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# Foreign tax credit limitations and public issuances by U.S. multinationals: New evidence of tax clienteles

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# FOREIGN TAX CREDIT LIMITATIONS AND PUBLIC ISSUANCES BY U.S. MULTINATIONALS: NEW EVIDENCE OF TAX CLIENTELES

by

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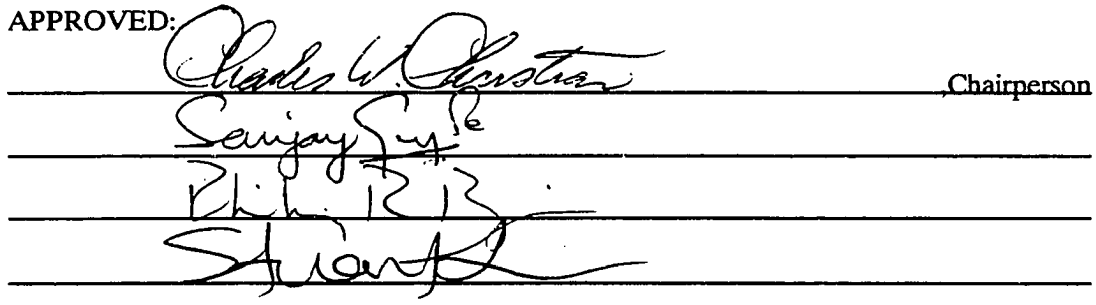

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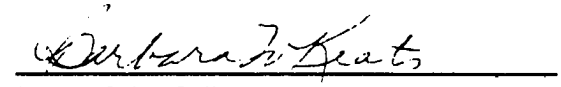

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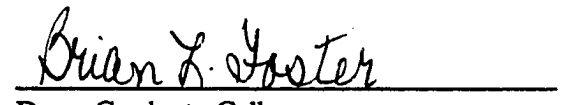

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ABSTRACT

Theoretical predictions of a relation between income taxes and financing choices are based on the concept that tax clienteles (defined by the tax benefit received on interest deductions) exist for alternative securities. The tax benefit of an interest deduction for a U.S. multinational is a function of its U.S. and foreign income taxes. The U.S. tax system allows firms to take a foreign tax credit (FTC) against their foreign income taxes; however, the FTC amount is subject to a limitation. Binding FTC limitations reduce the marginal tax benefit of interest deductions because the interest tax shield is offset by a related decrease in the FTC.

This study tests for a relation between the impact of FTC limitations on the marginal tax benefit of interest deductions and the issuance choices made by U.S. multinationals raising capital in the public markets. The empirical model also includes tax variables for net operating loss and business tax credit carryforwards, as well as controls for other factors that influence financing choices. The results provide strong evidence that the likelihood of a U.S. multinational publicly issuing equity rather than debt increases with the impact of FTC limitations on the marginal tax benefit of interest deductions. U.S. multinationals with net operating loss carryforwards or business tax credit carryforwards also are found to be more likely to issue equity.

The empirical results are important for two reasons. First, evidence that binding FTC limitations can increase the cost of debt financing to the extent that public issuances are impacted is consistent with current arguments that U.S. foreign tax policy undermines the competitiveness of U.S. multinationals. Second, the study finds clear evidence of a relation between income taxes and firms' financing choices. In particular, the finding that taxable firms substitute between unused foreign tax credits and interest deductions is

important because prior research generally has found no empirical evidence of a relation between income taxes and financing choices, or has only found evidence of such a relation for those firms paying little or no income taxes.

To my husband Harold for his love and support,

and to my parents for their many words of encouragement

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TABLE OF CONTENTS

Page

LIST OF TABLES

# 1. INTRODUCTION

The question of whether income taxes are related to the financing choices of firms has been explored in the financial economics literature since the seminal studies of Modigliani and Miller (1958, 1963) on cost of capital, firm value, and capital structure. Theoretical predictions of a relation between income taxes and financing choices are based on the concept that tax clienteles (defined by the tax benefit received on interest deductions) exist for alternative securities. A general prediction of tax clienteles is that firms whose interest payments are deducted at high effective marginal tax rates (MTRs) are more likely to use debt financing, and firms with low effective MTRs are more likely to use equity financing.

The tax benefit of an interest deduction for a U.S. multinational is a function of its total income tax liability, which includes both U.S. and foreign income taxes. Income earned in a foreign country is subject to taxation by the U.S. and the foreign government. The U.S. tax system attempts to eliminate this double taxation by allowing firms to offset their foreign income taxes with a foreign tax credit (FTC); however, the amount of the credit is subject to a limitation. If foreign income taxes exceed the limitation amount, then the FTC limitation is binding, and the U.S. multinational is in an excess FTC position. Binding FTC limitations impact the ability of firms to use their interest deductions because the interest tax shield is offset by a related decrease in the FTC amount.[1] The potential for binding FTC limitations to significantly reduce the marginal tax benefit of firms' interest deductions leads to the general question of whether FTC limitations influence the financing choices of U.S. multinationals.

This study tests for a relation between the impact of FTC limitations on the marginal tax benefit of interest deductions and the debt or equity issuance choices made

[1] Section 3.2 provides a detailed discussion of this concept.

by U.S. multinationals raising capital in the public markets. Tax years after the Tax Reform Act of 1986 (TRA86) are analyzed because the incidence of firms with excess FTCs is particularly high during this period.[2] Treasury data indicate that the percentage of U.S. manufacturing companies (weighted by worldwide income) with excess FTCs increased from 20 to 69 percent with the passage of the TRA86 (Grubert and Mutti 1987); further, the Internal Revenue Service estimates that in 1988 excess FTCs existed in every industry except construction (Daronco and Veletto 1992). The focus on a specific decision context (i.e., public issuance choices in the post-TRA86 period) allows for a strong test of the impact of FTC limitations on financing choices.[3] The empirical model also includes tax variables for net operating loss (NOL) and business tax credit (BTC) carryforwards, as well as controls for other factors that influence the choice to issue debt or equity.

The study serves at least three purposes. First, this study provides clear evidence of a relation between income taxes and firms' financing choices. In particular, the finding that taxable firms substitute between unused foreign tax credits and interest deductions is important because prior research generally has found no empirical evidence of a relation between income taxes and financing choices (see Mackie-Mason 1990b for a review), or

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[2] Prior to the TRA86, excess FTCs reduced the tax benefit of interest deductions for those U.S. multinationals with domestic losses and worldwide income (Cordes and Sheffrin 1983; Altshuler and Auerbach 1990). Thus, a tax effect is expected in the pre-TRA86 period, but the effect would likely be harder to detect because fewer firms were impacted.

[3] A choice variable also provides clearer interpretations than more aggregated measures (e.g., debt ratios) that may include: (1) the effects of Financial Accounting Standard No. 94 (FAS94) changes in financial consolidation practices (for fiscal years ending after December 15, 1988, FAS94 generally requires consolidation of all majority-owned subsidiaries); (2) systematic differences in the use of retained earnings to finance operations due to varying profit levels (the pecking order theory of Myers 1984); and (3) foreign debt issuances not subject to U.S. interest allocation provisions (discussed in section 3.1).

has only found evidence of such a relation for those firms paying little or no income taxes (e.g., Mackie-Mason 1990b; Trezevant 1992). Second, this is the first study to examine several tax variables (FTC limitations, NOL carryforwards, and BTC carryforwards) in the same model. The use of multiple tax variables is consistent with the suggestion of Altshuler and Auerbach (1990, 81) that: "...the combination of all tax constraints, including investment and foreign tax credits, must be considered in any model attempting to explain corporate borrowing decisions." Third, evidence that binding FTC limitations can increase the cost of debt financing to the extent that public issuances are impacted should be of interest to those involved in the current debate regarding the redesign of U.S. foreign tax policy. The U.S. foreign tax policy debate has largely centered on the impact of the U.S. tax system on the international competitiveness of U.S. multinationals and, in particular, on their cost of capital (McClure and Bouma 1989; Ross 1990; Joint Committee on Taxation 1991).

## 2. LITERATURE REVIEW

### 2.1 Financial Theory of Taxes and Capital Structure

The evolution of a financial theory of how taxes and capital structure are related began with Modigliani and Miller (1958, 1963). Assuming there is an equilibrium in perfect capital markets, Modigliani and Miller (1958) showed that a firm's market value is independent of its capital structure. This finding led to the conclusion that a firm's method of financing is irrelevant. In contrast, Modigliani and Miller (1963) modeled the impact of corporate taxes, and found that the value of a levered firm exceeded the value of an unlevered firm by the present value of the debt tax shield. Thus, corporate tax shields could lead to a preference for debt financing.

Miller (1977) extended the Modigliani and Miller analysis by introducing progressive personal taxes into a model of aggregate supply and demand for corporate bonds. With rate of interest on the vertical axis, the Miller model yields an upward sloping demand function because the rate of interest must be high enough to compensate investors for their personal taxes on interest income. Since the personal income tax is progressive, the demand interest rate must rise to pull in investors in higher and higher tax brackets. The supply function, on the other hand, is modeled as a horizontal straight line at the point where the tax-exempt rate is grossed up by the top statutory corporate tax rate. This perfectly elastic supply function results from the model assumption that all corporations deduct their debt tax shields at the top statutory corporate tax rate. The implications of the Miller model include: (1) a bondholder surplus, (2) an equilibrium debt-equity ratio for the corporate sector as a whole, and (3) no optimal debt-equity ratio for any individual firm.

DeAngelo and Masulis (1980) extended Miller's model by considering the possibility that firms may not use their debt tax shields if other deductions already shelter

earnings. The existence of tax shield substitutes implies that the marginal tax benefit of debt declines as leverage is added to the capital structure. Modeled in the Miller framework, the DeAngelo and Masulis argument yields a downward sloping supply curve for corporate debt.[4] This means that a surplus exists for both bondholders and bond issuers. In other words, investors with tax rates lower than the marginal investor earn a surplus because they receive higher after-tax returns, and firms with higher tax rates than the marginal corporate issuer receive a surplus because they pay a lower after-tax debt rate. These surpluses imply that tax clienteles exist in the corporate bond market.

The existence of tax clienteles in the bond market provides the basis for explaining debt or equity financing choices made by firms. A market equilibrium identifies the marginal issuers and holders of taxable corporate bonds and provides a benchmark for firms' financing choices. Firms with a MTR above the market equilibrium MTR have an incentive to issue debt (corporate bonds), and firms with low MTRs have an incentive to issue equity securities with implicit tax subsidies (Scholes and Wolfson 1992, 312).[5]

## 2.2 Empirical Studies of Taxes and Capital Structure

*2.2.1 Empirical Tests of a Substitution Effect.* The DeAngelo and Masulis (1980) model suggests that firms with greater investment-related tax shields employ less debt in their capital structure (i.e., a substitution effect exists). Most empirical research on the relation between taxes and capital structure has focused on tests of this substitution effect. Earlier

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[4] If bankruptcy and agency costs are included in the model, then the slope of the supply curve becomes steeper and the tax advantage of corporate borrowing is more significant (Kim 1989).

[5] Investor returns on corporate equity are tax-favored relative to returns on corporate debt. To the extent the tax advantages of equity translate into a lower demanded before-tax rate of return (risk-adjusted), an implicit tax subsidy is provided to corporations that use equity financing.

empirical research did not support the existence of a substitution effect; instead, the relation between investment tax shields and debt levels was found to be either insignificant (e.g., Auerbach 1985; Long and Malitz 1985; Titman and Wessels 1988) or positive (e.g., Bradley, Jarrell, and Kim 1984). However, recent studies have found evidence of a substitution effect by explicitly recognizing that this effect is more applicable to firms with a substantial probability of losing the deductibility of their tax shields (Dhaliwal, Trezevant, and Wang 1992; Trezevant 1992). Givoly et al. (1992) also detected a substitution effect by using an estimate of the amount of non-debt tax shields that a firm would lose as a result of the TRA86.

*2.2.2 Empirical Tests of Tax Clienteles.* Several studies have used NOL carryforwards as a proxy for the tax benefit of firms' interest deductions. Scholes, Wilson, and Wolfson (1990) focused on the commercial banking industry because this industry has a large number of relatively homogeneous firms. Using the presence of NOL carryforwards as a dependent variable, Scholes, Wilson, and Wolfson (1990) found that banks with NOL carryforwards use more preferred and common stock in their capital structures. Mackie-Mason (1990a, 1990b) tested the incremental choices of firms to publicly issue debt or equity given their current tax status. Mackie-Mason (1990a, 1990b) found a negative relation between NOL carryforwards and a discrete dependent variable equal to one if public debt were issued, or zero if common stock were issued. In addition, Mackie-Mason (1990b) found evidence of a negative relation between debt issuances and an investment tax credit interaction term (ITC*bankruptcy predictor).

There has been little empirical investigation of a relation between FTC limitations and financing choices. Collins and Shackelford (1992) began the investigation with their finding that firms with a higher proportion of foreign assets to worldwide assets (FA/WA)

issued greater amounts of preferred stock in the post-TRA86 period.[6] Collins and Shackelford (1992) estimated three equations with the dependent variables defined as the change in the preferred stock account, the common stock account, or outstanding debt. The FA/WA ratio was used as a proxy for the impact of FTC limitations. The study found a positive relation between the FA/WA ratio and the change in preferred stock for the 1986-1989 period; however, the relation between the FA/WA ratio and the change in either outstanding debt or common stock was found to be insignificant.

This study extends the Collins and Shackelford (1992) analysis along several dimensions. First, rather than relying on the FA/WA ratio as a proxy for the impact of FTC limitations, this study explicitly measures the impact of FTC limitations on the marginal tax benefit of interest deductions. Second, multiple tax variables are included in the model so that the combination of tax constraints is considered in the analysis. Third, instead of using separate estimations of changes in the equity and debt accounts, a discrete choice model of the decision to issue either debt or equity is estimated. Not only does this model more closely approximate the theoretical prediction that taxes affect a firm's choice to issue either debt or equity, but it allows greater control over factors that may confound the analysis. For example, Collins and Shackelford (1992) acknowledged that their insignificant results for debt and common stock may be attributed to other factors included in the dependent variables, such as foreign debt not subject to the interest allocation rules (discussed in section 3.1) and share repurchases. The present study overcomes this limitation by using outside sources to specifically identify public issuances of domestic debt or equity by U.S. multinationals (or their affiliates).

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[6] Similarly, Guenther (1992) found evidence that U.S. multinationals with excess FTCs have lower average debt-to-asset ratios in the post-TRA86 period.

## 3. FOREIGN TAX CREDIT LIMITATIONS

This section provides background information on the calculation of allowable FTCs, and on the relation between FTC limitations and the marginal tax benefit of interest deductions. Much of the following discussion is derived from the theoretical development of Collins and Shackelford (1992).

### 3.1 Calculation of Allowable Foreign Tax Credits

U.S. multinationals are subject to U.S. income taxes on their worldwide income. Income earned outside of the U.S. also is likely taxed by a foreign government. The U.S. attempts to eliminate the double taxation of foreign-source income by allowing a tax credit for foreign income taxes. Thus, the total tax liability of a U.S. multinational is computed as follows:

$$TAX = USTAX + FORTAX - FTC, \tag{1}$$

where: TAX equals total income tax liability,
USTAX equals U.S.income taxes on worldwide income,
FORTAX equals foreign income taxes, and
FTC equals the foreign tax credit.

To prevent the FTC from offsetting U.S. income taxes on domestic-source income, the FTC is limited to a proportion of USTAX as follows:

$$FTC\ Limitation = \frac{Foreign\ taxable\ income\ (FTI)}{Worldwide\ taxable\ income\ (WTI)}\ x\ USTAX, \tag{2}$$

where FTI/WTI is not allowed to exceed one.

The revised interest allocation rules under the TRA86 impact the computation of the FTC limitation. The U.S. tax laws require that interest expenses be allocated between foreign and domestic income for purposes of the FTC limitation. Prior to the TRA86, the allocation of interest expenses was made on a separate company basis within an affiliated

group.[7] This meant that U.S. multinationals could avoid allocating domestic interest expenses against foreign income by sourcing debt in a subsidiary with domestic operations. The TRA86 changed this rule by requiring that interest expenses be allocated, based on assets (tax basis or fair market value), as if the affiliated group were a single corporation. Thus, domestic interest expenses of the affiliated group are allocated against foreign income based on the FA/WA ratio. The interest allocation is reflected in the FTC limitation formula by changing the FTI term to [FTI−(FA/WA)INT], where INT equals the amount of allocable interest.

The credit for foreign taxes is equal to the lesser of foreign taxes paid or the limitation amount; however, the amount of the credit cannot be less than zero. The credit for foreign income taxes is therefore calculated as follows:

$$FTC = max\ (0,\ min\ \{FORTAX,\ [FTI-(FA/WA)INT]t_{cm},\ USTAX\}), \qquad (3)$$

where $t_{cm}$ is the U.S. corporate MTR.

3.2 Impact on Marginal Tax Benefit of Interest Deductions

The impact of FTC limitations on the marginal tax benefit of interest deductions depends on which equation (3) constraint applies for determining the amount of the FTC. If FORTAX (foreign income taxes paid), USTAX (U.S. income taxes), and [FTI−(FA/WA)INT] (adjusted foreign taxable income) are positive, then the FTC equals the minimum of FORTAX (scenario *a* below), [FTI−(FA/WA)INT]$t_{cm}$ (scenario *b* below), or USTAX (scenario *c* below).[8] The corresponding marginal tax benefit of

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[7] The general rule is that affiliated corporations are connected through stock ownership of at least 80 percent (by voting power and value). Foreign subsidiaries are typically not included in the affiliated group.

[8] The sample selection procedures insure that foreign taxes and foreign income are positive. If USTAX is less than or equal to zero, then the impact of FTC limitations on the marginal tax benefit of interest deductions should be minimal.

allocable interest deductions ranges from $t_{cm}$ (scenario *a* below) down to zero (scenario *c* below).[9]

*3.2.1 Scenario a: FTC = FORTAX.* Scenario *a* can occur when: (1) $t_{cm}$ exceeds the average foreign tax rate (foreign taxes paid/adjusted foreign taxable income), and (2) there are no significant domestic losses.[10] If the FTC equals FORTAX, then the total tax liability is equal to USTAX. Thus, an increase in allocable interest deductions reduces total taxes paid by $\Delta INT(t_{cm})$, and the marginal tax benefit of the interest deduction is equal to $t_{cm}$. The relation can be shown in terms of the total tax calculation as follows:

$$TAX = [USTAX - INT(t_{cm})] + FORTAX - FORTAX \tag{4a}$$

$$\partial TAX/\partial INT = -t_{cm}. \tag{4b}$$

*3.2.2 Scenario b: FTC = [FTI−(FA/WA)INT]$t_{cm}$.* Scenario *b* can occur when: (1) the average foreign tax rate exceeds $t_{cm}$, and (2) domestic-source income (net of interest allocated to domestic-source income) is positive. Given that the FTC equals $[FTI-(FA/WA)INT]t_{cm}$, an increase in allocable interest results in a corresponding decrease in the FTC of $\Delta INT[(FA/WA)t_{cm}]$. This means that the tax benefit of an interest deduction for U.S. tax purposes is partially offset (based on the FA/WA ratio) by a decrease in the FTC. The relation can be shown in terms of the total tax liability calculation as follows:

$$TAX = [USTAX - INT(t_{cm})] + FORTAX - [FTI - (FA/WA)INT]t_{cm} \tag{5a}$$

$$\partial TAX/\partial INT = -t_{cm} + (FA/WA)t_{cm} = -t_{cm}(1-FA/WA). \tag{5b}$$

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[9] This analysis does not consider the present value of FTC carryovers. The carryover benefit is limited by the TRA86 restrictions on FTC carrybacks and the short carryforward period. The exclusion of carryover benefits should only bias against finding results.

[10] Even if the U.S. tax rate exceeds the average foreign tax rate, domestic losses can result in a situation where the U.S. tax on worldwide income is less than foreign taxes paid. If this is the case, then scenario *c* (described further below) applies.

*3.2.3 Scenario c: FTC = USTAX.* Scenario *c* occurs when: (1) domestic-source income (net of interest allocated to domestic-source income) is less than or equal to zero, and (2) FORTAX is greater than or equal to USTAX. If net domestic income is less than or equal to zero, then the proportion ratio {[FTI−(FA/WA)INT]/WTI} of the FTC limitation formula must equal one, and the FTC limitation is equal to one times USTAX, or USTAX. The FTC equals USTAX as long as FORTAX is not less than this limitation amount (condition 2 above). In this scenario, an increase in allocable interest decreases both USTAX and the FTC by $\Delta INT(t_{cm})$. This means that the tax benefit of the interest deduction is completely offset by a decrease in the FTC. The relation can be shown in terms of the total tax liability calculation as follows:

$$TAX = [USTAX - INT(t_{cm})] + FORTAX - [USTAX - INT(t_{cm})] \quad (6a)$$

$$\partial TAX/\partial INT = -t_{cm} + t_{cm} = 0. \quad (6b)$$

## 4. RESEARCH HYPOTHESES

The hypothesized relations between the tax variables and the issuance choices of U.S. multinationals raising capital in the public markets are discussed below. The tax hypotheses are stated in terms of U.S. multinationals because this study specifically focuses on those firms. However, it should be noted that the hypotheses related to net operating loss carryforwards and business tax credit carryforwards would apply to all U.S. firms, and not just those firms with foreign operations.

### 4.1 Foreign Tax Credit Limitations and Debt or Equity Issuances

The analysis in section 3.2 shows that binding FTC limitations reduce the marginal tax benefit of interest deductions for U.S. multinationals. For those U.S. multinationals in scenario *c* (as defined above), FTC limitations eliminate the marginal tax benefit of interest deductions. For those U.S. multinationals in scenario *b* (as defined above), the reduction in the marginal tax benefit of allocable interest deductions is positively related to the FA/WA ratio. Theory predicts that firms whose interest payments are deducted at high effective MTRs are more likely to use debt financing, and firms with low effective MTRs are more likely to use equity financing. The following hypothesis is therefore proposed:

> H1: The likelihood that U.S. multinationals (publicly traded) will publicly issue equity rather than debt with allocable interest increases with the impact of foreign tax credit limitations on the marginal tax benefit of interest deductions.

### 4.2 Net Operating Loss Carryforwards and Debt or Equity Issuances

If a firm generates a loss in a given year, then the loss may be carried back to offset taxable income in the three preceding years. A loss that is not absorbed by taxable income in the three preceding years is carried forward for fifteen years.[11] The results of

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[11] An election may be made to forego the carryback period so that losses are carried forward only.

Auerbach and Poterba (1987) suggest that net operating loss (NOL) carryforwards result in lower MTRs because firms with NOL carryforwards have a high probability of remaining in a carryforward position. If NOL carryforwards are associated with lower MTRs, then theory predicts that firms with NOL carryforwards are more likely to use equity to finance their operations. This discussion leads to the following hypothesis:

H2: U.S. multinationals (publicly traded) are more likely to publicly issue equity rather than debt if they have net operating loss carryforwards.

4.3 Business Tax Credit Carryforwards and Debt or Equity Issuances

In the post-TRA86 period the general business tax credit (BTC) includes: (1) the investment tax credit, (2) the targeted jobs tax credit, (3) the alcohol fuels credit, (4) the increased research credit, and (5) the low-income housing credit.[12] The general BTC offsets regular U.S. income taxes up to $25,000, plus 75 percent of the amount in excess of $25,000. Thus, if a firm has unused BTCs, the regular U.S. tax imposed on an additional unit of income is offset (at least 75 percent) by a tax credit. This means that unused BTCs can substantially reduce the marginal tax benefit of interest deductions. Consistent with this expectation, Cordes and Sheffrin (1983) and Altshuler and Auerbach (1990) provide empirical evidence of an association between unused credits and reduced interest benefits. The following hypothesis is therefore proposed:

H3: U.S. multinationals (publicly traded) are more likely to publicly issue equity rather than debt if they have business tax credit carryforwards.

[12] Although the TRA86 generally eliminated the regular investment tax credit (ITC) for property placed in service after December 31, 1985, ITC carryforwards from prior years can still be used in the post-TRA86 period.

## 5. RESEARCH METHODS

### 5.1 *Sample Selection and Data*

The sample consists of firms that: (1) are domestic corporations, (2) are publicly traded, and (3) are not a utility or a financial services company. A firm is defined as a domestic corporation if it is incorporated in the U.S., and it is not a subsidiary of a foreign corporation. Utilities and financial institutions are eliminated because regulation makes the capital market transactions of firms in these industries different from other firms.[13] In addition to these general criteria, a sample firm must: (1) have positive foreign operations (taxable income and income taxes), (2) publicly issue debt or equity during the 1988-91 period (exclusions of certain types of public issuances are discussed below), and (3) have financial statement information available to compute the explanatory variables (e.g., at least four years of financial statements prior to an issuance year must be available to compute those variables that use multiple years of data).

The requirement that sample firms have positive foreign operations insures that the firm is a U.S. multinational with creditable foreign taxes, and that average foreign income tax rates can generally be computed for purposes of classifying firms into the FTC limitation scenarios.[14] Requisite data on foreign operations are obtained from various sources including: the Directory of American Firms Operating in Foreign Countries, the International Directory of Corporate Affiliations, the Compustat services, and the firms' financial statements and footnotes.

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[13] For example, utilities may negotiate rates that effectively pass the tax disadvantage of preferred stock on to consumers (Brealey and Myers 1991, 321).

[14] It also is not clear how to interpret the FTC limitations impact for firms with non-positive foreign operations. While these firms may have no current foreign income taxes, the foreign loss recapture provision of the TRA86 makes it more likely that binding FTC limitations will be faced some time in the future. The positive foreign operations requirement applies to the issuance year and the preceding year.

The requirement that firms publicly issue debt or equity during the 1988-91 period pertains to issuances by U.S. multinationals or their affiliated companies.[15] The post-TRA86 period is selected for analysis because more firms are impacted by binding FTC limitations during this period (Grubert and Mutti 1987; Daronco and Veletto 1992).[16] In the post-TRA86 period, the allocation rules are applied to interest expenses incurred within an affiliated group; thus, an issuance by an affiliated subsidiary is attributed to the U.S. multinational parent. Data on interfirm stock ownership interests are obtained from the following sources: America's Corporate Families, Directory of Corporate Affiliations, Moody's Industrial Manual, and financial statement footnote disclosures.

Issuances of debt by U.S. multinationals or their affiliated companies are identified through the Moody's Bond Survey. The following types of debt issuances are excluded: (1) ESOP trust issuances, (2) secondary offerings and direct debt exchanges, and (3) debt convertible into equity. ESOP trust issuances are excluded because funds transferred to an ESOP to make interest payments are treated as compensation expenses rather than as interest subject to the TRA86 allocation provisions.[17] Secondary offerings by existing bondholders and direct exchanges of debt are excluded because these types of issuances do not raise capital for the firm. Convertible debt issuances are excluded because they represent hybrid securities that, depending on the probability of conversion, could primarily represent either a debt issuance or an equity issuance (Janjigian 1987). Further,

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[15] As previously mentioned, the general rule is that affiliated corporations are connected through stock ownership of at least 80 percent (by voting power and value).

[16] 1987 is excluded from the sample because it is a transition year.

[17] A review of debt issuances for 1989 (a popular year for creating ESOP trusts) showed that there were only two instances where firms were not included in the sample because their debt issuances were made through an ESOP trust.

the number of firms with convertible issuances is relatively small for a multinomial analysis.[18]

Issuances of equity by U.S. multinationals or their affiliated companies are identified through the Directory of Corporate Financing.[19] Secondary offerings by existing shareholders are excluded because they do not raise capital for the firm. Initial public offerings (IPOs) also are excluded because the IPO decision is likely fundamentally different from an ongoing choice to use debt or equity financing.

Based on the above criteria, 201 firms with 320 issuances are selected for analysis (see Table 1 for a breakdown by year and by pooling assumption). The issuance data by year provides the basis for cross-sectional tests. In addition, two separate samples are constructed based on either a simple pooling of the cross-section and time-series observations, or a pooling by the largest issuance year for each firm. The debt and equity issuances are deleted from the primary analysis; however, sensitivity analysis is conducted whereby these issuances are retained as a debt observation. The debt and equity issuances are classified as debt in the sensitivity analysis because even though long-term debt and equity are usually clear substitutes (Friedman 1985), theory suggests that equity may be used in conjunction with debt as a mechanism to increase firms' debt capacity (Heinkel and Zechner 1990). In addition, the debt portion of the debt and equity issuances is usually quite large in comparison to the equity portion.

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[18] A review of the data showed that approximately 17 firms (or 27 observations) would be added to the simple pooling sample if convertible issuances were retained. Prior studies of financing choices also have deleted convertible debt because of its hybrid nature and the low number of issuances (e.g., Marsh 1982; Mackie-Mason 1990b).

[19] In 1991, the name of the service changed to Corporate Finance - The IDD Review of Investment Banking. Supplemental stock issuance information also was obtained from the Investment Dealers' Digest.

5.2 Empirical Model and Dependent Variable

The general model of the choice to issue either equity or debt is as follows:[20]

Choice = f(Foreign Tax Credit Limitations, Net Operating Loss Carryforwards, Business Tax Credit Carryforwards, and Control Variables).

The model is estimated using logistic regression. The dependent variable (choice) is coded one if there is a public issuance of equity (common or preferred stock), or zero if there is a public issuance of debt (corporate bonds). Sensitivity analysis of the dependent variable is conducted with the debt and equity observations included in the analysis as a debt observation (discussed in section 5.1), or with the preferred stock issuances deleted from the analysis.

5.3 Tax Variables

The tax variables include the impact of FTC limitations on the marginal tax benefit of interest deductions, the existence of NOL carryforwards, and the existence of BTC carryforwards. A combined NOL or BTC carryforward variable also is constructed as an alternative to the separate carryforward measures. Each tax variable is measured as of the end of the year preceding an issuance to avoid endogeneity.[21] Given the error rates associated with tax data items reported in Compustat (Kinney and Swanson 1993), the data for the tax variables is collected from the annual financial statements (tax and

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[20] Mackie-Mason (1990b) used a similar model in his test of a relation between certain tax shields and issuance choices (discussed earlier). Although this study primarily focuses on the impact of FTC limitations on the public issuance choices of U.S. multinationals, the control variables for other explanations of a debt or equity choice are similar to those used by Mackie-Mason. The primary differences in the control variables are: (1) the use of a debt ratio deviation from an industry mean rather than from an individual firm mean, and (2) the addition of a control for depreciation expenses.

[21] See Judge et al. (1985, 564-66) for a discussion of endogenous variables. If the tax variables are measured contemporaneously with issuance choice, then the potential exists that not only will the tax variables impact the issuance choice, but that the issuance choice will impact the tax variable measures.

segment reporting footnotes). Table 2 provides a summary of the tax variables and their definitions and predicted sign in the model.

*5.3.1 Foreign Tax Credit Limitations.* The FTC limitations variable measures the degree to which FTC limitations impact the marginal tax benefit of firms' interest deductions, and its value depends on which scenario applies for determining the FTC amount (discussed in section 3.2). If scenario *a* applies, wherein FTC limitations have no impact on the marginal tax benefit of interest deductions, then the FTC limitations variable is coded zero. The FTC limitations variable also is coded zero for those firms with worldwide taxable losses because these firms have little or no U.S. income taxes to offset with a FTC. If scenario *c* applies, wherein the tax benefit of an additional interest deduction is completely offset by a decrease in the FTC, then the FTC limitations variable is coded one. If scenario *b* applies, wherein the ability of firms to use their interest deductions declines with the FA/WA ratio, then the FTC limitations variable equals the firms' FA/WA ratio.

Table 3 provides a summary of the criteria used to determine which FTC scenario applies, and the related value of the FTC limitations impact variable. The determination of which FTC scenario applies generally requires two levels of analysis. First, if a firm's domestic income is less than or equal to zero (and worldwide income is positive), then either: (1) scenario *c* applies if foreign income taxes are greater than or equal to U.S. income taxes, or (2) scenario *a* applies if foreign income taxes are less than U.S. income taxes. Second, if domestic income is positive, then either: (1) scenario *b* applies if the firm is in an excess FTC position, or (2) scenario *a* applies if the firm is not in an excess FTC

position.[22] Consistent with prior research (e.g., Hines 1991), a firm generally is identified as being in an excess FTC position if its average foreign income tax rate exceeds the top statutory U.S. tax rate. However, this identification method is supplemented with other tax footnote information that indicates firms' FTC positions (see the Appendix A tax footnote disclosure examples).

The empirical analysis also is conducted with alternative measures of the FTC limitations impact variable. These alternative measures include: (1) a dummy variable equal to one if FTC limitations have a 'high' impact on the marginal tax benefit of interest deductions, or zero otherwise, and (2) an adjusted FTC variable that takes into account firms' dividend payout ratios.

*5.3.2 Tax Carryforwards.* Two tax carryforward variables are included in the model. The NOL carryforward variable is a dummy variable equal to one if a NOL tax carryforward exists at the end of the year preceding an issuance, or zero otherwise.[23] The BTC carryforward variable is a dummy variable equal to one if a BTC carryforward exists at the end of the year preceding an issuance, or zero otherwise. A combined NOL or BTC carryforward variable also is constructed as an alternative to the separate carryforward measures. The combined variable is a dummy variable equal to one if either a NOL or BTC carryforward exists at the end of the year preceding an issuance, or zero otherwise. The combined variable is used in the 1991 cross-sectional tests because a model with both tax carryforward variables would not converge.

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[22] Because the sample criteria require that firms have positive foreign income, those firms with positive domestic income will always have positive worldwide income.

[23] Alternative NOL measures that take into account firms' current taxable income positions (see Shevlin 1990) also were constructed and tested in the model. Similar test results are obtained with these alternative measures.

5.4 Control Variables

The empirical model includes other variables that are expected to influence the decision to issue either debt or equity. The control variables include proxies for financial distress costs, agency costs, signaling costs, and other factors.[24] As previously discussed, the variables are measured in the year(s) preceding an issuance year to avoid endogeneity. Table 4 provides a summary of the control variables and their definitions and predicted sign in the model.

*5.4.1 Financial Distress Costs.* One theory of capital structure involves balancing the tax advantage of debt against costs associated with financial distress (see Kim 1989 for a detailed discussion of financial distress costs). Under this theory, a positive relation between equity issuances and the likelihood of financial distress is predicted.

The empirical model includes two measures of firms' likelihood of financial distress: an operating risk variable and a bankruptcy predictor variable.[25] The operating risk variable [(standard deviation of first differences in earnings before interest, depreciation, and taxes)/mean assets] agrees with risk measures used in prior capital structure research (e.g., Mackie-Mason 1990b; Bradley, Jarrell, and Kim 1984).[26] Operating risk is computed using six years of financial data prior to an issuance (or at

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[24] Harris and Raviv (1991) also survey theories of short-term changes in capital structure in response to takeover threats. Although a specific control is not included for takeovers, several variables related to predicting takeover targets are in the model including: size, the percentage of tangible assets, the dividend payout ratio, and the debt ratio (see Dietrich and Sorensen 1984; Palepu 1986; Ambrose and Megginson 1992).

[25] Alternative measures of operating risk (using the standard deviation of percentage changes in earnings) and of bankruptcy (using Ohlson 1980) also were computed. The results of tests using these alternative measures are not substantially different.

[26] A squared term of the operating risk measure also was tested in the model (with insignificant results) because a quadratic functional form is suggested by Kale, Noe, and Ramirez (1991).

least four years if data are missing). Consistent with Mackie-Mason (1990b), the bankruptcy predictor variable is based on the discriminant function developed by Altman (1968).

*5.4.2 Agency Costs.* Agency costs arise because conflicts of interest between bondholders and stockholders result in inefficient investment strategies that lower firm value. Stockholders (and managers acting on behalf of stockholders) have incentives to expropriate wealth from bondholders by taking on excessive risk (Jensen and Meckling 1976), and by underinvesting in certain positive net present value projects (Myers 1977). Myers (1977) argues that firms have two basic types of assets: (1) tangible assets (or assets in place) that provide collateral to bondholders, and whose returns are less affected by further investment, and (2) growth opportunities whose returns are enhanced by subsequent discretionary investments. The proportion of firms' growth opportunities is positively related to the level of agency costs associated with debt financing because growth opportunities make it is easier to alter a firm's market value and risk to the benefit of stockholders. This means that equity issuances should be positively (negatively) related to the proportion of growth opportunities (tangible assets).[27]

The controls for agency costs that arise because of conflicts between bondholders and stockholders include a measure of the proportion of tangible assets (net property, plant, and equipment/total assets), and a measure of the proportion of growth options (advertising and R&D/net sales).[28] Bradley, Jarrell and Kim (1984) argue that advertising and research and development (R&D) expenses can be viewed as either a

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[27] The Harris and Raviv (1990) model also predicts that firms with higher liquidation values (i.e., those firms with more tangible assets) will use more debt.

[28] The ratio of market-to-book equity (Gaver and Gaver 1993) was included in the model as an additional measure of growth opportunities with insignificant results.

proxy for the growth options described by Myers (1977), or as a proxy for investment-related tax shields that substitute for interest deductions. Either interpretation yields a prediction of a positive relation between the proportion of advertising and R&D expenses and the choice to issue equity.

Agency costs also arise from conflicts of interest between stockholders and managers. Theory suggests that these conflicts of interest are especially severe when firms generate substantial uncommitted cash flows. Jensen (1986) showed that firms can alleviate these agency costs by increasing future cash commitments through debt issuances. A cash flow deficit measure developed by Auerbach (1985) is therefore included in the model as a control for the potential impact of these agency costs on the issuance choice (see Table 4 for a detailed definition of the cash flow deficit variable).

*5.4.3 Signaling Costs.* Empirical evidence suggests that financing choices provide signals regarding firm quality. Prior research generally has found that seasoned equity issuances are interpreted as a negative signal by the market and, as such, a significant reduction in stock price typically accompanies an equity announcement (see Harris and Raviv 1991 for a survey of the literature). Prior research also has found that the magnitude of the negative stock price reaction is: (1) positively related to the size of the issue relative to total equity value (e.g., Asquith and Mullins 1986; Korajczyk, Lucas, and McDonald 1990), and (2) negatively related to whether the issuance follows an increase in the firm's stock price (e.g., Asquith and Mullins 1986; Viswanath 1993). The empirical model includes measures of the issue size relative to total equity value and the prior year stock price change as controls for the magnitude of the negative signal that may accompany an equity issuance.

Not only may firms provide negative signals by issuing equity, but firms may provide a positive signal of quality by paying higher dividends and using more debt (Ravid and Sarig 1991). Based on Ravid and Sarig's (1991) signaling model, a negative relation between firms' dividend payout ratios and equity issuances would be predicted.[29] A negative relation between firms' dividend payout ratios and common stock issuances also is supported by the tax explanation that the risk-adjusted returns demanded on stock increase with the dividend rate (i.e., higher dividend rates result in lower implicit tax subsidies).[30]

*5.4.4 Other Factors.* Other factors that may influence issuance choices include: (1) the firm size, (2) the debt ratio, (3) the deviation of the debt ratio from an industry mean, (4) the magnitude of depreciation expenses, and (5) the year of issuance. Although most of the measures used in the model are scaled by total assets or net sales, a separate size variable (measured as the natural log of total assets) controls for any remaining size effects. The debt ratio variable (measured as long-term debt/total equity plus long-term debt) controls for the relative magnitude of firms' cumulative debt and equity decisions prior to a current issuance choice. The inclusion of a variable for the deviation of the debt ratio from an industry mean ratio (computed at the 3-digit SIC code level) is supported by evidence that the debt ratios of firms converge to an industry mean over time, and that this convergence requires firms to make periodic adjustments (Lev 1969; Bowen, Daley, and Huber 1982). Depreciation expenses (depreciation expense/net sales)

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[29] In addition, a negative relation is consistent with Loderer and Mauer's (1992) finding that dividend-paying firms elicit more negative announcement effects (for seasoned equity offerings) than non-dividend-paying firms.

[30] Brennan (1970) and Scholes and Wolfson (1992, Ch. 17) provide a further discussion of this tax explanation.

are included as an additional control for investment-related tax shields. Although the DeAngelo and Masulis (1980) substitution effect implies a positive relation between depreciation expenses and equity issuances, prior research suggests that this variable will proxy for the collateral value of assets, and that a negative relation will be observed (Trezevant 1992; Dhaliwal, Trezevant, and Wang 1992). Dummy variables for the year of issuance provide a rough control for macroeconomic factors that are predicted to influence financing choices including: (1) the recent performance of the stock and bond markets (Marsh 1982), (2) whether the business cycle is at a peak (Viswanath 1993), (3) interest rates (Gordon 1982; Blazenko 1987), (4) inflation (Gordon 1982; Taggart 1985), and (5) supplies of competing securities (Taggart 1985).

## 6. EMPIRICAL RESULTS

As previously discussed, two pooled samples are constructed from the issuance data based on either a simple pooling of the cross-section and time-series observations, or a pooling by the largest issuance year. By analyzing both samples, the robustness of the results across pooling assumptions is tested. Separate cross-sectional tests also are conducted for each year in the sample period; however, convergence is only obtained in the 1991 logistic regression.[31] Tables 5 and 6 present descriptive statistics and a correlation matrix, respectively, for the simple pooling sample.[32] Table 7 presents logistic regression results and goodness-of-fit statistics for three separate models: the simple pooling, the pooling by largest issuance year, and 1991. The following section begins with a summary of the goodness-of-fit statistics, and then proceeds to a discussion of the individual explanatory variables and sensitivity analysis of the dependent variable.

### 6.1 Goodness-of-fit Statistics

The goodness-of-fit statistics for the logistic regression models suggest a 'good' fit (see Table 7). Likelihood ratio tests (not reported in Table 7) reflect that the explanatory variables are significant at the .0001 level; further, the pseudo-$R^2$ (or $\rho^2$) statistic ranges from 65.6 percent to 78.9 percent. The $\rho^2$ may be interpreted as measuring the percent of "uncertainty" in the data explained by the empirical results (Judge et al. 1985, 767). Another useful summary measure is the ability of the model to correctly classify the observed choices in the sample. Not only are the total correct prediction rates for the models fairly high (83.7 percent to 87.3 percent) but, more importantly, the models do a

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[31] An examination of the maximum likelihood iterations revealed that the data is ill-conditioned in the individual years. This may be due, in part, to the small cell size associated with the equity observations (i.e., the number of cxplanatory variables approximates (or exceeds) the number of equity observations in the years 1988-1990).

[32] These statistics are not substantially different for the 1991 and pooling by largest issuance year samples.

'good' job of correctly predicting both equity issuances (78.1 percent to 83.3 percent) and debt issuances (86.1 percent to 89.1 percent). As a comparison, these prediction rates are somewhat better than those obtained by Mackie-Mason (1990b).

6.2 Tax Variables

*6.2.1 Descriptive Statistics.* As previously discussed, the tax carryforwards (NOLs and BTCs) are measured as indicator variables, and the impact of FTC limitations on the marginal tax benefit of interest deductions is measured as a continuous variable ranging from zero to one. Frequency data of the FTC limitations impact variable reflect that this variable has a wide distribution of values.

Descriptive statistics of the means for the full sample, and for each issuance choice (debt or equity) are presented in Table 5. Further, the results of statistical tests of significance for the difference in means (continuous variables), or for the difference in proportions (indicator variables) also are presented in Table 5.[33] The results of the univariate statistical tests are consistent with the prediction of a positive relation between each tax variable and the choice to issue equity. For each tax variable, the mean (or proportion) for the equity observations is significantly greater (at the .01 level) than the mean (or proportion) for the debt observations. Although not reported in Table 5, similar results (at the .01 significance level) are obtained with nonparametric Wilcoxon tests.

Table 6 provides pearson correlation coefficients for the explanatory variables. Not only are the correlation coefficients for the tax variables relatively small, but correlation diagnostics (tolerance and variance inflation factors) suggest that the tax variables are not significantly correlated with the other variables in the model.

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[33] The mean for an indicator variable is actually the proportion of the observations with the characteristic of interest. For these variables, the appropriate statistical test is a test for a difference in proportions, rather than a test for a difference in means.

*6.2.2 Logistic Regression Results.* The logistic regression results (see Table 7) clearly support the hypothesis 1 prediction that the likelihood of U.S. multinationals publicly issuing equity rather than debt increases with the impact of FTC limitations on the marginal tax benefit of interest deductions. The FTC limitations impact variable is significant at the .01 level in both pooling models, and it is significant at the .05 level in 1991. Similarly, there is clear support for the hypothesis 2 prediction that U.S. multinationals are more likely to publicly issue equity rather than debt if they have NOL carryforwards. The NOL carryforward variable is significant at the .01 level for both the simple pooling and the pooling by largest issuance year models. Because the 1991 logistic regression would not converge with both tax carryforward variables, a combined NOL or BTC carryforward variable is used in the 1991 analysis. The combined NOL or BTC carryforward variable is significant at the .05 level; further, a separate NOL carryforward variable (in a 1991 model that excludes the BTC carryforward variable) is significant at the .01 level.[34] Although the results are weaker, there also is support for the hypothesis 3 prediction that U.S. multinationals are more likely to publicly issue equity rather than debt if they have BTC carryforwards. The BTC carryforward variable is significant at the .01 level in the simple pooling model, and it is marginally significant (at the .10 level) in the pooling by largest issuance year model.

In evaluating the impact of the tax variables it is useful to supplement the above tests of significance with an examination of the magnitude of the tax coefficients. It is difficult to interpret the magnitude of coefficients in a logistic regression model because it is nonlinear. One approach is to compute the probability of an event (equity issuance) at

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[34] A separate analysis of the impact of NOL carryforwards in a model that excludes BTC carryforwards is appropriate because NOL carryforwards are used before BTC carryforwards in the calculation of firms' income taxes.

the mean of the sample data, and then compute the change in this probability given a one unit change in the variable of interest. Using this approach, the impact of the tax variables on the probability of an equity issuance was found to be economically important, as well as statistically significant. In the simple pooling model, a 10 percentage point increase in the FTC limitations impact variable results in a 5.5 percentage point increase in the probability that equity will be issued rather than debt. Further, an increase of one standard deviation (or 26 percentage points) in the FTC limitations impact variable results in a 20 percentage point increase in the probability of an equity issuance. For the tax carryforward variables, the existence of NOL carryforwards (BTC carryforwards) increases the probability of an equity issuance by 30 percentage points (32 percentage points). Important magnitude effects also are obtained in the pooling by largest issuance year and 1991 models.[35]

*6.2.3 Alternative Definitions of the FTC Limitations Impact Variable.* Appendix B explores the possibility that FTC limitations and issuance choices are not related in a simple continuous manner. By equating the after-tax returns to a marginal investor, Appendix B provides estimates of those points where the impact of FTC limitations is such that U.S. multinationals would be indifferent (for tax reasons) between issuing debt and either preferred stock or common stock. Using the estimated indifference point (0.34) for a common stock versus debt issuance choice, a dichotomous FTC limitations impact measure is constructed. The dichotomous measure equals one if the FTC limitations variable exceeds 0.34 (i.e., there is a 'high' impact on the marginal tax benefit of interest deductions), or zero otherwise. The significance levels of the FTC limitations

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[35] Compared to the simple pooling model, the magnitude effects are somewhat less in 1991; however, in the pooling by largest issuance year model, the impact of either FTC limitations or NOL carryforwards on the probability of an equity issuance is greater.

impact and NOL carryforward variables remain unchanged when this dichotomous measure is used; however, the BTC carryforward variable becomes insignificant in the pooling by largest issuance year model (see Table B-1).

The Appendix B analysis also reflects that the impact of FTC limitations on issuance choices may be influenced by firms' dividend payout ratios. To the extent risk-adjusted returns demanded on stocks increase with the dividend rate (see Copeland and Weston 1988, Ch. 16 for a survey of the literature), the estimated indifference point for issuance choices also increases. Thus, a second alternative measure of the FTC limitations impact variable is constructed to incorporate the possibility that higher dividend rates decrease the impact of FTC limitations on the equity versus debt issuance choice. Specifically, the continuous FTC limitations impact variable (unless it equals one) is multiplied by the complement of the dividend payout ratio.[36] The significance levels of the FTC limitations impact and NOL carryforward variables remain unchanged when this adjusted FTC measure is used; however, the significance level of the BTC carryforward variable increases from .10 to .05 in the pooling by largest issuance year model (see Table B-2).

A final variation of the FTC limitations impact measure involved testing for possible interactions with the other tax variables. In particular, the NOL carryforward variable may interact with the FTC limitations impact variable because NOL carryforwards are used before FTCs in the calculation of firms' income taxes. To the extent NOL carryforwards reduce a firm's MTR, the marginal tax benefit of an interest deduction

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[36] If the FTC limitations impact variable equals one then there is no marginal tax benefit for an additional interest deduction, and the payout ratio must equal 100 percent before issuance choices are impacted. Thus, no adjustment is made if the impact variable equals one unless the payout ratio is 100 percent.

(before FTCs) is less; thus, the point at which binding FTC limitations influence a firm to issue equity may be impacted. By including interaction terms in the logistic regressions, it was found that no significant interactions exist between the FTC limitations impact variable and either the NOL or BTC carryforward variables.

6.3 Control Variables

*6.3.1 Descriptive Statistics.* There are at least two interesting observations that may be drawn from the univariate statistics for the control variables. First, the means by issuance choice (see Table 5) generally agree with the sign predictions for these variables. In other words, the means for the equity issuances tend to be significantly higher (lower) than the means for the debt issuances if a positive (negative) relation between the control variable and equity issuances is predicted. The primary exception to this result is the relative issue size variable, where the equity and debt means are not in the predicted direction, and a two-tailed test for the difference in means would be significant at the .01 level.

Second, the pearson correlation coefficients (see Table 6) suggest that some of the control variables are correlated. In particular, correlation coefficients greater than .50 are detected for depreciation expenses and the bankruptcy predictor (0.68), and for debt ratios and the deviation of debt ratios from an industry mean (0.83). Correlation diagnostics also provide evidence of moderate correlation for the debt ratio variable and for the deviation of debt ratios from an industry mean variable (i.e., variance inflation factors in the 4-5 range were detected).[37] To the extent these correlations increase the standard errors of the variables, it will be harder to detect a significant effect.

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[37] However, the diagnostics did not provide evidence of any significant correlations for the other explanatory variables in the model.

*6.3.2 Logistic Regression Results.* Consistent with Mackie-Mason's (1990b) analysis, the logistic regression results (see Table 7) support that equity versus debt choices are related to financial distress costs, agency costs, and signaling costs. The bankruptcy predictor, which proxies for financial distress costs, is positively related to equity choices at either the .01 level (in the pooling models), or at the .05 level (in the 1991 model). Similarly, the controls for agency costs (percentage of tangible assets, advertising and R&D expenses, and cash flow deficits) are all significantly related to equity choices in the predicted direction. To the extent advertising and R&D expenses proxy for investment-related tax shields, the positive relation between this variable and equity choices also supports the existence of a tax shield substitution effect. Although the signaling cost results are weaker (i.e., the payout ratio and change in stock price variables are not significant), issue size is negatively related to equity choice at the .01 level (in the pooling models). This result is consistent with the signaling cost explanation that the negative signal accompanying a stock issuance increases with the size of the issue.

Mixed results are obtained for the other factors in the model. While size and depreciation expenses are negatively related (generally at the .01 level) to equity issuances, the debt ratio and deviation of debt ratios from an industry mean are not significant. The insignificant results for debt ratios and their deviations from an industry mean may, in part, be due to the higher standard errors that result from correlations between these variables and the other regressors in the model.[38] The finding of a negative relation between size and equity issuances is consistent with prior studies of financing choices (e.g., Mackie-Mason 1990b; Marsh 1982), and the negative relation for depreciation expenses is

[38] Mackie-Mason (1990b) also did not find significance for his measures of debt ratios and their deviation from an individual firm mean.

consistent with the explanation that this variable proxies for the collateral value of assets. In the pooling by largest issuance year model, a negative relation also exists between equity issuances and the 1988 and 1989 year dummies at the .10 and .05 levels, respectively. One possible explanation for firms making fewer equity choices in 1988 and 1989 (relative to 1991) is that firms were reacting to the effects of a severe stock market downturn in the last quarter of 1987.

6.4 Sensitivity Analysis of the Dependent Variable

In the primary analysis, issuances of both debt and equity are deleted, and the dependent variable (choice) is coded one if there is an issuance of equity (common or preferred stock), or zero if there is an issuance of debt (corporate bonds). The results of sensitivity analysis of the dependent variable are reported in Appendix C.

One sensitivity test of the dependent variable is to include issuances of both debt and equity in the analysis as a debt observation (see Table C-1).[39] The logistic regression results for this variation reflect that the significance levels of the control variables generally increase, particularly in the 1991 model. For the tax variables, the FTC limitations impact and NOL carryforward variables remain significant at the .01 level, and the BTC carryforward variable remains marginally significant at the .10 level or better.

Another sensitivity test of the dependent variable is to define an equity choice as an issuance of common stock (i.e., preferred stock issuances are deleted from the analysis). The results of this sensitivity test are presented in Table C-2. These logistic regression results reflect that the FTC limitations impact and NOL carryforward variables remain significant at the .01 level, but that the BTC carryforward variable is now only

[39] The reasons for classifying these issuances as debt are discussed in section 5.1.

significant in the simple pooling model (at the .10 level).[40] Mixed results are obtained for the other control variables (i.e., the significance levels increase, decrease, or remain the same); however, any previously significant control variables remain significant at the .10 level or better.

[40] No logistic regression results are reported for 1991 because the model does not converge when the preferred stock issuances are deleted.

## 7. CONCLUSIONS, IMPLICATIONS, AND LIMITATIONS

The empirical results provide strong evidence of tax clienteles. The FTC limitations impact and NOL carryforward variables are significantly related (generally at the .01 level) to issuance choices. Further, these significant results are robust to variations in the sample assumptions (see Table 1), alternative FTC limitations impact measures, and variations in the issuance choice definition. The empirical results also provide evidence of a relation between BTC carryforwards and issuance choices; however, these results are sensitive to the inclusion of preferred stock issuances, and to whether the impact of FTC limitations is measured as a dichotomous variable. The results for the control variables support that, in addition to tax considerations, other theories of capital structure play an important role in explaining the financing choices of firms.

The finding of a significant relation between the impact of FTC limitations on the marginal tax benefit of interest deductions and public issuance choices made by U.S. multinationals is important for two reasons. First, evidence that binding FTC limitations can increase the cost of debt financing to the extent that large capital transactions are impacted is consistent with arguments that current U.S. foreign tax policy undermines the competitiveness of U.S. multinationals. Thus, the finding should be of interest to those involved in the current debate regarding the redesign of U.S. foreign tax policy. Second, the FTC limitations result provides empirical evidence of a situation where taxable firms substitute between unused tax credits and interest deductions. Prior research that has attempted to establish an empirical link between income taxes and financing choices has either been unsuccessful (see Mackie-Mason 1990b for a discussion), or has only found evidence of such a relation for those firms paying little or no income taxes (e.g., Mackie-Mason 1990b; Trezevant 1992).

The above conclusions and implications are subject to several inherent limitations of the empirical model. First, financial statement data (primarily the tax and segment reporting footnotes) must be used to compute the FTC limitations impact variable because tax return information for individual firms is not publicly available. Second, proxies must be used to measure the theoretical constructs of financial distress, agency, and signaling costs; however, similar measures have been used in prior capital structure studies with fairly consistent results. Third, those design features that serve to make the empirical tests stronger, such as the focus on U.S. multinationals raising capital in the public markets, may also serve to decrease the degree to which the results can be generalized. For example, although the tax hypotheses for NOL carryforwards and BTC carryforwards would be expected to apply to all U.S. firms, this study only tests these hypotheses for a specific subset of U.S. firms. Finally, by measuring the tax variables at the end of the year preceding an issuance, the implicit assumption is made that a firm's current tax status is a good proxy for its anticipated tax status during the period that the debt or equity is outstanding. Support for this assumption is found in prior research findings that tax-loss carryforwards (Auerbach and Poterba 1987) and certain excess FTC positions (Altshuler and Auerbach 1990) are persistent (i.e., firms with carryforwards tend to remain in a carryforward position).

TABLE 1
Sample

| Type of Issuance | 1988 | 1989 | 1990 | 1991 | Simple Pooling[a] | Pooling by Largest Issuance Year[b] |
|---|---|---|---|---|---|---|
| Debt (%) | 51 (76%) | 57 (79%) | 49 (74%) | 72 (63%) | 229 (71%) | 129 (64%) |
| Common Stock (%) | 9 (13%) | 9 (12%) | 12 (18%) | 30 (26%) | 60 (19%) | 54 (27%) |
| Preferred Stock (%) | 2 (3%) | 4 (6%) | 4 (6%) | 2 (2%) | 12 (4%) | 6 (3%) |
| Subtotal (%) | 62 (92%) | 70 (97%) | 65 (98%) | 104 (91%) | 301 (94%) | 189 (94%) |
| Debt & Equity[c] (%) | 5 (8%) | 2 (3%) | 1 (2%) | 11 (9%) | 19 (6%) | 12 (6%) |
| Total (%) | 67 (100%) | 72 (100%) | 66 (100%) | 115 (100%) | 320 (100%) | 201 (100%) |

[a] 65 firms (or approximately 32 percent of the sample firms) have an issuance in more than one year. Almost all of the multiple issuances are debt (i.e., there are only 3 firms with equity issuances in more than one year).

[b] Pooling by the largest issuance year results in a sample with one observation for each firm. If there is a tie for the largest issuance year (for example, a firm issued the same amount of debt in two years), then the earlier year is retained in the sample.

[c] Debt & equity consists of observations where a firm issued both debt and equity in the same year.

TABLE 2
Tax Variables - Predicted Sign and Definitions
(Dependent variable equals 1 for an equity issuance or 0 for a debt issuance)

| Variable | Predicted Sign | Definitions |
|---|---|---|
| Foreign Tax Credit (FTC) Limitations Impact | + | Continuous variable (ranging from 0 to 1) defined by the impact of FTC limitations on the marginal tax benefit of interest deductions (see Table 3 for a detailed definition). |
| Net Operating Loss (NOL) Carryforward | + | Dummy variable defined as one if a NOL carryforward exists for tax purposes, or zero otherwise. |
| Business Tax Credit (BTC) Carryforward | + | Dummy variable defined as one if a BTC carryforward exists for tax purposes, or zero otherwise. |
| NOL or BTC Carryforward[a] | + | Dummy variable defined as one if either a NOL carryforward or BTC carryforward exists for tax purposes, or zero otherwise. |

Notes:

(1) The tax variables are measured as of the end of the year prior to an issuance.

(2) The tax data is obtained from the firms' financial statements and footnotes (tax and segment reporting).

[a] The combined NOL or BTC carryforward variable is an alternative measure to the two separate carryforward variables.

TABLE 3
Measure of Foreign Tax Credit Limitations Impact on the Marginal Tax Benefit of Interest Deductions

| Domestic Taxable Income ≤ 0 Worldwide Taxable Income > 0[a] | | Domestic Taxable Income > 0 Worldwide Taxable Income > 0[b] | |
|---|---|---|---|
| FORTAX ≥ USTAX | FORTAX < USTAX | Excess Foreign Tax Credits[c] | No Excess Foreign Tax Credits |
| Scenario *c* Impact=1 | Scenario *a* Impact=0 | Scenario *b* Impact=FA/WA | Scenario *a* Impact=0 |

Note: FORTAX equals foreign income taxes, USTAX equals U.S. income taxes, and FA/WA equals foreign assets/worldwide assets.

[a] If worldwide taxable income ≤ 0, then Impact=0.

[b] Worldwide taxable income is always > 0 because foreign taxable income > 0 for the sample firms.

[c] If the average foreign income tax rate > top statutory U.S. tax rate, then excess foreign tax credits generally are deemed to exist. This identification method is supplemented with other tax footnote information that indicates firms' foreign tax credit positions (see the Appendix A tax footnote disclosure examples).

TABLE 4
Control Variables - Predicted Sign and Definitions
(Dependent variable equals 1 for an equity issuance or 0 for a debt issuance)

| Variable | Predicted Sign | Definitions (Including Compustat Items) |
|---|---|---|
| Financial Distress: | | |
| Operating Risk | + | [Standard deviation of ($EBIDT_t - EBIDT_{t-1}$)]/Mean Assets, for 6 years (or at least 4 years if data are missing), where EBIDT = (V170 + V14 + V15) and Assets=V6. |
| Bankruptcy Predictor | + | 1/zprob (Altman 1968). zprob = [.012(Working Capital/Assets)] + [.014(Retained Earnings/Assets] + [.033(EBIT/Assets)] + [.006(MVE/Debt)] + [.999(Sales/Assets)], where: Working Capital=V179, Assets=V6, Retained Earnings=V36, EBIT = V170 + V15, MVE=V24*V25, Debt=V9, and Sales=V12. |
| Agency Costs: | | |
| % of Tangible Assets | − | Net Property, Plant, and Equipment/Assets (V8/V6). |
| Advertising and R&D | + | (Advertising + R&D expenses)/Net Sales [(V45 + V46)/V12]. |
| Cash Flow Deficit | + | {Capital Expenditures + Average Dividends − [Cash Flow + Capital Expenditures (Debt/Net Assets)]}/Net Sales, where: Capital Expenditures=V30; Average Dividends=mean of V19 + V21 over 5 years (or 4 years if data are missing); Cash Flow = V308 − V124 or if V308=. then Cash Flow = V110 − V124 + (V34 + V70 + V72 − V44) − ($V34_{t-1} + V70_{t-1} + V72_{t-1} - V44_{t-1}$) − (V4 − V1) + ($V4_{t-1} - V1_{t-1}$); Debt=V9; Net Assets = V6 − V70; and Net Sales=V12. |

TABLE 4 Cont.

| Variable | Predicted Sign | Definitions (Including Compustat Items) |
|---|---|---|
| Signaling Costs: | | |
| Relative Size of Issue | – | Issuance Amount/MVE, where MVE=V24*V25. |
| Stock Price Change | + | Closing Price$_{(t-1)}$ – Closing Price$_{(t-2)}$, where Closing Price=V24. |
| Payout Ratio | – | Dividends per Share/Earnings per Share (V26/V58), mean over 5 years (or 4 years if data are missing). |
| Other: | | |
| Size | No Sign Prediction | Natural Log of Assets, where Assets=V6. |
| Debt Ratio | | Long-term Debt/(Equity + Long-term Debt) [V9/(V60 +V130 +V9)]. |
| Debt Ratio Deviation from Industry | | Difference between the firm's debt ratio and a mean debt ratio for its industry (3-digit SIC code level), where the industry mean is computed over the sample period. |
| Depreciation | | Depreciation Expense/Net Sales (V14/V12). |
| Year of Issuance | | Year Dummy Variables (1991 is the excluded year). |

Note: Each control variable is measured in the year(s) preceding an issuance.

TABLE 5
Descriptive Statistics

| Variable | Mean (N=301) | Equity Mean (N=72) | Debt Mean (N=229) | Diff. Equity vs. Debt[a] |
|---|---|---|---|---|
| FTC Limitations Impact[b] | 0.20 | 0.31 | 0.16 | 0.15*** |
| NOL Carryforward | 0.19 | 0.43 | 0.12 | 0.31*** |
| BTC Carryforward | 0.17 | 0.32 | 0.12 | 0.20*** |
| NOL or BTC | 0.26 | 0.49 | 0.18 | 0.31*** |
| Operating Risk | 0.05 | 0.08 | 0.04 | 0.04*** |
| Bankruptcy Predictor | 1.01 | 0.95 | 1.02 | 0.07 |
| % of Tangible Assets | 0.38 | 0.30 | 0.41 | 0.11*** |
| Advertising and R&D | 0.05 | 0.06 | 0.04 | 0.02* |
| Cash Flow Deficit | −0.01 | 0.00 | −0.02 | 0.02** |
| Relative Size of Issue | 0.16 | 0.27 | 0.12 | 0.15 |
| Stock Price Change | −0.84 | 2.70 | −1.96 | 4.66*** |
| Payout Ratio | 0.39 | 0.27 | 0.42 | 0.15*** |
| Size | 8.06 | 6.05 | 8.70 | 2.65*** |
| Debt Ratio | 0.38 | 0.39 | 0.37 | 0.02 |
| Debt Ratio Deviation | 0.02 | 0.08 | 0.00 | 0.08*** |
| Depreciation | 0.05 | 0.05 | 0.06 | 0.01 |
| Year (1988) | 0.21 | 0.15 | 0.22 | 0.07 |
| Year (1989) | 0.23 | 0.18 | 0.25 | 0.07 |
| Year (1990) | 0.22 | 0.22 | 0.21 | 0.01 |
| Year (1991) | 0.34 | 0.45 | 0.32 | 0.13** |

Note: The means are for the simple pooling sample (years 1988-91) without the debt and equity observations. The means are not substantially different for the other samples.

[a] The difference in the means (or proportions for the indicator variables) is significant at the *** .01 level, ** .05 level, or * .10 level (one-tailed tests for those variables with sign predictions). Similar results are obtained with nonparametric Wilcoxon tests.

[b] The frequency of the FTC limitations impact variable is as follows: 44 percent of the observations equal zero, 5 percent equal one, and 51 percent are between zero and one.

TABLE 6
Pearson Correlation Matrix

| | ftc | nol | btc | nob | rsk | bnk | tan | adr | def | iss | stk | pay | siz | dbt | dev | dep | y88 | y89 | y90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ftc Impact (ftc) | | | | | | | | | | | | | | | | | | | |
| Loss cf (nol)[a] | .16 | | | | | | | | | | | | | | | | | | |
| Credit cf (btc)[a] | .03 | .50 | | | | | | | | | | | | | | | | | |
| Nol or btc (nob)[a] | .12 | .83 | .77 | | | | | | | | | | | | | | | | |
| Risk (rsk) | .12 | .39 | .35 | .36 | | | | | | | | | | | | | | | |
| Bankruptcy (bnk) | -.01 | .14 | .28 | .24 | -.05 | | | | | | | | | | | | | | |
| Tang. assets (tan) | .06 | -.04 | .16 | .06 | -.08 | .19 | | | | | | | | | | | | | |
| Adv.& res (adr) | -.02 | .08 | -.10 | .04 | .13 | -.05 | -.26 | | | | | | | | | | | | |
| Cash deficit (def) | .10 | .12 | .08 | .14 | .13 | .02 | .07 | .22 | | | | | | | | | | | |
| Issue size (iss) | .11 | .21 | .30 | .26 | .23 | .09 | -.15 | .04 | .20 | | | | | | | | | | |
| Stock price (stk) | .07 | .06 | -.06 | .01 | -.02 | .03 | .03 | -.05 | .02 | -.01 | | | | | | | | | |
| Payout (pay) | .06 | .01 | .02 | .01 | -.02 | .20 | .17 | -.11 | -.10 | -.33 | -.03 | | | | | | | | |
| Size (siz) | -.02 | -.15 | -.18 | -.19 | -.33 | .20 | .15 | -.09 | -.18 | -.47 | -.10 | .42 | | | | | | | |
| Debt Ratio (dbt) | .09 | .20 | .20 | .17 | .01 | .44 | .13 | -.19 | -.07 | .28 | .03 | .09 | .18 | | | | | | |
| Debt Dev. (dev) | .12 | .27 | .18 | .20 | .14 | .26 | -.02 | -.05 | -.02 | .28 | .00 | .02 | .04 | .83 | | | | | |
| Depr. (dep) | .14 | .19 | .31 | .26 | .09 | .68 | .42 | -.06 | -.06 | -.01 | .00 | .23 | .04 | .26 | .15 | | | | |
| Year88 (y88)[a] | -.19 | -.04 | .01 | .00 | -.05 | -.10 | -.00 | -.03 | -.05 | -.02 | -.16 | .08 | -.04 | -.06 | -.06 | -.08 | | | |
| Year89 (y89)[a] | -.01 | -.01 | -.04 | -.03 | .02 | .04 | -.08 | .09 | .08 | .13 | .13 | -.05 | .02 | -.00 | -.06 | -.05 | -.28 | | |
| Year90 (y90)[a] | .08 | .01 | .04 | .01 | .07 | .08 | .08 | -.09 | .04 | -.08 | .11 | .08 | .09 | .05 | .01 | .08 | -.27 | -.29 | |
| Year91 (y91)[a] | .10 | .03 | -.01 | .02 | -.03 | -.02 | .01 | .02 | -.06 | -.02 | -.08 | -.09 | -.06 | .01 | .09 | .04 | -.37 | -.40 | -.38 |

Note: This is the correlation matrix for the simple pooling sample without the debt and equity observations (N=301). The correlations are not substantially different for the 1991 and pooling by largest issuance year samples.

[a] These are indicator variables for which correlation coefficients may be less meaningful.

TABLE 7
Logistic Regression Results
(Dependent variable equals 1 for an equity issuance or 0 for a debt issuance)

| Variable | Simple Pooling (N=301) | Pooling by Largest Issuance (N=189) | 1991 (N=104) |
|---|---|---|---|
| Intercept | 13.65*** | 24.62*** | 11.38* |
| | (2.70) | (7.24) | (5.99) |
| FTC Limitations Impact | 5.77*** | 8.80*** | 7.81** |
| | (1.40) | (2.88) | (3.56) |
| NOL Carryforward[a] | 2.22*** | 5.13*** | |
| | (0.75) | (1.82) | |
| BTC Carryforward | 2.32*** | 1.95* | |
| | (0.98) | (1.44) | |
| NOL or BTC Carryforward[b] | | | 4.53** |
| | | | (2.07) |
| Operating Risk | 0.31 | 4.38 | 17.07 |
| | (7.26) | (10.69) | (17.11) |
| Bankruptcy Predictor | 2.30*** | 6.18*** | 9.60** |
| | (0.73) | (2.04) | (4.86) |
| % of Tangible Assets | −3.98** | −8.94** | −5.75* |
| | (1.99) | (4.70) | (3.64) |
| Advertising and R&D | 12.73*** | 21.40*** | 21.97* |
| | (5.48) | (7.88) | (15.74) |
| Cash Flow Deficit | 5.82* | 17.26** | 24.69** |
| | (3.85) | (9.29) | (13.54) |
| Relative Size of Issue | −8.14*** | −13.23*** | −0.57 |
| | (2.14) | (4.45) | (6.26) |
| Stock Price Change | 0.01 | 0.00 | 0.10 |
| | (0.02) | (0.04) | (0.08) |
| Payout ratio | 0.32 | 1.23 | 2.62 |
| | (1.04) | (1.55) | (2.50) |
| Size | −2.18*** | −3.79*** | −3.14** |
| | (0.37) | (1.03) | (1.42) |

TABLE 7 Cont.

| Variable or Goodness-of-fit Statistics | Simple Pooling (N=301) | Pooling by Largest Issuance (N=189) | 1991 (N=104) |
|---|---|---|---|
| Debt Ratio | 3.93<br>(2.48) | 5.41<br>(4.51) | 13.02<br>(8.06) |
| Debt Ratio Deviation from Industry Mean | 2.10<br>(2.30) | 2.91<br>(3.52) | −5.26<br>(5.33) |
| Depreciation | −38.56***<br>(10.33) | −79.86***<br>(24.68) | −117.10*<br>(60.51) |
| Year (1988) | −0.71<br>(0.71) | −2.43*<br>(1.24) | |
| Year (1989) | −1.11<br>(0.75) | −3.73**<br>(1.69) | |
| Year (1990) | 0.53<br>(0.71) | −1.66<br>(1.34) | |
| $\rho^2$ (pseudo-$R^2$)[c] | 65.6% | 78.9% | 75.5% |
| % of Correct Equity Predictions | 80.6% | 83.3% | 78.1% |
| % of Correct Debt Predictions | 87.8% | 89.1% | 86.1% |
| % of Correct Total Predictions | 86.0% | 87.3% | 83.7% |

Notes:

(1) Standard errors are in parentheses.

(2) Significant at the *** .01 level, ** .05 level, or * .10 level (one-tailed tests for those variables with sign predictions).

[a] The NOL carryforward variable is significant at the .01 level in 1991 if the BTC carryforward variable is deleted from the model.

[b] The NOL or BTC carryforward variable is used in the 1991 logistic regression because the model would not converge with both carryforward variables.

[c] See Judge et al. (1985, 767) for a definition and discussion of the $\rho^2$ statistic.

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# APPENDIX A

## TAX FOOTNOTE DISCLOSURE EXAMPLES

## TAX FOOTNOTE DISCLOSURE EXAMPLES

1. Occidental Petroleum Corporation - December 31, 1988 (Italics added for emphasis)

The domestic and foreign components of income before domestic and foreign income and other taxes and extraordinary gain (loss) were as follows (in millions):

| | Domestic | *Foreign* | Total |
|---|---|---|---|
| 1989 | $ 344 | $ 230 | $ 574 |
| 1988 | $ 100 | $ 647 | $ 747 |
| 1987 | $ 7 | $ 521 | $ 528 |

The provision (credit) for domestic and foreign income and other taxes consisted of the following (in millions):

| | U.S Federal | State and Local | *Foreign* | Total |
|---|---|---|---|---|
| 1988 | | | | |
| Current | $ 38. | $ 66. | $188. | $292. |
| Deferred | 14. | -19. | -26. | -31. |
| | $ 52. | $ 47. | $162. | $261. |
| 1987 | | | | |
| Current | $ 7. | $ 5. | $497. | $509. |
| Deferred | -39. | 12. | 25. | -2. |
| Charge equivalent to extraordinary benefit of capital loss carryforward | 52. | 0. | 4. | 56. |
| | $ 20. | $ 17. | $526. | $563. |
| 1986 | | | | |
| Current | $ 2. | $ 34. | $315. | $351. |
| Deferred | -32. | 4. | 24. | -4. |
| Charge equivalent to extraordinary benefit of capital loss carryforward | 9. | 0. | 0. | 9. |
| | $ -21. | $ 38. | $339. | $356. |

*At December 31, 1988, Occidental had, for U.S. federal income tax purposes, a net operating loss carryforward of approximately $ 825 million and an investment tax credit carryforward of approximately $150 million available to reduce future income taxes.* To the extent not used, the net operating loss carryforward expires in varying amounts beginning in 2001 and the investment tax credits expire in varying amounts during the years 1994 through 2001. Because of differences in the recognition of revenue and expense for financial reporting and tax return purposes, no such carryforwards exist for financial statement purposes and deferred income tax provisions may be required as the tax carryforwards are recognized. *For U.S. federal income tax return purposes, Occidental has foreign tax credit carryforwards that expire in varying amounts through 1990.*

The following is a reconciliation of the U.S. statutory federal income tax rate to Occidental's effective tax rate on income before extraordinary gain (loss) (percentage of pretax income):

| | 1988 | 1987 | 1986 |
|---|---|---|---|
| U.S. federal statutory tax rate | 34.% | 40.% | 46.% |
| *Foreign taxes in excess of U.S. federal statutory rate* | 13. | 41. | 21. |
| Effect of differences between fair values assigned in purchase accounting and historical tax values | -5. | 10. | 9. |
| Capital Loss benefit relating to liabilities assumed in connection with sale of a subsidiary | 0. | -10. | 0. |
| State taxes net of federal benefit | 5. | 4. | 4. |
| Capital gain benefit | 0. | - 2. | -1. |
| Prior-year accruals no longer required | 0. | - 6. | -6. |
| Investment tax credits | 0. | 0. | -3. |
| Nontaxable gain on subsidiary's issuance of stock | -10. | 0. | 0. |
| Minority interest in subsidiaries | 3. | 0. | 0. |
| Nondeductible expenses | 6. | 0. | 0. |
| Other | - 1. | - 2. | -3. |
| Tax rate provided by Occidental | 45.% | 75.% | 67.% |

2. Pepsico Inc. - December 31, 1990 (Italics added for emphasis)

Provision for income taxes on income from continuing operations:

| | 1990 | 1989 | 1988 |
|---|---|---|---|
| Current- Federal | $301.5 | $221.7 | $235.2 |
| *Foreign* | 126.6 | 89.5 | 52.8 |
| State | 62.3 | 38.0 | 40.6 |
| | 490.4 | 349.2 | 328.6 |
| Deferred- Federal | 66.0 | 95.7 | 37.4 |
| *Foreign* | 12.5 | 1.2 | 1.7 |
| State | 7.9 | 3.0 | -2.7 |
| | 86.4 | 99.9 | 36.4 |
| | $576.8 | $449.1 | $365.0 |

U.S. and foreign income from continuing operations before income taxes:

| | 1990 | 1989 | 1988 |
|---|---|---|---|
| U.S. | $915.5 | $843.4 | $773.4 |
| *Foreign* | 751.9 | 507.1 | 353.8 |
| | $1,667.4 | $1,350.5 | $1,127.2 |

Reconciliation of the U.S. federal statutory tax rate to PepsiCo's effective tax rate on income from continuing operations:

| | 1990 | 1989 | 1988 |
|---|---|---|---|
| U.S. federal statutory tax rate | 34.0% | 34.0% | 34.0% |
| State income tax net of federal benefit | 1.9 | 2.0 | 2.2 |
| *Earnings in jurisdictions taxed at lower rates (principally Puerto Rico and Ireland)* | -3.9 | -3.9 | -3.7 |
| Nondeductible amortization of goodwill and other intangibles | 1.6 | 2.0 | 1.4 |
| Tax basis difference related to joint venture stock offering | 1.6 | 0.0 | 0.0 |
| Other, net | -0.6 | -0.8 | -1.5 |
| Effective Tax Rate | 34.6% | 33.3% | 32.4% |

# APPENDIX B

## ESTIMATE OF INDIFFERENCE POINTS AND ANALYSIS OF ALTERNATIVE FOREIGN TAX CREDIT LIMITATION MEASURES

## ESTIMATE OF INDIFFERENCE POINTS

If a profitable U.S. multinational has excess foreign tax credits and positive domestic income, then the marginal tax benefit of its allocable interest expenses declines as the proportion of foreign assets to worldwide assets (FA/WA) increases. Estimates of FA/WA levels that would make firms indifferent (for tax reasons) between issuing equity or debt with allocable interest are provided below.

1) *Preferred Stock versus Debt With Allocable Interest*: (See Collins and Shackelford 1992)

If profitable U.S. corporations are the marginal investors at the market equilibrium where the relative yields on debt and preferred stock are determined, then the following equivalent relationship exists between the after-tax returns (risk-adjusted) on an investment:

$$int(1 - t_{ci}) = div[1 - t_{ci}(1 - d)] \qquad (A.1)$$

where:

int = interest income,
$t_{ci}$ = U.S. corporate marginal tax rate (MTR) for marginal investors,
div = preferred dividend income, and
d = dividends-received deduction percentage.

Rearranging terms, we can see that the marginal investor is indifferent between receiving \$1 of interest or dividends of $(1 - t_{ci})/[1 - t_{ci}(1 - d)]$.

The point at which a profitable U.S. multinational is indifferent between issuing preferred stock or debt with allocable interest is computed as follows:

$$1 - t_{cm}(1 - FA/WA) = (1 - t_{ci})/[1 - t_{ci}(1 - d)] \qquad (A.2)$$

where: $t_{cm}$ = U.S. corporate MTR for the U.S. multinational issuer.

Solving for FA/WA yields:

$$FA/WA = 1 - (1/t_{cm}) + (1 - t_{ci})/\{[1 - t_{ci}(1 - d)]t_{cm}\} \qquad (A.3)$$

If $t_{cm}$=.34, $t_{ci}$=.34, and d=.70 (current tax parameters), then FA/WA equals .22. Hence, the U.S. multinational would be indifferent between issuing preferred stock or debt with allocable interest if FA/WA=22 percent. Firms with FA/WA ratios greater than 22 percent would issue preferred stock.

2) *Common Stock versus Debt With Allocable Interest*:

If U.S. individuals are the marginal investors at the market equilibrium where the relative yields on debt and common stock are determined, then the following equivalent relationship exists between the after-tax returns (risk-adjusted) on an investment:[41]

$$int(1 - t_p) = (1 - x)R[1 - t_{cg}(1 - \alpha)] + xR(1 - t_p) \quad (A.4)$$

where:

int = interest income,
$t_p$ = personal MTR (for marginal investors) on interest and dividend income,
x = proportion of common stock returns received as dividends,
R = common stock returns,
$t_{cg}$ = personal MTR (for marginal investors) on capital gains, and
$\alpha$ = deferral benefit of capital gains as a percentage.

Rearranging terms, we can see that the marginal investor is indifferent between receiving \$1 of interest or common stock returns of $(1 - t_p)/[1 - xt_p - (1 - x)t_{cg}(1 - \alpha)]$.

The point at which a profitable U.S. multinational is indifferent between issuing common stock or debt with allocable interest is computed as follows:

$$1 - t_{cm}(1 - FA/WA) = (1 - t_p)/[1 - xt_p - (1 - x)t_{cg}(1 - \alpha)] \quad (A.5)$$

where: $t_{cm}$ = U.S. corporate MTR for the U.S. multinational issuer.

Solving for FA/WA yields:

$$FA/WA = 1 - (1/t_{cm}) + (1 - t_p)/\{[1 - xt_p - (1 - x)t_{cg}(1 - \alpha)]t_{cm}\} \quad (A.6)$$

If $t_{cm}$=.34, $t_p$=.28, $t_{cg}$=.28, $\alpha$=.75 (Gordon and Mackie-Mason 1990), and x=0, then FA/WA equals .34. Hence, the U.S. multinational would be indifferent between issuing common stock that pays no current dividends or debt with allocable interest if FA/WA=34 percent. Firms with FA/WA ratios greater than 34 percent would issue common stock.

If the example is changed so that x=.5, then FA/WA equals .63. Hence, the U.S. multinational would be indifferent between issuing common stock that pays out 50 percent of common stock returns as dividends or debt with allocable interest if FA/WA=63 percent. Firms with FA/WA ratios greater than 63 percent would issue common stock.

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[41] The calculation of after-tax common stock returns is similar to the formulations developed by Chang and Rhee (1990) and Farrar and Selwyn (1967).

TABLE B-1
Logistic Regression Results With Dichotomous FTC Limitations Measure
(Dependent variable equals 1 for an equity issuance or 0 for a debt issuance)

| Variable | Simple Pooling (N=301) | Pooling by Largest Issuance (N=189) | 1991 (N=104) |
|---|---|---|---|
| Intercept | 13.20*** | 31.49*** | 15.85* |
| | (2.57) | (9.98) | (8.41) |
| FTC Limitations Impact[a] | 2.90*** | 7.06*** | 6.97** |
| | (0.71) | (2.34) | (3.13) |
| NOL Carryforward | 2.37*** | 7.18*** | |
| | (0.76) | (2.60) | |
| BTC Carryforward | 1.76** | 1.73 | |
| | (0.88) | (1.52) | |
| NOL or BTC Carryforward | | | 6.98** |
| | | | (3.29) |
| Operating Risk | 0.09 | 1.72 | 11.29 |
| | (7.05) | (13.62) | (19.24) |
| Bankruptcy Predictor | 1.86*** | 7.23*** | 11.54** |
| | (0.70) | (2.48) | (6.41) |
| % of Tangible Assets | −4.33** | −11.52** | −7.04* |
| | (2.10) | (5.40) | (4.68) |
| Advertising and R&D | 12.65*** | 30.43*** | 32.31* |
| | (5.14) | (10.75) | (20.94) |
| Cash Flow Deficit | 4.74* | 18.92** | 17.46 |
| | (3.65) | (10.40) | (14.91) |
| Relative Size of Issue | −6.96*** | −14.65*** | −2.08 |
| | (1.85) | (5.05) | (6.92) |
| Stock Price Change | 0.01 | 0.01 | 0.11 |
| | (0.02) | (0.04) | (0.10) |
| Payout ratio | 0.49 | 2.82* | 3.42 |
| | (0.99) | (1.84) | (2.95) |
| Size | −2.09*** | −4.91*** | −4.08** |
| | (0.35) | (1.47) | (1.94) |

TABLE B-1 Cont.

| Variable or Goodness-of-fit Statistics | Simple Pooling (N=301) | Pooling by Largest Issuance (N=189) | 1991 (N=104) |
|---|---|---|---|
| Debt Ratio | 4.36* | 6.84 | 16.09 |
| | (2.44) | (5.46) | (9.93) |
| Debt Ratio Deviation from Industry Mean | 2.66 | 5.91 | −6.19 |
| | (2.38) | (4.36) | (6.46) |
| Depreciation | −28.52*** | −87.64*** | −140.50* |
| | (8.87) | (28.81) | (84.31) |
| Year (1988) | −1.08 | −3.33** | |
| | (0.70) | (1.64) | |
| Year (1989) | −1.38* | −5.00*** | |
| | (0.74) | (1.87) | |
| Year (1990) | 0.17 | −2.63* | |
| | (0.70) | (1.39) | |
| $\rho^2$ (pseudo-$R^2$)[b] | 64.7% | 81.3% | 78.7% |
| % of Correct Equity Predictions | 79.2% | 81.7% | 75.0% |
| % of Correct Debt Predictions | 86.5% | 89.9% | 90.3% |
| % of Correct Total Predictions | 84.7% | 87.3% | 85.6% |

Notes:
(1) Standard errors are in parentheses.

(2) Significant at the *** .01 level, ** .05 level, or * .10 level (one-tailed tests for those variables with sign predictions).

[a] The FTC limitations variable is defined as one if greater than 0.34, or zero otherwise. The 0.34 cutoff is derived from the indifference point estimate for common stock versus debt (see Appendix B). A 0.50 cutoff also was tested with similar results.

[b] See Judge et al. (1985, 767) for a definition and discussion of the $\rho^2$ statistic.

TABLE B-2
Logistic Regression Results With FTC Limitations Measure Adjusted by Payout Ratio
(Dependent variable equals 1 for an equity issuance or 0 for a debt issuance)

| Variable | Simple Pooling (N=301) | Pooling by Largest Issuance (N=189) | 1991 (N=104) |
|---|---|---|---|
| Intercept | 13.71*** | 29.12*** | 12.26* |
| | (2.71) | (8.84) | (6.89) |
| FTC Limitations Impact[a] | 6.51*** | 15.67*** | 11.12** |
| | (1.49) | (5.52) | (5.87) |
| NOL Carryforward[b] | 2.10*** | 5.80*** | |
| | (0.74) | (2.36) | |
| BTC Carryforward | 2.48*** | 3.44** | |
| | (0.99) | (1.71) | |
| NOL or BTC Carryforward | | | 5.29** |
| | | | (2.64) |
| Operating Risk | 0.98 | 7.14 | 15.68 |
| | (7.34) | (12.58) | (17.21) |
| Bankruptcy Predictor | 1.59*** | 6.49*** | 11.28** |
| | (0.66) | (2.27) | (6.16) |
| % of Tangible Assets | −5.55*** | −12.64*** | −5.90* |
| | (2.10) | (5.24) | (3.82) |
| Advertising and R&D | 11.98** | 23.14*** | 25.70* |
| | (5.55) | (9.02) | (17.93) |
| Cash Flow Deficit | 6.22* | 17.08* | 23.61** |
| | (3.85) | (10.46) | (13.54) |
| Relative Size of Issue | −8.76*** | −18.41*** | −1.72 |
| | (2.27) | (6.16) | (6.91) |
| Stock Price Change | 0.01 | −0.01 | 0.13* |
| | (0.02) | (0.04) | (0.09) |
| Payout ratio | 0.74 | 2.49* | 3.95* |
| | (1.00) | (1.83) | (2.89) |
| Size | −2.14*** | −4.50*** | −3.52** |
| | (0.36) | (1.31) | (1.78) |

TABLE B-2 Cont.

| Variable or Goodness-of-fit Statistics | Simple Pooling (N=301) | Pooling by Largest Issuance (N=189) | 1991 (N=104) |
|---|---|---|---|
| Debt Ratio | 4.80** | 6.62 | 15.24 |
| | (2.45) | (5.13) | (9.92) |
| Debt Ratio Deviation from Industry Mean | 1.73 | 4.79 | −6.65 |
| | (2.26) | (4.29) | (6.30) |
| Depreciation | −20.14** | −61.00*** | −140.10* |
| | (8.06) | (22.83) | (75.60) |
| Year (1988) | −0.73 | −2.52* | |
| | (0.69) | (1.37) | |
| Year (1989) | −1.43* | −4.70** | |
| | (0.77) | (1.96) | |
| Year (1990) | 0.30 | −2.62* | |
| | (0.71) | (1.57) | |
| $\rho^2$ (pseudo-$R^2$)[c] | 65.5% | 81.7% | 76.7% |
| % of Correct Equity Predictions | 84.7% | 88.3% | 78.1% |
| % of Correct Debt Predictions | 86.5% | 89.1% | 84.7% |
| % of Correct Total Predictions | 86.0% | 88.9% | 82.7% |

Notes:
(1) Standard errors are in parentheses.

(2) Significant at the *** .01 level, ** .05 level, or * .10 level (one-tailed tests for those variables with sign predictions).

[a] The FTC limitations variable (if it is less than one) is multiplied by the complement of the payout ratio. FTC limitations variables coded one are only adjusted if the payout ratio is 100 percent (i.e., there are no implicit tax subsidies).

[b] In 1991, the NOL carryforward variable is significant at the .05 level if the BTC carryforward variable is deleted from the model.

[c] See Judge et al. (1985, 767) for a definition and discussion of the $\rho^2$ statistic.

# APPENDIX C

## SENSITIVITY ANALYSIS OF THE DEPENDENT VARIABLE

TABLE C-1
Logistic Regression Results With Inclusion of Debt and Equity Observations
(Dependent variable equals 1 for equity or 0 for debt or debt and equity)

| Variable | Simple Pooling (N=320) | Pooling by Largest Issuance (N=201) | 1991 (N=115) |
|---|---|---|---|
| Intercept | 13.58*** | 22.87*** | 13.89** |
| | (2.65) | (6.42) | (5.78) |
| FTC Limitations Impact | 5.71*** | 8.06*** | 6.98*** |
| | (1.38) | (2.56) | (2.96) |
| NOL Carryforward[a] | 2.21*** | 4.82*** | |
| | (0.75) | (1.68) | |
| BTC Carryforward | 2.20** | 1.84* | |
| | (0.97) | (1.43) | |
| NOL or BTC Carryforward | | | 4.49*** |
| | | | (1.85) |
| Operating Risk | 1.47 | 7.70 | 23.99* |
| | (7.18) | (10.05) | (14.68) |
| Bankruptcy Predictor | 2.33*** | 5.75*** | 8.97** |
| | (0.73) | (1.90) | (4.26) |
| % of Tangible Assets | −3.93** | −8.18** | −6.20* |
| | (1.99) | (4.39) | (3.86) |
| Advertising and R&D | 13.60*** | 21.92*** | 24.50** |
| | (5.40) | (7.69) | (13.91) |
| Cash Flow Deficit | 6.71** | 20.15** | 29.69** |
| | (3.80) | (8.92) | (13.12) |
| Relative Size of Issue | −8.29*** | −12.81*** | −5.11 |
| | (2.12) | (4.15) | (5.17) |
| Stock Price Change | 0.01 | 0.00 | 0.06 |
| | (0.02) | (0.04) | (0.06) |
| Payout ratio | 0.48 | 1.44 | 2.24 |
| | (1.02) | (1.53) | (2.25) |
| Size | −2.21*** | −3.62*** | −3.37*** |
| | (0.37) | (0.92) | (1.31) |

TABLE C-1 Cont.

| Variable or Goodness-of-fit Statistics | Simple Pooling (N=320) | Pooling by Largest Issuance (N=201) | 1991 (N=115) |
|---|---|---|---|
| Debt Ratio | 4.07<br>(2.48) | 5.59<br>(4.45) | 11.88*<br>(7.21) |
| Debt Ratio Deviation from Industry Mean | 2.03<br>(2.32) | 3.00<br>(3.54) | −2.99<br>(4.85) |
| Depreciation | −38.91***<br>(10.28) | −74.87***<br>(22.80) | −100.20**<br>(45.17) |
| Year (1988) | −0.62<br>(0.71) | −2.15*<br>(1.20) | |
| Year (1989) | −1.01<br>(0.74) | −3.38**<br>(1.60) | |
| Year (1990) | 0.67<br>(0.71) | −1.43<br>(1.32) | |
| $\rho^2$ (pseudo-$R^2$)[b] | 65.8% | 78.6% | 74.5% |
| % of Correct Equity Predictions | 81.9% | 81.7% | 75.0% |
| % of Correct Debt Predictions | 87.9% | 90.8% | 85.5% |
| % of Correct Total Predictions | 86.6% | 88.1% | 82.6% |

Notes:

(1) Standard errors are in parentheses.

(2) Significant at the *** .01 level, ** .05 level, or * .10 level (one-tailed tests for those variables with sign predictions).

[a] The NOL carryforward variable is significant at the .05 level in 1991 if the BTC carryforward variable is deleted from the model.

[b] See Judge et al. (1985, 767) for a definition and discussion of the $\rho^2$ statistic.

TABLE C-2
Logistic Regression Results With Preferred Stock Observations Excluded
(Dependent variable equals 1 for a common stock issuance or 0 for a debt issuance)

| Variable | Simple Pooling (N=289) | Pooling by Largest Issuance (N=183) |
|---|---|---|
| Intercept | 15.55*** | 24.19*** |
| | (3.33) | (7.26) |
| FTC Limitations Impact | 5.88*** | 8.48*** |
| | (1.63) | (2.94) |
| NOL Carryforward | 2.93*** | 5.01*** |
| | (0.93) | (1.76) |
| BTC Carryforward | 1.69* | 1.49 |
| | (1.21) | (1.45) |
| Operating Risk | 1.89 | 0.89 |
| | (8.82) | (11.08) |
| Bankruptcy Predictor | 2.18** | 6.12*** |
| | (0.95) | (2.06) |
| % of Tangible Assets | −3.60* | −10.49** |
| | (2.74) | (5.54) |
| Advertising and R&D | 13.90** | 22.18*** |
| | (6.09) | (8.08) |
| Cash Flow Deficit | 8.77** | 18.42** |
| | (4.24) | (9.54) |
| Relative Size of Issue | −7.48*** | −12.19*** |
| | (2.57) | (4.51) |
| Stock Price Change | 0.00 | 0.01 |
| | (0.02) | (0.04) |
| Payout ratio | 0.96 | 1.30 |
| | (1.21) | (1.52) |
| Size | −2.50*** | −3.65*** |
| | (0.46) | (1.01) |

TABLE C-2 Cont.

| Variable or Goodness-of-fit Statistics | Simple Pooling (N=289) | Pooling by Largest Issuance (N=183) |
|---|---|---|
| Debt Ratio | 3.66<br>(2.84) | 4.40<br>(4.50) |
| Debt Ratio Deviation from Industry Mean | 2.10<br>(2.58) | 3.51<br>(3.55) |
| Depreciation | −37.98***<br>(12.05) | −72.15***<br>(23.70) |
| Year (1988) | −1.57*<br>(0.90) | −2.76**<br>(1.35) |
| Year (1989) | −1.76*<br>(0.96) | −3.97**<br>(1.75) |
| Year (1990) | −0.18<br>(0.87) | −1.57<br>(1.32) |
| $\rho^2$ (pseudo-$R^2$)[a] | 72.3% | 78.7% |
| % of Correct Equity Predictions | 85.0% | 81.5% |
| % of Correct Debt Predictions | 89.5% | 88.4% |
| % of Correct Total Predictions | 88.6% | 86.3% |

Notes:

(1) Standard errors are in parentheses.

(2) Significant at the *** .01 level, ** .05 level, or * .10 level (one-tailed tests for those variables with sign predictions).

(3) There was no convergence with the 1991 model.

[a] See Judge et al. (1985, 767) for a definition and discussion of the $\rho^2$ statistic.