.749*
DSEC	2.944	4.076*	1.059	1.265
STK	-0.018	-0.622	-0.131	-3.484*
INFL	-0.012	-0.429	-0.026	-0.723
N	470		230	
F-statistic	11.851*		8.340*	

	High Dividend		All Others	
Variable	Estimate	t-Statistic	Estimate	t-Statistic
INTERCEPT	-5.465		-4.978	
TINT	-0.372	-4.894*	-0.365	-2.982*
CTAX	0.009	0.718	0.028	1.443**
SIZE	1.107	14.920*	0.853	7.753*
DSEC	-0.110	-0.493	2.815	5.816*
STK	0.016	1.734*	-0.003	-0.222
INFL	0.018	2.113*	0.015	1.142
N	260		660	
F-statistic	48.730*		21.283*	

Value for INTERCEPT is average of firm specific intercepts.
Separate regressions required by portfolio.
All t-tests are one tailed.
* - Significant at 5% level of significance.
** - Significant at 10% level of significance.

creasing equity and thus increasing the book value of debt-to-equity ratios.

As with the New Zealand sample, the effect of the corporate tax rate (CTAX) was not significant, which is an expected result for NOL firms. Since NOL firms pay no taxes due to their losses, changes in the marginal corporate tax rate should have no effect on their leverage decisions.

High-growth firms. For the group of high-growth firms, four variables were found to affect firm leverage significantly: tax integration/capital gains, the corporate tax rate, firm size, and the stock index. The effects of firm size and the stock index are as described above with respect to New Zealand. Unlike the New Zealand sample, the corporate tax rate was found to be positive and significant. This is consistent with the results of Mackie-Mason (1990) and Givoly, et.al. (1992), and indicates that increases in the marginal corporate tax rate lead high growth firms, who face a potentially large tax liability, to seek more tax shields by increasing leverage. Although the debt securability variable was not significant (p-value of 0.15) this is consistent with the idea that high growth firms can collateralize debt with earnings potential rather than fixed assets. Finally, the coefficient for the combined effect of a capital gains tax and tax integration was positive and significant. Thus, as hypothesized, high growth-low dividend paying firms increase leverage since taxes on capital gains increase the cost of equity financing relative to debt.

It is interesting to note from Table 2 that while mean debt-to-equity ratios of high growth firms increased after the introduction of a tax on capital gains/tax integration, the increase was not significant. This is due to the fact that the positive effects of larger firm size and the TINT variable were offset by the reduction in the corporate tax rate and the negative effect of a higher stock index. Note also from Table 2 that, as with the NOL and high growth groups, the mean debt-to-equity ratios of both high dividend firms and "average" firms increased after integration. However, as discussed next, these increases would have actually been larger in the absence of integration.

High-dividend firms. Results for the group of high dividend firms indicate that four of the variables significantly affect firm leverage: tax integration, firm size, the stock index, and unexpected inflation. The positive and significant effects of firm size and unexpected inflation are as hypothesized. The estimated effect of the stock index is positive—the opposite of what was be predicted. The negative effect of the capital gains/tax integration variable is as hypothesized and indicates, other things equal, a decrease in the leverage of high dividend firms as a result of integration. As can be seen from Table 2, there was a significant increase in mean debt-to-equity ratios for high dividend firms from 0.87 to 1.11; a 27.6 percent increase. However, the negative, significant coefficient on TINT indicates that other things equal, this increase would have been 6.8 percent higher in the absence of integration. Thus, while the mean debt-to-equity ratios of this group of firms increased after integration, the increase was smaller than would have occurred otherwise.

As with the group of high-growth firms, the effect of debt securability (DSEC) on the leverage of high dividend

firms was found to be insignificant. Although this group of firms exhibited low earnings growth, their high return on dividends implies a stable earnings pattern. The insignificance of DSEC could indicate that high dividend firms are able to collateralize debt based on the reputation of consistent earnings.

Other firms. Four independent variables were found to be significant for the final group of average firms: the tax integration variable, the corporate tax rate, firm size, and debt securability. The effects of each of these variables on capital structure were in the direction hypothesized. Larger firms and more secure (highly collateralized) firms tend to be more leveraged and firms increase leverage in response to increases in the corporate tax rate in an effort to shield income from taxation. The negative significant coefficient on TINT indicates that integration led to a decrease in leverage for this group of firms and that, other things equal, in the absence of integration debt to equity ratios would have been 7.3 percent higher than those observed.

Further tests. As discussed in the methodology section, above, while pooling of the four portfolios was not indicated, there is a possibility that some subset of the independent variables may be equal across the four portfolios. Of particular interest for the present study is the possibility that the effects of tax integration/capital gains tax could be equal across the four groups while the effects of the remaining variables differ.

To explore the possibility that tax integration might have similar effects across the four portfolio groups, a single regression model was estimated for the Canadian sample that restricted the coefficients of all independent variables to be the same within portfolios but allowed for variation across groups. Wald tests for the equality of the effects of the tax integration variable across the four groups and all possible sub-groups were conducted.[23] The results of these tests indicate that the effects of integration (TINT) could not be restricted to be equal across all four groups. However, the effect for the NOL group was found to be statistically no different than that for the high growth group. Similarly, the effect for the high dividend group was no different than that for the group of all other firms, but did differ significantly from the reaction of the other two groups of firms. This implies that while NOL firms and high growth firms do not respond differently to integration, as with high dividend firms and all others, there is a significant difference in responses across these two pairs of groups.

Australia

The results for the Australian sample, presented in Table 3.C, were less conclusive. As discussed in the methodology section above, the effects of all independent variables except that for tax integration could be restricted to be equal across the four portfolios. Imposing these restrictions leads to a single regression model in which three of the independent variables were found to be significant; tax integration for the NOL group, firm size, and debt securability. While the effects of firm size is consistent with the results obtained for New Zealand and Canada, the effect of debt securability—negative and significant—

was the opposite of that found for the New Zealand and Canadian samples. Furthermore, while the effects of tax integration for the NOL group was consistent with that found for Canada, the tax integration effects for the high-growth, high-dividend, and all other groups were individually and jointly insignificant. Although few variables were found to affect firm leverage significantly, the relatively low value for the F-Statistic indicates that the problem *does not lie* with multicollinearity, but simply an overall poor fit.

Conclusion

The results of this study are consistent with assertions that adoption of an integrated tax system reduces corporate financial leverage. Evidence from both New Zealand and Canada indicates that tax integration is a significant determinant of corporate capital structure, and contributed to decreased levels of financial leverage. In Australia, no link could be established between the adoption of integration and the debt-to-equity ratios of domestic firms.

The magnitude of the effect of integration in each country is summarized in Table 4. Using the model defined above, the predicted debt-to-equity ratios, absent integration are compared to the observed debt-to-equity ratios in post-integration years. In New Zealand, where no significant changes were made in the taxation of capital gains, the coefficient for the integration variable was -1.79. Mean debt-to-equity ratios in New Zealand for the period prior to integration were 2.69, and

Table 3.C
Regression Results for Australia

Variable	Estimate	t-Statistic
INTERCEPT	0.957	
$TINT_{NOL}$	0.425	2.724*
$TINT_{HG}$	0.031	0.14
$TINT_{HD}$	0.064	0.246
$TINT_{AO}$	-0.135	-0.882
CAPG	-0.023	-0.155
CTAX	-0.006	-0.404
SIZE	0.255	2.867*
DSEC	-1.465	-3.007*
STK	-0.001	-0.474
INFL	0.005	0.166
N	700	
F-Statistic	3.657*	

Value for INTERCEPT is average of firm specific intercepts.
Except for tax integration variable, no portfolio separation required.
All t-tests are one tailed.
* - Significant at 5% level of significance.
** - Significant at 10% level of significance.

dropped to 1.40 after integration. As indicated in Table 4, the corporate leverage ratio was 56 percent lower than it would have been without integration, a significant reduction in more than a statistical sense. New Zealand's experience provides strong evidence that the shareholder-credit system of tax integration, in the absence of confounding tax law changes, will significantly decrease corporate leverage.

In Canada, the effects of integration were intermingled with reactions to capital gains taxes. Since the average firm should react to both changes, we concentrated our attention on firms believed to be affected by only one or the other of the changes. In response to the new capital gains tax, it was expected that high growth firms would increase their debt. Table 4 reveals that, in response to the combined tax changes, high growth Canadian firms had debt-

to-equity ratios which were 21 percent higher than expected in the absence of integration and capital gains. This contrasts sharply with Canada's high-dividend firms. These firms, which were most influenced by integration, reported debt-to-equity ratios 25 percent lower than predicted in the absence of integration and capital gains. These results support our New Zealand findings and extend the research by confirming that the "benefits" of tax integration may be offset by changes in capital gains taxes, and that firms should not be considered homogeneous in their reactions to tax policy changes.

In Australia, no sample or sub-sample reacted as expected to the passage of integration. As indicated in Table 4, the two portfolios of interest, high growth and high dividend, experienced no significant change in leverage in response to either tax integration or capital gains taxes. If Australian firms reacted to integration by reducing leverage, it was apparently offset by other tax changes, including the capital gains tax increase.

The identification and testing of portfolios was designed to separate the effects of capital gains taxes and integration by focusing on firms which provide primarily one source of return to shareholders. The selection procedure successfully identified distinct groups of high-growth, low dividend-paying firms and low-growth, high dividend-paying firms in Canada. Unfortunately, this process was much less successful in stratifying the Australian sample, which proved to be very homogeneous. As revealed in Table 2, average growth measures for firms in the two portfolios drawn from the Australian sample were nearly identical. Furthermore, the dividend payout ratios were not as diverse as hoped. Our methodology relies on the assumption that each portfolio reacts to only one tax change, either capital gains or integration, but not both. Clearly, the two Australian portfolios do not meet this assumption. This may explain why the follow-up test in Australia was inconclusive, in sharp contrast to the test on distinct portfolios in Canada.

As the differences between Canada and Australia show, one must use caution in generalizing the results of this study to other countries. Graham and Bromson (1992) determined that there exist significant country-specific influences on corporate leverage. Such country-specific influences, believed to arise from differing

Table 4
Summary of Results

(Tests of Interest Outlined in Bold)

Country	All Firms	Portfolios			
		NOL Firms	High Growth Firms	High Dividend Firms	All other firms
New Zealand:					
Predicted Debt/Equity Ratio without integration	3.19	-- Portfolio Tests Inappropriate --			
Predicted Debt/Equity Ratio with integration	1.42				
Effect on Debt/Equity Ratios	56.09% decrease				
Test Results	significant				
Canada:					
Predicted Debt/Equity Ratio without integration	Combined Tests Inappropriate	1.44	2.03	1.48	1.84
Predicted Debt/Equity Ratio with integration		1.81	2.46	1.11	1.48
Change in Debt/Equity Ratios		25.40% increase	21.29% increase	25.13% decrease	19.86% decrease
Test Results		significant	significant	significant	significant
Australia:					
Predicted Debt/Equity Ratio without integration	Combined Tests Inappropriate	1.34	1.34	1.34	1.34
Predicted Debt/Equity Ratio with integration		1.76	1.37	1.4	1.2
Change in Debt/Equity Ratios		31.72% increase	2.33% increase	4.77% increase	10.12% decrease
Test Results		significant	not significant	not significant	not significant

"Test Results" refer to statistical tests. A response of "not significant" indicates that the observed change is so small that it may be nothing other than random change. A "significant" finding, on the other hand, indicates that the change appears to be non-random and, in fact, was caused by the tax change.

state-finance-industry relationships, probably explain much of the observed difference between mean debt-to-equity ratios of the samples in the three countries both before and after integration. Furthermore, the adoption of integration in any country may differ by a multitude of factors such as time, political climate, and economic environment.

Despite these limitations, the findings provide empirical support for theoretical arguments and prior econometric research. First, an imputation credit method of integration can reduce corporate financial leverage. Second, this favorable impact is diminished by increased taxes on gains realized through stock appreciation. These are important conclusions for the United States, which is considering both integration and the reintroduction of preferential tax treatment of capital gains.

Endnotes

[1] The other economic distortions addressed by the U.S.Treasury report are closely linked to corporate financing decisions. These include the bias against operating in the corporate form and the incentive to retain rather than distribute corporate earnings.

[2] Hereafter, unless otherwise indicated, the term "capital gains" refers only to gains realized on the sale of corporate stocks. Examination of taxes levied on other capital assets is beyond the scope of this study.

[3] Actual calculation of the grossed-up dividend varies between countries. The U.S.Treasury study discussed, but rejected, the adoption of an imputation credit method of integration patterned after the system in New Zealand (U.S. Treasury 1992, 95-106). On the other hand, the AICPA (AICPA 1992) recommends this method. Other countries adopting the shareholder credit method of integration include France (1965), Italy (1977) and the U.K. (1973). In 1977, Germany supplemented its split-rate method of integration with a shareholder credit. See Avi-Yonah (1990).

[4] Other major changes in New Zealand tax laws in 1988 included a new system of trust taxation and changes in the provisional tax system (CCH 1989, 11).

[5] Another change in Canadian tax laws was the repeal of federal estate and gift taxes. Prior to 1972, capital gains had been included in the estate at the time of death for estate tax purposes. Subsequent to 1971, capital gains are included in the final income tax return.

[6] Additional economic objectives of Australia's tax integration included increased availability of equity capital for start-up companies and reduction of the overall tax burden for corporate entities (Treasurer's Second Reading Speech to Taxation Laws Amendment (Company Distributions) Bill 1987). Reduction of the relative tax burden of corporations was specifically rejected as an objective of tax integration by the U.S.Treasury (U.S. Treasury 1992).

[7] Stocks with a short-term holding period (the period varies from 12 to 18 months during the years examined in this study) were subject to tax prior to 1985. Both New Zealand and Australia differentiate the tax treatment on shares of publicly held corporations based on the intent for which they were purchased. If the shares are purchased "for the purpose of profit-making by sale" in Australia, or "for the clear purpose of resale" in New Zealand, gains realized on sale are treated as ordinary income. The determination of this intent is apparently quite subjective. For example, in New Zealand shares may be acquired for the purpose of securing "not only income from dividends but also growth in the value of shares" without triggering gain so long as there is no "clear purpose of resale at time of purchase" (see section 65(2)(e) of New Zealand's Income Tax Act of 1976).

[8] Under the Counter-Inflation Act of 1973, the British Treasury limited dividends by publicly traded companies, as well as shareholder credits thereon. Thus, the potential utilization and tax benefit of the shareholder credit was severely diminished.

[9] Of course, corporations may elect to decrease dividends after integration, since the after-tax dividend yield could be

maintained or even enhanced simultaneously. While research has failed to establish the determinants of corporate dividend policy, it is widely held that non-tax factors such as signalling play an important role. For purposes of these examples only, it is assumed that corporate dividend policies remain unchanged by tax integration or capital gains.

[10] Individual tax rates can also affect corporate leverage. However, analysis revealed that individual tax rates are highly correlated with the changes in the corporate tax rates in New Zealand ($r = 0.96$), Canada ($r = 0.93$), and Australia ($r = .71$). Therefore, corporate tax rates, which should more directly effect corporate financing behavior, are included as a measure of all tax rates changes. Use of both individual and corporate rates as separate variables introduces multicollinearity into the model. Changes in Canadian provincial tax rates are excluded for the same reason.

[11] The return on dividends was defined as total dividends declared (common and preferred) divided by total equity. The return on retained earnings was defined as income before taxes and interest less total dividends divided by total equity.

[12] Note that the Australia sample is not as cleanly divided as the Canadian, which may confound results.

[13] The pooled model is restricted in the sense that slope parameters, or the marginal effects of the independent variables, are held constant across individual firms. The 'testing down' procedure used in this paper insures that these restrictions are consistent with the data. The normal tests of specification related to time-series (autocorrelation) and cross-sectional (heteroskedasticity) data were performed, with the presence of either of these conditions indicating a misspecified model.

[14] While a 12 firm sample may seem rather small for purposes of inference, it should be noted that over the sample period under investigation, the combined pre-tax income of these 12 firms constituted 0.5% - 4.3% of New Zealand GDP. By comparison, the combined pre-tax income of the Canadian sample (162 firms) constituted 0.9%-2.0% of Canadian GDP.

[15] For each firm, autocorrelation and heteroskedasticity were tested using the Durbin-Watson and White (1980) tests, respectively, and rejected at the 5% level of significance. This implies that the regression equation represented by (3) is well specified insofar as there are no systematic influences captured by the error term. Details of the analysis are available from the authors upon request.

[16] Each pooled model was tested for heteroskedasticity, which was rejected at the 5% level of significance. There is no need to test for autocorrelation in the pooled models since this hypothesis was rejected in the least restricted model given by (3). However, pooling imposes an auxiliary restriction that the variance of the error term be the same across firms. The fact that heteroskedasticity was rejected in the pooled models indicates that the data are consistent with the restriction of equal variances.

[17] None of the debt-to-equity ratios in the New Zealand data fell within these extremes, and no firms were deleted.

[18] For each pooled portfolio model,

heteroskedasticity was tested and rejected at the 5% level of significance. In addition, the hypothesis of identical firm intercepts within each portfolio was tested and rejected at the 5% level of significance.

[19] Autocorrelation and heteroskedasticity were rejected at the 5% level in the firm specific regressions and heteroskedasticity was rejected in each of the pooled samples.

[20] The figures reported for the intercept in Tables 3.A-3.C are averages of the firm specific intercepts. Estimates of the firm specific intercepts and their associated t-statistics are excluded in the interest of brevity but are available from the authors upon request along with details of the autocorrelation, heteroskedasticity, and pooling tests discussed above.

[21] The percentage decrease in average debt to equity ratios attributable to integration can be calculated as the ratio of the coefficient on TINT to the mean predicted value of debt to equity ratios over the post-integration period.

[22] Recall from above that for the Canadian sample, the TINT variable captures the combined effects of tax integration and the introduction of a tax on capital gains.

[23] A single regression model for the entire sample is necessary to use the Wald test so as to allow for non-zero covariances among the estimated coefficients on TINT; see Greene (1993) page 204.

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