Incremental Financing Decisions and Time-Series Variation in Personal Taxes on Equity Income

Dan Dhaliwal
University of Arizona

Merle Erickson
University of Chicago

Linda Krull*
University of Texas at Austin

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*Corresponding Author: The University of Texas at Austin, Department of Accounting, 1 University Station, B6400, Austin, TX 78712
Phone: 512-232-7729; Fax: 512-471-3904; Email:linda.krull@mccombs.utexas.edu

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Abstract: We investigate whether changes in personal tax rates on dividend and capital gain income affect firms' incremental financing decisions. We find that after the 1997 and 2003 Tax Acts decreased tax rates on equity income, firms were less likely to issue debt relative to equity, consistent with the hypothesis that decreases in tax rates on equity income decrease the tax benefits of debt. Further, the magnitude of this effect varies predictably with dividend yield, a proxy for the proportion of equity income taxed at capital gains tax rates versus dividend tax rates. The magnitude of this effect is also decreasing in institutional ownership, a proxy for the proportion of firms' shares held by investors not affected by the tax legislation. This paper contributes to the literature that examines the effect of taxes on corporate financing decisions.

JEL classification: G32; H20; H24; H25
Keywords: capital structure; dividend taxes; capital gains taxes; corporate taxes

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I. Introduction

This study investigates whether changes in investor level taxes on equity income affect firms' incremental choices between debt and equity. Specifically, we examine whether the probability of a debt versus equity issue decreases when investor level tax rates on equity income decrease.

Miller (1977) suggests that in addition to corporate tax rates, investor tax rates on income from debt and equity securities affect corporations' tax gains from issuing debt. As corporate tax rates increase, the tax benefit of interest deductions increases, decreasing the cost of debt relative to equity. Personal taxes on interest income offset the benefit of corporate interest deductions. Specifically, if investors pay higher tax rates on income from debt securities relative to income from equity securities, then corporations must offer higher returns on debt securities to compensate investors for the tax differential, increasing the cost of debt relative to equity. If investor taxes on equity securities affect the cost of debt relative to equity, then we may observe changes in firms' choices between debt and equity around changes in tax rates on equity income.

Existing studies find evidence that investor-level taxes on equity income affect the cost of equity capital. Dhaliwal, Krull, Li, and Moser (2005) use three implementations of the residual income model to estimate the implied cost of equity capital and find that these measures are increasing in the tax-penalized portion of dividend yield, calculated as the product of the dividend tax penalty and dividend yield. Dhaliwal, Krull, and Li (2005) find that ex ante measures of implied cost of equity capital decreased substantially when the 2003 Tax Act decreased the tax rate on dividends from 38.6% to 15% and the tax rate on capital gains from

20% to 15%. These studies provide evidence that the cost of equity capital decreases when tax rates on equity income decrease.

Some evidence also exists that investor level taxes affect capital structure decisions. Graham (1999) examines firms' debt to value ratios from 1980 to 1994 and finds that cross-sectional differences in levels and changes in debt are related to the firm-specific tax benefits of debt calculated to incorporate corporate tax deductions, personal tax rates on interest income, and the proportion of equity income taxed at ordinary income tax rates. However, he finds no evidence that time-series variation in personal taxes affects capital structure decisions. He attributes this lack of evidence to the lack of time-series variation in the tax rate on interest income relative to the tax rate on dividend income because the two rates tend to move together.

We further investigate whether time-series variation in personal taxes affect capital structure decisions using samples of debt and equity issues around tax rate changes in 1997 and 2003 that changed the tax rates on equity income with little or no change in the tax rate on interest income. Tax laws existing before the Taxpayer Relief Act of 1997 (hereafter, the 1997 Tax Act) provided for the taxation of interest income and dividend income at ordinary income tax rates. At this time, the maximum tax rate on ordinary income for individual taxpayers was 39.6%, and the maximum tax rate on capital gains was 28%. The 1997 Tax Act decreased the maximum tax rate on capital gains from 28% to 20% and left the tax rate on ordinary income (including dividend and interest income) unchanged.[1] The Jobs and Growth Tax Relief Reconciliation Act of 2003 (hereafter, the 2003 Tax Act) decreased the tax rate on dividend income from 38.6% to 15%, the tax rate on capital gains from 20% to 15%, and the tax rate on interest income from 38.6% to 35%. Because the 1997 and 2003 Tax Acts decreased the tax rate

[1] Tax legislation passed in 2001 decreased the maximum tax rate on dividend and interest income to 39.1% in 2001 and 38.6% in 2002.

on equity income relative to the tax rate on interest income and the corporate tax rate was not changed, we expect that the legislation decreased the issuing corporation's cost of equity capital relative to the cost of debt capital.[2] Therefore, we expect firms to be less likely to issue debt relative to equity after the enactment of each tax proposal.

We test this prediction using samples of debt and equity issues during a 6-year window that includes three years before and three years after the 1997 Tax Act became effective in May 1997 and a five-year window that includes three years before and two years after the 2003 Tax Act became effective in May 2003. We find that when the tax rate on capital gains decreased in 1997 and the tax rates on dividends and capital gains decreased in 2003, firms became less likely to issue debt relative to equity. We also find that the magnitude of the change in the probability of debt versus equity issues is decreasing in institutional ownership, a proxy for the proportion of shareholders taxed at individual tax rates. We obtain similar results when we define the sample period six months before and six months after the tax acts.

Additionally, we find that the magnitude of the change in the probability of debt versus equity issues varies predictably with dividend yield, a proxy for the proportion of equity returns taxed at dividend versus capital gain tax rates. Specifically, we predict and find that because the 1997 Tax Act decreased the capital gain tax rate relative to the dividend tax rate, the magnitude of the effect of the 1997 Tax Act is decreasing in dividend yield; because the 2003 Tax Act decreased the dividend tax rate relative to the capital gain tax rate, the magnitude of the effect of the 2003 Tax Act is increasing in dividend yield. However, the effect of dividend yield on the magnitude of the change in the probability of debt versus equity issues is sensitive to the definition of the sample period.

[2] The statutory corporate tax rate for the highest income bracket was 35% throughout this period.

This study contributes to the literature that examines the determinants of firms' capital structure decisions. Although existing studies identify corporate marginal tax rates as a determinant of capital structure, few studies incorporate personal taxes into investigations of corporate capital structure decisions. Other studies find evidence consistent with the notion that investor level taxes on equity income affect stock prices. However, Graham (2003, p. 1120) notes that "…we also need evidence that corporate policies are altered in response to these investor tax influences on security prices." We provide evidence that changes in personal taxes on equity income affect firms' incremental financing decisions. The evidence also indicates that the magnitude of the effect of personal taxes on capital structure decisions depends on the firm's dividend payout policy and on the firm's level of institutional ownership.

The paper proceeds as follows: Section II discusses the theoretical background and hypothesis development, Section III discusses the research methodology, Section IV presents the results, and Section V concludes.

II. Theoretical Background and Hypothesis Development

A. Background

Miller (1977) estimates the gain per dollar of leverage for the stockholders of a firm as:

$$G_L = \frac{(1 - t_c)(1 - t_{PS})}{(1 - t_{PB})}, \quad (1)$$

where t_c equals the corporate tax rate, t_{PS} equals the personal tax rate on income from stocks, and t_{PB} equals the personal tax rate on income from bonds. This equation suggests that a firm's cost of debt decreases as its marginal tax rate increases because interest deductions benefit the firm at the marginal tax rate. However, because investors pay taxes on interest income, they demand higher returns on corporate bonds, offsetting the benefit of corporate interest deductions.

DeAngelo and Masulis (1980) suggest that the corporate benefit of interest deductions results in firm-level optimum debt ratios because firms have different levels of non-debt tax shields, such as depreciation deductions and investment tax credits, which may reduce or eliminate the tax benefit of debt.[3] Subsequent studies test whether cross-sectional differences in corporate marginal tax rates and non-debt tax shields affect corporate capital structure decisions. These studies find that the use of debt relative to equity is positively related to firms' marginal tax rates and negatively related to tax exhaustion from non-debt tax shields (see, e.g., MacKie-Mason (1990), Dhaliwal, Trezevant, and Wang (1992), Givoly, Hayn, Ofer, and Sarig (1992), and Graham (1996)).

Other studies examine the effect of personal tax rates on corporate debt levels. Givoly, Hayn, Ofer, and Sarig (1992) predict that when the Tax Reform Act of 1986 increased the tax rate on capital gains relative to dividend income, firms with high marginal tax rate investors (firms with low dividend yield) increased their use of debt more than firms with low marginal tax rate investors (firms with high dividend yield). Consistent with this hypothesis, they find that changes in leverage are not related to dividend yield before the 1986 Tax Act and are negatively related to dividend yield after the 1986 Tax Act. Campello (2001) finds that non-dividend-paying firms increased their debt to equity ratios in response to the reduction in personal tax rates enacted by the 1986 Tax Act. In contrast, high dividend-paying firms reduced their use of debt relative to other firms. These studies use firms' dividend policies as a proxy for the marginal tax rate of individual investors and interpret their findings as evidence that personal taxes affect capital structure decisions. However, subsequent literature indicates that dividend yield may be

[3] Graham, Lang, and Shackelford (2004) and Kahle and Shastri (2005) suggest that the tax benefits of stock options also reduce or eliminate the tax benefits of debt.

a poor proxy for investors' marginal tax rates.[4] Moreover, investor level tax rates on dividend and interest income remained equal during the sample period used by these studies suggesting that high marginal tax rate investors had a high marginal tax rate on both debt and equity income. Therefore, additional evidence is necessary to determine the effect of personal taxes on corporate financing decisions.

Graham (1999) uses dividend payout in the context of capital structure decisions to proxy for the proportion of income from a corporation's equity securities that will be taxed at ordinary versus capital gain tax rates. Using the dividend payout ratio, Graham estimates a net tax advantage of debt that varies cross-sectionally. His measure allows the net tax advantage of debt to vary cross-sectionally with firm-level differences in the personal tax rate on equity (t_{PS}) and over time with economy-wide differences in the personal tax rate on interest (t_{PB}). He finds that estimates of the personal tax penalty of debt are negatively related to debt to value ratios providing further evidence that personal taxes affect corporate capital structure decisions. However, he finds that cross-sectional differences in corporate and personal tax rates drive the relation between debt to value ratios and the net tax advantage of debt whereas time-series variation in personal tax rates do not significantly explain variation in debt to value ratios.

This study further examines the relation between personal tax rates and corporate debt levels by examining whether changes in personal tax rates on dividends and capital gains affect corporations' decisions to issue debt versus equity. We extend Graham (1999) and Givoly et al. (1992) in three ways. First, we examine incremental debt decisions around tax regime changes. Givoly et al. (1992) and Graham (1999) examine levels and changes in debt to value ratios. Incremental debt decisions during a narrow window around changes in tax rates provide a

[4] Jain (2000) finds that low-tax investors hold low-dividend-yield stocks and high-tax investors hold high-dividend-yield stocks. Grinstein and Michaely (2005) find that, although institutional investors avoid holding shares in non-dividend paying firms, among dividend paying firms, they prefer low-dividend-yield stocks.

powerful test of the effects of personal taxes on capital structure decisions and substantially reduce concerns about correlated omitted variables. Second, we allow time-series variation in t_{PS} by investigating incremental debt decisions around two pieces of tax legislation that (1) changed the tax rates on dividends and capital gains and (2) made little or no change in the tax rate on interest income. Thus, our period of study allows us to isolate the effects, if any, of changes in investor taxes on equity income. Third, we allow the effect of changes in t_{PS} to vary with the proportion of firms' stock owned by taxpayers subject to the tax legislation. Because the tax regime changes we consider only affect tax rates that apply to individual investors, we investigate whether the effects of the tax regime changes are decreasing in the proportion of firms' stock held by tax-exempt investors and investors subject to corporate tax rates to provide additional evidence that the observed results are related to changes in tax rates on equity income.

B. Hypotheses

A long stream of literature tests whether investor level taxes on equity income affect firms' cost of equity capital. The theory maintains that because investors pay taxes on returns from equity securities, returns on stocks must compensate investors for these taxes. Because taxpayers pay higher tax rates on dividend income than on capital gain income, these studies predict that required equity returns are increasing in dividend yield, a proxy for the proportion of income from a security that comes from tax-disfavored dividends (Brennan 1970). Existing studies find mixed support for this hypothesis. For example, Litzenberger and Ramaswamy (1979) find evidence that ex post stock returns are increasing in dividend yield. However, the evidence in Black and Scholes (1974) and Miller and Scholes (1982) does not support these findings. Additionally, Kalay and Michaely (2000) emphasize that dividends are tax-disfavored

only relative to long-term capital gains (gains on stock held more than 12 months), whereas Litzenberger and Ramaswamy (1979) use monthly stock returns to test their hypothesis. Using long-term returns, Kalay and Michaely (2000) do not find evidence that higher yield stocks have higher required returns.[5]

However, recent studies find evidence that required equity returns are increasing in the difference between tax rates on dividends and capital gains and that this effect is increasing in dividend yield and decreasing in institutional ownership (see e.g. Ayers, Cloyd, and Robinson (2002) and Dhaliwal, Li, and Trezevant (2003)). Lang and Shackelford (2000) find evidence of positive abnormal returns when the 1997 Tax Act decreased the tax rate on capital gains from 28% to 20%. Further, they find that the abnormal returns during the week the 1997 Tax Act became effective are decreasing in leverage. These results suggest that required equity returns decrease when tax rates on equity income decrease, and this effect is smaller for highly levered firms. Dhaliwal, Krull, Li, and Moser (2005) use three implementations of the residual income model to estimate the ex ante required cost of equity capital. They find that the implied cost of equity capital is increasing in the product of the dividend tax penalty and dividend yield. Dhaliwal, Krull, and Li (2005) find that the implied cost of equity capital decreased after the 2003 Tax Act decreased the tax rate on dividends from 38.6% to 15% and the tax rate on capital gains from 20% to 15%. These studies provide evidence that the cost of equity capital decreases when tax rates on equity income decrease, a result that has potential implications for corporate financing decisions.

[5] Another stream of literature tests whether dividends affect stock prices by examining the change in stock prices on the ex-dividend day. Elton and Gruber (1970) and Kalay (1982) find that stock prices drop by less than the full amount of the dividend on the ex-day, consistent with a dividend tax effect on stock prices. However, Michaely (1991) finds that tax rate changes around the Tax Reform Act of 1986 did not affect ex-dividend stock price behavior and suggests that short-term traders and institutional investors dominate stock price determination on the ex-dividend day. Bali and Hite (1998) suggest that transactions costs offer an alternative explanation for ex-dividend day stock price behavior. See Graham (2003) for a more complete discussion of this literature.

Miller (1977) suggests that the tax gains from leverage (G_L) are increasing in the tax rate on equity income (t_{PS}), as indicated in Equation (1). He notes that if the personal tax rate on income from bonds (t_{PB}) is equal to the personal tax rate on income from stock (t_{PS}) then the tax gains from leverage are determined by $-t_c$. However, if $t_{PS} < t_{PB}$, then the before-tax return on bonds must be high enough relative to the before-tax return on equity such that the after-tax return on bonds is equal to the after-tax return on equity. Therefore, if t_{PS} increases, investors require higher returns on equity securities relative to debt securities, and the tax gains from leverage increase. Likewise, if t_{PS} decreases, investors require lower returns on equity securities relative to debt securities, and the tax gains from leverage decrease. As the tax gains from leverage decrease, we expect that the cost of debt relative to equity increases and firms become less likely to issue debt, suggesting the following hypothesis:

> Hypothesis 1: The probability of debt issues relative to equity issues decreases as personal tax rates on equity income decrease relative to personal tax rates on income from bonds.

In deriving an equation for the tax gains from leverage (Equation (1)), Miller (1977) assumes that all income from stock is taxed at the same tax rate. We expand Equation (1) to relax this assumption by allowing the tax rate on income from stock to differ for dividend and capital gain income.[6] We expand t_{PS} to incorporate the percentage of earnings firms pay out as dividends. Thus, t_{PS} becomes $dt_D + (1-d)t_{CG}$ where d equals the percentage of earnings the corporation pays out as dividends, t_D equals the personal tax rate on dividends, and t_{CG} equals the personal tax rate on capital gains. Using the expanded equation for t_{PS}, the tax benefit of leverage (ignoring any non-tax costs or benefits of debt) can be expressed as follows:

[6] Graham (1999) and Gordon and MacKie-Mason (1990) also allow the tax rate on equity income to vary with tax rates on dividend income and capital gains. Their estimate of the tax rate on equity income is $[d+(1-d)g\alpha]t_D$, where d is the dividend-payout ratio, g is the proportion of long-term gains that are taxable, α is a measure of the benefits of deferring capital gains, and t_D is the tax rate on dividends.

(2) $$G_L = 1 - \left[\frac{(1 - t_c)(1 - [dt_D + (1 - d)t_{CG}])}{1 - t_{PB}} \right].$$

To further examine the effect of personal taxes on corporate debt decisions, we calculate the change in the tax benefit of leverage for changes in tax rates on dividends and capital gains. The change in the tax benefit of leverage for a change in the personal tax rate on capital gains is as follows:

(3) $$\frac{\partial G_L}{\partial t_{CG}} = \frac{(1 - t_c)(1 - d)}{(1 - t_{PB})}.$$

This equation is positive for all values of d between 0 and 1 and all reasonable values of t_c and t_{PB}. Therefore, as predicted by Hypothesis 1, a decrease in the tax rate on capital gains decreases the tax benefit of leverage by decreasing the tax cost of equity income relative to the tax cost of income from bonds for individual taxpayers. This effect is decreasing in d, the amount of returns from equity securities taxed at dividend tax rates, which suggests that the magnitude of the effect of a decrease in capital gain tax rates decreases as a firm's dividend yield increases.

The change in the tax benefit of leverage from a change in the personal tax rate on dividends is as follows:

(4) $$\frac{\partial G_L}{\partial t_D} = \frac{(1 - t_c)d}{(1 - t_{PB})}.$$

Equation (4) is positive for values of d between 0 and 1 and is increasing in d. Therefore, as the tax rate on dividends increases, the tax benefits of leverage increase, and this effect is larger as d increases. Because the magnitude of the change in the tax benefits of leverage due to a change in the tax rates on equity income varies with the proportion of equity income taxed at the dividend tax rate as opposed to the capital gain tax rate, we predict the following:

> Hypothesis 2: The magnitude of the effect of a change in capital gain (dividend) tax rates on the probability of debt issues relative to equity issues is decreasing (increasing) in the

proportion of equity income from a firm that is taxed at dividend tax rates versus capital gain tax rates.

Equation (1) also assumes that all investors are taxed at personal tax rates. However, in addition to individual investors, institutional investors that are tax-exempt (such as pensions and endowments) or taxed at corporate tax rates (such as banks, insurance companies, and other corporations) may hold a corporation's debt and equity securities. Existing studies find that when personal tax rates on equity income change, the magnitude of the change in required equity returns is decreasing in institutional ownership, a proxy for the probability that the marginal investor is tax exempt or tax favored on dividends (Ayers, Cloyd, and Robinson (2002), Dhaliwal, Li, and Trezevant (2003), Dhaliwal, Krull, Li, and Moser (2005)). Because the magnitude of the change in required equity returns is decreasing in institutional ownership, then to the extent that a corporation's stock is owned by institutional investors, we expect that the effect of changes in personal tax rates on the probability that firms issue debt versus equity will be diminished:

Hypothesis 3: The magnitude of the effect of a change in personal tax rates on equity income on the probability of debt issues relative to equity issues is decreasing in the proportion of a firm's outstanding stock held by institutional investors.

III. Methodology

To test these hypotheses we examine corporations' decisions to issue debt versus equity around statutory changes in personal tax rates on dividend income and capital gains. On May 7 1997, President Clinton and Congressional leaders announced that they had agreed to reduce the capital gains tax rate. This announcement came as a surprise to the public because the budget introduced by the President in March of 1997 did not propose to reduce the capital gains tax rate (Lang and Shackelford (2000)). In August of 1997, Congress passed the Taxpayer Relief Act of

1997, which reduced the tax rate on capital gains from 28% to 20%, effective May 7, 1997. This tax act provides a relatively clean window during which to test the effects of changes in personal capital gain tax rates on capital structure decisions because the legislation left the tax rates on interest and dividend income unchanged.

On May 23, 2003, Congress passed the 2003 Tax Act that decreased the personal tax rate on dividend income from 38.6% to 15% and the tax rate on interest income from 38.6% to 35%, effective January1, 2003. This legislation also decreased the tax rate on capital gains from 20% to 15%, effective May 6, 2003. The 2003 Tax Act provides a unique opportunity to investigate the effects of changes in personal tax rates on corporate financing decisions because it substantially decreased the tax rates on equity income relative to the tax rate on interest income.

A. Sample Selection

We examine new issues of debt and equity during two windows around each of the tax acts. The 1997 Tax Act became effective on May 7, 1997.[7] The 2003 Tax Act became effective on May 6, 2003.[8] For the 1997 Tax Act we examine windows that include debt and equity issues three years before (from May 1, 1994 through May 7, 1997) and three years after (from May 8, 1997 through May 31, 2000) the effective date of the tax act, and six months before (from November 1, 1996 through May 7, 1997) and after (from May 8, 1997 through November 30, 1997) the effective date. Because the 2003 Tax Act was fairly recent, the length of the window after the tax act is limited by the passage of time. Therefore, we examine windows that include

[7] Although the 1997 Tax Act was not passed until August of 1997, Congress announced its intent to reduce the capital gain tax rate in May of 1997 and the tax rate change was made retroactive to May 7, 1997.

[8] The change in the dividend tax rate is effective for dividends received after December 31, 2002 and the change in the capital gain tax rate is effective for sales of stock on or after May 6, 2003. To be eligible for the 15% dividend tax rate, stock must be held for more than 60 days of the 120 day period beginning 60 days prior to the ex-dividend day. To be eligible for the 15% capital gain tax rate, stock must be held more than one year. Both provisions expire on December 31, 2008.

debt and equity issues three years before (from May 1, 2000 through May 6, 2003) and two years after (from May 7, 2003 through May 31, 2005) the effective date of the 2003 Tax Act, and six months before (from November 1, 2002 through May 6, 2003) and after (from May 7, 2003 through November 30, 2003) the effective date.[9] The samples include all common stock and non-convertible debt issues by publicly traded U.S. firms listed on the SDC Platinum New Issues database that occurred during the sample period. For each type of security issue, we allow only one observation per firm per year for each period before and after the tax acts. We exclude IPOs, issues by financial services firms, debt issues with maturities of less than one year, and observations missing Compustat data required to compute control variables.

Panel A summarizes the sample of new issues for the three years before and three years after the 1997 Tax Act, which decreased investor taxes on equity income relative to income from debt. In the three years preceding the effective date of the 1997 Tax Act, of 836 new issues, 491 (58.73%) were debt issues. Proceeds of debt issues account for 85% of new issues proceeds during this period. In the three years after the tax act, 531 of 869 new issues (61.10%) were debt issues. Proceeds of debt issues during this period account for 80% of new issues proceeds. These figures indicate that there was not a significant economy wide shift from debt to equity after the 1997 Tax Act (χ^2=0.9990; p=0.3176). This finding suggests that controls for firm specific characteristics are necessary to detect a tax effect.

Panel B summarizes new issues around the 2003 Tax Act, which further decreased investor tax rates on equity income relative to income from debt. Panel B indicates that of the 974 new issues during the three years preceding the tax act, 465 (47.74%) were debt issues.

[9] May 6, 2003 is the date that the capital gain tax rate reduction became effective. We use this date as the cutoff for the pre-enactment period in our main tests because all tax rate changes were in effect after this date. Because the dividend tax rate reduction became effective on January 1, 2003, we examine the sensitivity of our results to using this date as the cutoff for the pre-enactment period in Section IV.

Proceeds of debt issues account for 86% of new issues proceeds during this period. During the two years after the tax act, 236 of 844 new issues (27.96%) were debt issues, accounting for 67% of the proceeds of new issues. These figures indicate that debt issues significantly decreased relative to stock issues after the 2003 Tax Act (χ^2=74.67; p<0.0001).

B. Empirical Model

To investigate the effects of personal tax rate changes on firms' debt versus equity decisions, we estimate the following probit model separately for the 1997 and 2003 samples of new issues:

$$\begin{aligned}(5)\quad \text{Type} = {} & \alpha_0 + \alpha_1\text{TRD} + \alpha_2\text{Yield} + \alpha_3\text{Inst} + \alpha_4\text{TRD*Yield} + \alpha_5\text{TRD*Inst} \\ & + \alpha_6 t_{cDUM} + \alpha_7\text{PPE/TA} + \alpha_8 1/\text{ZProb} + \alpha_9\text{PPE/TA*}1/\text{ZProb} + \alpha_{10}\text{TobinQ} \\ & + \alpha_{11}\Delta\text{Price} + \alpha_{12}\text{Size} + \alpha_{13}\text{EarnVar}, + \alpha_{14}\text{Regdum} + \sum_{j=1}^{7}\alpha_{15,j}\text{IND}_j,\end{aligned}$$

where:

Type = 1 if the firm issued debt and 0 if the firm issued equity;

TRD = 1 for issues after the tax legislation became effective (after May 7, 1997 for the 1997 Tax Act and after May 6, 2003 for the 2003 Tax Act), and zero otherwise;

Yield = the annualized amount of the last regular dividend paid in year t-1 / year t-1 market value of equity;

Inst = the percent of institutional ownership as of the beginning of the same quarter in the prior year;

t_{cDUM} = a trichotomous variable equal to 0 if the firm had an unused NOL carryforward and negative taxable income in the prior year, 1 if the firm had either an unused NOL carryforward or negative taxable income in the prior year, and 2 if the firm had no unused NOL carryforward and had positive taxable income in the prior year;

PPE/TA = net property plant and equipment / total assets calculated in year t-1;

1/ZProb = the inverse of the modified Altman's (1968) ZProb used by MacKie-Mason (1990) and Graham (1996) calculated in year t-1;

TobinQ = the sum of preferred stock, market value of common equity, and net short-term liabilities in year t-1 divided by total assets in year t-1;

ΔPrice = the percent change in the stock price per share from year t-2 to year t-1;

Size = the log of the market value of equity in year t-1;

EarnVar = earnings variance calculated as the standard deviation of the change in earnings before interest, depreciation, and taxes ($EBIDT_t$ - $EBIDT_{t-1}$) divided by the mean of total assets for the ten years prior to the debt or equity issue (at least four years if data are missing);

Regdum = 1 if the firm is in a regulated industry and 0 otherwise.

IND = a vector of industry dummies that correspond to one-digit SIC codes.

1. Tax Variables

Hypothesis 1 predicts that the probability that firms issue debt versus equity decreases when the tax rates on equity income decrease relative to tax rates on income from bonds. TRD, a dummy variable equal to one in the post-enactment period around the 1997 and 2003 Tax Acts, measures the change in the probability that firms issue debt versus equity after the effective date of each tax proposal. Both the 1997 and 2003 Tax Acts decreased the tax rates on equity income. The 1997 Tax Act decreased the tax rate on capital gains with no change in the tax rate on interest income or dividend income thereby decreasing the tax rate on equity income relative to the tax rate on income from bonds. The 2003 Tax Act decreased the tax rates on both dividends and capital gains with only a small decrease in the tax rate on interest income further decreasing the tax rate on equity income relative to the tax rate on income from bonds. Because the tax acts decreased the personal tax rates on equity income relative to the tax rate on income from bonds, we expect that the probability that firms issue debt decreased after each tax act as

predicted by Hypothesis 1. Therefore, we predict that the coefficient on TRD (α_1) is negative for the 1997 sample and the 2003 sample.

Hypothesis 2 predicts that as the proportion of return investors earn in the form of dividends increases, the magnitude of the effect of a capital gain tax rate reduction on the probability that firms issue debt versus equity decreases and the magnitude of the effect of a dividend tax rate reduction increases. Because the 1997 Tax Act decreased the tax rate on capital gains, we expect that the magnitude of the effect of the 1997 Tax Act is decreasing in dividend yield. We test this hypothesis by interacting TRD with Yield in the probit model. Because we predict that the main effect for TRD is negative, we predict that the coefficient on TRD*Yield (α_4) is positive for the 1997 sample.

The 2003 Tax Act decreased both the dividend and capital gain tax rates. However, the dividend tax rate decreased from 38.6% to 15% and the capital gain tax rate decreased from 20% to 15%. Because the dividend tax rate reduction was much larger than the capital gain tax rate reduction, we expect that the magnitude of the effect of the 2003 Tax Act on the probability that firms issue debt versus equity is increasing in dividend yield. Therefore, consistent with Hypothesis 2, we predict that the coefficient on TRD*Yield (α_4) is negative for the 2003 sample.

Hypothesis 3 predicts that because the tax rate changes enacted by the 1997 and 2003 Tax Acts apply only to individual investors, as the proportion of equity owned by investors other than individuals increases, the magnitude of the effect of the change in tax rates on equity income decreases. We test this hypothesis by interacting TRD with Inst in the probit model. Because we predict that the coefficient on the main effect for TRD is negative for both the 1997 and 2003 Tax Acts, we predict that the coefficient on TRD*Inst (α_5) is positive for the 1997 sample and the 2003 sample.

2. Control Variables

We include main effects for dividend yield and institutional ownership to control for the relation between these variables and firms' capital structure choices unrelated to tax effects. Existing literature finds a negative relation between dividend policy and leverage. Jensen, Solberg, and Zorn (1992) find that firms' debt ratios are negatively related to dividend payout. Graham (1999) finds that non-dividend-paying firms have higher debt to value ratios than dividend paying firms. Therefore, we expect that the probability of debt issues relative to equity issues is negatively related to dividend yield. Grier and Zychowicz (1994) suggest two competing predictions for the relation between institutional ownership and debt to equity ratios. First, institutional investors may substitute for the disciplinary role of debt, which suggests a negative relation. Conversely, institutional investors may place a higher value on firms that signal higher levels of managerial discipline through higher use of debt, which suggests a positive relation. They find a negative relation between institutional ownership and debt to equity ratios, consistent with the first prediction. Additionally, Moh'd, Perry, and Rimbey (1998) find that institutional ownership is negatively related to the debt to value ratio. Based on this prior research, we predict that institutional ownership is negatively related to the probability of issuing debt versus equity. Thus, we predict that the coefficient on Inst is negative.

The remaining variables in Equation (5) control for factors that prior research has found to affect corporate capital structure decisions. Existing literature finds that the probability that firms issue debt, changes in debt to value ratios, and the level of debt to value ratios are increasing in the corporate marginal tax rate. We use Shevlin's (1990) corporate tax rate measure to proxy for firms' marginal tax rates. This variable (t_{cDUM}) takes on a value of two if

the firm's prior year taxable income is greater than zero and the firm had no unused net operating loss carryforwards in the prior year, one if the firm had either an unused net operating loss carryforward or negative taxable income in the prior year, and zero if the firm had both unused net operating loss carryforwards and negative taxable income in the prior year. Similar to Shevlin (1990), we calculate taxable income as net income before taxes, extraordinary items, and discontinued operations plus extraordinary income and income from discontinued operations grossed up by one minus the statutory tax rate, plus minority interest, minus the change in deferred taxes grossed up by the statutory tax rate. Because the value of interest deductions is increasing in the marginal tax rate, we expect the coefficient on t_{cDUM} to be positive.[10]

MacKie-Mason (1990) and Graham (1999) suggest that firms with extensive collateral or with a market value that depends to a large extent on assets in place may be able to negotiate more favorable terms in debt contracts. These firms likely have a lower cost of debt relative to other firms. PPE/TA (the ratio of property, plant, and equipment to total assets) measures the extent of collateral. We expect this variable to be positively related to the probability of debt issues.

Firms in financial distress have a higher probability of bankruptcy and therefore higher costs of issuing debt. We use the modified Altman's (1968) Z-score as defined by MacKie-Mason (1990) and Graham (1999) to control for financial distress. This variable is defined as follows:

$$(6) \quad \text{ZProb} = 3.3\frac{\text{EBIT}}{\text{Total Assets}} + 1.0\frac{\text{Sales}}{\text{Total Assets}} + 1.4\frac{\text{Retained Earnings}}{\text{Total Assets}} + 1.2\frac{\text{Working Capital}}{\text{Total Assets}}.$$

[10] Graham (1996) and Graham, Lang, and Shackelford (2004) develop more precise measures of corporations' marginal tax rates. However, use of these measures would reduce our already limited sample size.

As ZProb decreases, the probability of bankruptcy increases. Therefore, the cost of debt is decreasing in ZProb. We include the inverse of ZProb in the probit model. Therefore we expect the coefficient on this variable to be negative.

We include PPE/TA to control for firms' ability to collateralize debt. However, as PPE/TA increases, firms' non-debt tax shields in the form of depreciation deductions increase. Firms in financial distress with high levels of non-debt tax shields are likely to be tax-exhausted and unable to benefit from interest deductions. Thus, these firms are less likely to issue debt. To control for firms' probability of tax exhaustion we interact 1/ZProb with PPE/TA. We expect the coefficient on PPE/TA*1/ZProb to be negative.

High growth firms may have higher costs of debt. Myers (1977) argues that a firm with risky fixed claims in its capital structure may forgo positive net present value projects because income from the project would accrue to existing bondholders. Because this underinvestment problem is likely to be most severe in high growth firms, we include Tobin's q-ratio to control for growth opportunities of the firm. Similar to Graham (1999) we calculate Tobin's q as defined in Chung and Pruitt (1994):

$$\text{TobinQ} = \frac{\text{PS} + \text{MVE} + \text{LTD} + \text{NSTD}}{\text{Total Assets}}, \tag{7}$$

where PS equals preferred stock, MVE equals market value of equity, LTD equals long-term debt, and NSTD equals net short term liabilities. We expect a negative coefficient on TobinQ.

Myers and Majluf (1984) suggest that managers are more likely to issue equity securities when the firm's stock is over-priced. The market prices new shares at a discount to adjust for this incentive. Bagnoli and Khanna (1987) argue that this discount is lower after a price increase than after a price decrease. Therefore, firms are more likely to issue equity securities as the change in price from the previous period increases. To control for this effect we include the

percent change in the stock price from year t-2 to year t-1 (ΔPrice) in the empirical model. We expect the coefficient on ΔPrice to be negative.

Large firms may have lower costs of debt. We use the natural log of market value of equity (Size) to proxy for size and expect the coefficient on this variable to be positive. The cost of debt is also increasing in risk. We use the variance of firms' earnings over the previous ten years (EarnVar) as a proxy for risk and expect the coefficient on this variable to be negative.

We also include a dummy variable equal to one for regulated industries and zero otherwise (Regdum) to control for differences in the information environment for regulated industries. MacKie-Mason (1990) predicts that regulatory agencies inform investors of relevant information about regulated firms thereby reducing signaling costs, and therefore the cost of equity, for these firms. However, regulation may also lower the risk associated with debt which would decrease the cost of debt. Because the anticipated effect of regulation on the cost of debt relative to equity is ambiguous, we make no prediction for the coefficient on Regdum. Finally, we include dummy variables that correspond to one-digit SIC codes (IND) to control for industry effects.

IV. Results

A. Descriptive Statistics

Table 2 presents descriptive statistics for the samples of firms issuing debt or equity around the 1997 and 2003 Tax Acts. The mean dividend yield is 0.0119 in the 1997 sample and 0.0109 in the 2003 sample. The 25th percentile of Yield in each sample is zero indicating that the samples contain significant numbers of non-dividend paying firms. However, the median for the

1997 sample is greater than zero (0.0042) indicating that at least half of the 1997 sample firms pay dividends. In 1996, 30% of Compustat firms paid dividends and in 2002, 21% of Compustat firms paid dividends. Thus, the 1997 sample contains an over-representation of dividend paying firms. To the extent that dividend and non-dividend paying firms have different preferences for debt and equity, our results may not generalize to the broader population of Compustat firms.

The mean (median) institutional ownership is 0.4206 (0.4608) in the 1997 sample and 0.3760 (0.3888) in the 2003 sample suggesting that institutions own a significant proportion of sample firms' shares. The mean (median) t_{cDUM} is 1.617 (2.0) in Panel A and 1.2442 (1.0) in Panel B which suggests that over half of the firms in the 1997 sample are fully taxable, but the 2003 sample contains a smaller proportion of fully taxable firms.

B. Multivariate Results for the 1997 Tax Act

Because our predictions differ somewhat for the two tax acts, we discuss our results first for the 1997 Tax Act and then for the 2003 Tax Act. Table 3 presents results of estimating Equation (5) for two windows around the effective date of the 1997 Tax Act. Positive coefficients on the explanatory variables indicate a higher probability of issuing debt.

Columns (1) and (2) provide results from estimating Equation (5) for debt and equity issues three years before and three years after May 1997. Column (1) estimates Equation (5) before including the interaction of the tax regime dummy (TRD) with dividend yield (TRD*Yield) and institutional ownership (TRD*Inst). Consistent with the prediction that the probability of debt issues relative to equity issues decreased after the 1997 Tax Act, the coefficient on TRD is negative and significant (α_1= -0.137; t= -1.87). This result suggests that when the 1997 Tax Act decreased the tax rate on capital gains, corporations became less likely to

issue debt relative to equity. In Column (2) we estimate Equation (5) including the interactions of TRD with Yield and Inst. In Column (2) the coefficient on the main effect for TRD is again negative and significant (α_1=-0.492; t=-3.95). Consistent with the prediction that the magnitude of the effect of the decrease in capital gain taxes is smaller for firms with higher dividend yields, the coefficient on TRD*Yield is positive and significant (α_4=14.940; t=3.23). The coefficient on TRD*Inst is also positive and significant (α_5=0.470; t=2.26). This result is consistent with the prediction that the magnitude of the effect of the decrease in capital gain taxes on the probability of debt issues is decreasing in institutional ownership. These findings suggest that the decrease in the tax rate on capital gains had a smaller effect on the probability of debt issuance as the proportion of returns from a corporation's stock taxed at dividend tax rates increases and as the proportion of the firm owned by investors not subject to the tax legislation increases.[11,12]

The 6-Year window has the advantage of averaging out any anticipation of the tax change before the tax act and allowing firms a lengthy amount of time to respond to the tax rate change and complete the process of issuing debt or equity after the tax act. However, these windows have the disadvantage that other events during the long window may affect capital structure decisions. Therefore, we also investigate the effects of the tax rate change over a short window, which we define as six months before and six months after the tax act. We report these results in Column (3) of Table 3. The results provide additional support for our hypotheses. The coefficient on TRD is negative and significant consistent with the prediction that the decrease in

[11] A market-wide time effect could also explain the decrease in the probability that firms issue debt relative to equity. However, the effects of dividend yield and institutional ownership on the magnitude of the effect of TRD provide support for the tax hypothesis.

[12] Because the 1997 Tax Act was passed on August 5, 1997 and made retroactive to May 7, 1997 we re-estimate Equation (5) using August 5, 1997 as the cutoff date for the pre-enactment period and find similar results. We also find similar results when we define the pre-enactment period as May 1, 1994 through May 7, 1997 and the post-enactment period as August 5, 1997 through May 31, 2000.

the capital gains tax rate decreased the cost of equity relative to debt and therefore decreased the probability that firms issue debt. The coefficient on TRD*Inst is positive and significant consistent with the prediction that the effect of the tax rate change is decreasing in the proportion of the firm's stock owned by institutions. However, the coefficient on TRD*Yield is not significantly different from zero, indicating that the result related to the effect of dividend yield on the magnitude of the effect of the tax rate change on the probability that firms issue debt versus equity is sensitive to the sample period used to test the hypothesis.[13]

The coefficient on the main effect for Yield is positive and significant in all three columns of Table 3. Although this result is inconsistent with our prediction, Mackie-Mason (1990) finds that dividend paying firms are more likely to issue debt than non-dividend paying firms. The coefficient on Inst is negative and significant in Columns (2) and (3) of Table 3 consistent with our prediction.

Results for other control variables are generally consistent with existing literature. The coefficient on t_{cDUM} is positive and significant in Column (2) of Table 3, consistent with the prediction that as the tax benefit of corporate interest deductions increases, firms become more likely to issue debt relative to equity. However, this result is sensitive to the sample period and model specification around the 1997 Tax Act. As expected, PPE/TA is positive and significant suggesting that firms with more value derived from assets in place have a lower cost of debt. The coefficients on 1/ZProb and PPE/TA*1/ZProb are not significant for any window. The coefficients on ΔPrice and EarnVar are negative as predicted, but are generally not significant. The coefficient on TobinQ is negative and significant, and the coefficient on Size is positive and significant, consistent with predictions.

[13] Results for the 1997 and 2003 Tax Acts are robust to including the yield on ten-year U.S. treasury bonds as a control for the risk-free rate.

C. Multivariate Results for the 2003 Tax Act

Table 4 presents results from estimating Equation (5) for the 2003 sample. Columns (1) and (2) present the results using debt and equity issues three years before May 2003 and two years after May 2003. Column (1) presents the results of estimating Equation (5) without the interaction terms (TRD*Yield and TRD*Inst). Consistent with the prediction that the probability of debt issues decreased relative to equity issues after the 2003 Tax Act, the coefficient on TRD is negative and significant (α_1= -0.252; t= -3.06). In Column (2) we estimate Equation (5) with the interaction terms. The coefficient on TRD is again negative and significant (α_1=-0.469; t=-2.57). The coefficient on TRD*Yield is negative and significant (α_4=-10.254; t=-2.71) consistent with the prediction that as the proportion of a firm's return that is taxed at the dividend tax rate increases, the magnitude of the effect of a decrease in dividend tax rates on the probability that firms issue debt versus equity increases. The coefficient on TRD*Inst is positive and significant (α_5=0.792; t=2.55), consistent with the prediction that the magnitude of the effect of the 2003 Tax Act on the probability of debt issues is smaller for firms with high institutional ownership. [14, 15]

The 13-Month column reports results for debt and equity issues six months before May 2003 and six months after May 2003. Results related to TRD and TRD*Inst are consistent with

[14] As with the 1997 Tax Act, a market-wide time effect could explain the results related to TRD. However, the effects of dividend yield and institutional ownership on the magnitude of the effect of TRD are inconsistent with a market-wide time effect.

[15] We use May 6, 2003 as the cutoff date for the pre-enactment period because this is the date after which the 2003 Tax Act was effective for both the dividend and capital gain tax rate changes. However, the tax act was passed on May 23, 2003 and the dividend tax rate reduction became effective for dividends received after December 31, 2002. Therefore we estimate Equation (5) using December 31, 2002 and May 23, 2003 as alternate cutoff dates for the pre-enactment period and find similar results. We also find similar results when we define the pre-enactment period as May 1, 2000 through May 6, 2003 and the post-enactment period as May 23, 2003 through May 31, 2005 and when we define the pre-enactment period as May 1, 2000 through December 31, 2002 and the post-enactment period as May 23, 2003 through May 31, 2005.

the results for the 5-year window. However, the coefficient on TRD*Yield is positive and insignificant for the 13-month window.

The results related to the control variables for the 2003 Tax Act are more consistent with our predictions than the results for the 1997 Tax Act. Similar to the results for the 1997 Tax Act, the coefficient on the main effect for Yield is positive and significant in Columns (1) and (2), contrary to our expectations. The coefficient on Inst is positive and significant in Column (1) and insignificant in Columns (2) and (3). As expected, the coefficients on t_{cDUM}, PPE/TA, and Size are positive and significant in all three columns of Table 4. The coefficients on TobinQ and EarnVar are negative and significant in all three columns of Table 4, and the coefficient on ΔPrice is negative and significant in Columns (1) and (2). Similar to the results for the 1997 Tax Act, the coefficients on 1/ZProb and PPE/TA*1/ZProb are not significant in any of the model specifications.

Overall, the results in Tables 3 and 4 suggest that decreases in the capital gain and dividend tax rates enacted by the 1997 and 2003 Tax Acts decreased the tax benefits of debt and, therefore, decreased the probability that firms issue debt relative to equity. The magnitude of the effect of decreases in individual tax rates on dividends and capital gains is decreasing in the proportion of the firm's stock owned by tax exempt investors and investors subject to corporate tax rates. Additionally, the magnitude of the effect of the decrease in the capital gain tax rate (dividend tax rate) is decreasing (increasing) in the proportion of return from the firm's stock taxed at dividend tax rates as opposed to capital gain tax rates. However, this result is sensitive to the length of the window over which we estimate the empirical model.

D. Economic Significance

Next we evaluate whether the magnitude of the effects of the 1997 and 2003 Tax Acts are both economically significant and reasonable given the magnitude of the tax rate changes. For the 6-Year window around the 1997 Tax Act, when we estimate Equation (5) without the interaction of TRD with Yield and Inst (Column (1) of Table 3) the marginal effect of TRD is -0.0527.[16] This result suggests that the 1997 Tax Act decreased the probability that firms issue debt relative to equity by 5.27%. When we include the interaction terms in Equation (5) the marginal effect of TRD is -0.1136 which suggests that the 1997 Tax Act decreased the probability that firms issue debt relative to equity by 11.36%. A one standard deviation increase in dividend yield decreases the magnitude of this effect by 7.14%, and a one standard deviation increase in institutional ownership decreases the magnitude of this effect by 6.23%.[17]

To determine whether the magnitude of this effect appears reasonable, we calculate the values of G_L from Equation (2) for dividend paying and non-dividend paying firms before and after the 1997 Tax Act and report the estimates in Table 5. We assume that t_c is equal to 35%, which is the marginal tax rate on corporate income for corporations in the highest income bracket during our sample period. We set d equal to the mean dividend payout ratio for dividend paying firms in our sample (0.40). We calculate the dividend payout ratio as dividends divided by average earnings over the three previous years. We set t_D, t_{CG}, and t_{PB} equal to their highest rates during the period just before the 1997 Tax Act to calculate the net tax gains from leverage before the 1997 Tax Act ($G_{Lpre\text{-}1997}$) and their rates just after the 1997 Tax Act to calculate the net

[16] We calculate the marginal effect of TRD as the change in the probability that firms issue debt when TRD goes from 0 to 1, with all other variables set equal to their mean values. The marginal effect of TRD=$F(\bar{I}_{(TRD=1)}) - F(\bar{I}_{(TRD=0)})$, where $F(\bar{I}_{(TRD=1)})$= the cumulative density function of Equation (5) evaluated with all variables set to their mean and TRD set equal to 1 and $F(\bar{I}_{(TRD=0)})$= the cumulative density function of Equation (5) evaluated with all variables set to their mean and TRD equal to 0.

[17] We calculate the marginal effect of TRD*Yield (TRD* Inst) as the change in the probability that firms issue debt when TRD*Yield (TRD*Inst) increases by one standard deviation, and all other variables are evaluated at their mean. The marginal effect of TRD*Yield = $f(\bar{I})*\alpha_4*s_{TRD*Yield}$, where $f(\bar{I})$ is the probably density function of Equation (5) evaluated at the mean and $s_{TRD*Yield}$ is the standard deviation of TRD*Yield. The marginal effect of TRD*Inst = $f(\bar{I})*\alpha_5*s_{TRD*Inst}$ where $s_{TRD*Inst}$ is the standard deviation of TRD*Inst.

tax gains from leverage after the 1997 Tax Act ($G_{Lpost\text{-}1997}$). Using these values, G_L decreased from 0.275 to 0.223 for dividend paying firms around the 1997 Tax Act. These estimates suggest that the net tax gains from leverage decreased by 5.2 cents per dollar of debt after the 1997 Tax Act for dividend paying firms. G_L decreased from 0.225 to 0.139 for non-dividend paying firms suggesting that the net tax gains from leverage decreased by 8.6 cents per dollar of leverage for non-dividend paying firms. Although it is difficult to directly compare these figures with the marginal effects from the probit estimation, the magnitude of the marginal effects appear to be within a reasonable range in light of the decrease in the net tax benefit of debt after the 1997 Tax Act.

For the 5-year window around the 2003 Tax Act, the marginal effect of TRD is -0.069 when we estimate Equation (5) without the interaction of TRD with Yield and Inst (Column (1) of Table 4). This result suggests that the probability that firms issue debt versus equity decreased by 6.9% after the 2003 Tax Act. The marginal effect of TRD is -0.097 when we estimate Equation (5) with the interaction terms, which suggests that the probability that firms issue debt versus equity decreased by 9.7% after the 2003 Tax Act. A one standard deviation increase in dividend yield increases the magnitude of the TRD effect by 3.6%. A one standard deviation increase in institutional ownership decreases the magnitude of the TRD effect by 5.9%.

We report estimates of G_L before and after the 2003 Tax Act for dividend paying and non-dividend paying firms in Table 5. For dividend paying firms G_L decreased by 8.2 cents per dollar of leverage after the 2003 Tax Act. For non-dividend paying firm G_L decreased by only 0.3 cents per dollar of leverage. When compared with these figures, the magnitude of the effect of the 2003 Tax Act appears reasonable for dividend paying firms but larger than expected for non-dividend paying firms.

E. Supplemental Tests

In Tables 3 and 4 we analyze changes in the probability that firms issue debt versus equity using samples of new issues of debt and equity around changes in tax rates. However, this measure only captures new issues of debt and equity and does not incorporate decisions of firms to pay down existing debt or to repurchase stock. To more broadly measure the effects of changes in tax rates on firms' financing decisions, we estimate the effects of changes in the tax gains from leverage on changes in debt ratios. For this specification, we include PTP, an estimate of the personal tax penalty of issuing debt from Graham (1999), in the empirical model. Graham (1999) estimates the personal tax penalty of debt as:

$$PTP = [t_{PB} - (1 - t_c)t_{PS}], \tag{8}$$

where t_{PB} is the personal tax rate on income from bonds, t_c is the corporate tax rate, and t_{PS} is the personal tax rate on income from stocks, as in Equation (1). We set t_c equal to zero if t_{cDUM} equals zero, 0.175 if t_{cDUM} equals one, and 0.35 if t_{cDUM} equals two. As in Equation (2), we expand t_{PS} to allow for different tax rates on dividends and capital gains:

$$PTP = t_{PB} - (1 - t_c)[d(1 - t_D) + (1 - d)(1 - t_{CG})], \tag{9}$$

where d equals the dividend payout ratio defined as dividends paid divided by average earnings over the previous three years, t_D equals the personal tax rate on dividend income, and t_{CG} equals the personal tax rate on capital gains, as in Equation (2). We calculate PTP from 1994 through 2004 which incorporates the sample periods used in Tables 3 and 4, encompasses the personal tax rate changes enacted by the 1997 and 2003 Tax Acts, and represents a period during which statutory corporate tax rates remained unchanged. This measure of the personal tax penalty of debt varies over time with changes in t_{PB}, t_D, and t_{CG} and cross-sectionally with variations in t_c

and d. To determine whether incremental debt decisions vary with changes in the personal tax penalty of debt, we estimate the following regression equation:

$$(10) \quad \Delta debt = \alpha_0 + \alpha_1 \Delta PTP + \alpha_2 t_{cDUM} + \alpha_3 \Delta PPE/TA + \alpha_4 \Delta 1/ZProb + \alpha_5 \Delta PPE/TA * \Delta 1/ZProb + \alpha_6 \Delta TobinQ + \alpha_7 \Delta Price + \alpha_8 \Delta Size + \alpha_9 \Delta EarnVar + \varepsilon,$$

where Δdebt equals the change in the debt ratio (defined below), ΔPTP equals the change in the personal tax penalty of debt from the prior year to the current year, t_{cDUM} is the proxy for the corporate tax rate defined in Equation (5), and all other variables are defined as the change in the variables as defined in Equation (5) from the prior to the current year. Because the personal tax penalty of debt decreases the tax gains from leverage, we expect the coefficient on ΔPTP, α_1, to be negative.

We estimate Equation (10) for firm-years from 1994 through 2004 that have data available in Compustat to compute all required variables. To determine whether firms' debt ratios change with time-series changes in the personal tax penalty of debt we estimate Equation (10) using fixed firm-year effects and present the results in Table 6. Column (1) of Table 6 presents the results using the change in the debt to value ratio as the dependent variable, defined as the change from year t-1 to year t of long-term debt plus debt in current liabilities, the sum divided by total assets minus book value of equity plus market value of equity.[18] The coefficient on ΔPTP is negative and significant in support of the prediction that when the personal tax penalty of debt increases, firms become less likely to issue debt relative to equity. In Columns (2) and (3) of Table 6, we find that changes in the ratio of debt to total assets (long-term debt plus debt in current liabilities divided by total assets) and net debt issues from the statement of cash flows (net long-term debt issues minus net sales of common and preferred stock from the

[18] t-statistics in Table 6 are calculated using White's (1980) heteroskedastic-consistent standard errors.

statement of cash flows, the difference divided by the market value of the firm) are negatively related to the personal tax penalty of debt.[19] These results provide additional evidence that time-series variation in personal taxes on equity income affect firms' decisions to issue debt relative to equity.

V. Conclusion

This paper provides evidence that investor level taxes on equity income affect corporate capital structure decisions. Specifically, we find that firms are less likely to issue debt after the effective date of the 1997 Tax Act which decreased individuals' tax rates on capital gains. This finding is consistent with the prediction that decreases in tax rates on equity income decrease the cost of equity relative to debt and, therefore, decrease the probability that firms issue debt. Further, we find that the magnitude of the effect of the 1997 Tax Act on the probability of debt issues is decreasing in dividend yield, a proxy for the proportion of returns from equity income taxed at capital gain tax rates. The magnitude of this effect is also decreasing in institutional ownership, a proxy for the proportion of a firm's stock owned by investors not affected by the 1997 Tax Act.

We perform additional tests of the effect of investor level tax rates on the probability that firms issue debt versus equity by examining corporate debt and equity issues around the 2003 Tax Act which decreased the dividend tax rate and the capital gain tax rate. This legislation provides a unique opportunity to test the effect of dividend taxes on capital structure decisions because it decreased the tax rates on equity income relative to the tax rate on interest income.

[19] Results are similar when we define d as regular dividends paid in the prior year divided by market value of equity in the calculation of PTP, however, the coefficient on this measure of ΔPTP becomes insignificant when the dependent variable is defined as net issues from the statement of cash flows (α_1 = -0.036; t = -1.18).

Results around this tax legislation provide additional support for the hypothesis that decreases in the tax rate on equity income decrease the probability that firms issue debt versus equity.

This paper contributes to literature that examines the effects of taxes on capital structure decisions by providing evidence that time-series changes in investor level tax rates on equity income affect incremental financing decisions. The evidence in this paper is also consistent with existing studies that find that personal taxes on equity income affect required equity returns.

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TABLE 1
Summary of Proceeds from New Issues of Debt and Equity Around the 1997 and 2003 Tax Acts
(in $ Millions)

Panel A: Sample of New Issues During 6-Year Window around the 1997 Tax Act in May, 1997[a]

	Stock Issues				Debt Issues			
Year	N	Sum	Mean	Median	N	Sum	Mean	Median
1994	64	6,363.90	99.44	47.20	96	36,355.90	378.71	125.00
1995	104	10,823.30	104.07	54.10	153	61,846.30	404.22	194.60
1996	137	13,571.30	99.06	54.00	176	69,759.20	396.36	175.00
1997	40	3,908.50	97.71	50.00	66	30,215.10	457.80	199.35
Totals	345	34,667.00			491	198,176.50		
1997	91	21,084.00	231.69	63.00	135	99,670.60	738.30	248.70
1998	96	27,628.70	287.80	77.20	193	143,297.30	742.47	275.20
1999	98	39,188.00	399.88	124.35	152	127,212.20	836.92	348.15
2000	53	22,098.20	416.95	104.80	51	67,500.00	1,323.53	848.00
Totals	338	109,998.90			531	437,680.10		

Panel B: Sample of New Issues During 5-Year Window around the 2003 Tax Act in May, 2003[a]

	Stock Issues				Debt Issues			
Year	N	Sum	Mean	Median	N	Sum	Mean	Median
2000	83	27,487.60	331.18	113.60	89	146,643.50	1,647.68	897.10
2001	176	33,171.70	188.48	59.75	175	205,856.90	1,176.33	500.00
2002	196	34,136.70	174.17	76.15	140	169,250.90	1,208.94	397.85
2003	54	7,735.40	143.25	53.75	61	91,099.60	1,493.44	1,046.90
Totals	509	102,374.30			465	612,850.90		
2003	201	23,929.60	119.05	52.50	116	74,728.30	644.21	321.20
2004	333	41,436.70	124.43	51.00	94	64,308.90	684.14	316.40
2005	74	13,995.10	189.12	64.45	26	20,342.10	782.39	497.50
Totals	608	79,361.40			236	159,379.30		

[a] The sample in Panel A includes new issues during the sample period for firms with required Compustat data, allowing one observation per firm per year per period. The period before the 1997 Tax Act begins May, 1 1994 and ends May 7, 1997. The period after the 1997 Tax Act begins May 8, 1997 and ends May 31, 2000. The sample in Panel B includes new issues during the sample period for firms with required Compustat data, allowing one observation per firm, per year, per period. The period before the 2003 Tax Act begins May 1, 2000 and ends May 6, 2003. The period after the 2003 Tax Act begins May 7, 2003 and ends May 31, 2005.

TABLE 2
Distribution of Variables Used to Estimate the Probability of Debt Versus Equity Issues for Samples of New Issues Around the 1997 and 2003 Tax Acts

Panel A: Sample of Firms Issuing Debt or Equity During 6-Year Window Around the 1997 Tax Act[a]

Variable[b]	Sample Size	Mean	Q1	Median	Q3
TRD	1,705	0.5097	0.0000	1.0000	1.0000
Yield	1,705	0.0119	0.0000	0.0042	0.0203
Inst	1,705	0.4206	0.0298	0.4608	0.6477
t_{cDUM}	1,705	1.6170	1.0000	2.0000	2.0000
PPE/TA	1,705	0.4047	0.2003	0.3585	0.5904
1/ZProb	1,705	0.0459	0.3561	0.4923	0.8503
PPE/TA*1/ZProb	1,705	0.0647	0.0782	0.1565	0.4155
TobinQ	1,705	1.2734	0.3587	0.6789	1.3765
ΔPrice	1,705	0.4381	-0.0385	0.1777	0.4936
Size	1,705	6.8047	5.3070	6.7570	8.3352
Evar	1,705	0.1075	0.0375	0.0662	0.1147

Panel B: Sample of Firms Issuing Debt or Equity During 5-Year Window Around the 2003 Tax Act[a]

Variable[b]	Sample Size	Mean	Q1	Median	Q3
TRD	1,818	0.4642	0.0000	0.0000	1.0000
Yield	1,818	0.0109	0.0000	0.0000	0.0165
Inst	1,818	0.3760	0.0768	0.3888	0.6252
t_{cDUM}	1,818	1.2442	1.0000	1.0000	2.0000
PPE/TA	1,818	0.3468	0.1192	0.2781	0.5435
1/ZProb	1,818	0.6747	-0.0383	0.5030	1.0027
PPE/TA*1/ZProb	1,818	0.3591	-0.0006	0.1205	0.4594
TobinQ	1,818	1.6542	0.2845	0.6746	1.8467
ΔPrice	1,818	1.5074	-0.1921	0.0834	0.5416
Size	1,818	6.6378	4.8711	6.5001	8.3160
Evar	1,818	0.1901	0.0397	0.0837	0.2061

[a]The sample in Panel A includes debt and equity issues three years before and three years after the 1997 Tax Act became effective, excluding issues for which Compustat data are not available. The sample in Panel B includes debt and equity issue three years before and two years after the 2003 Tax Act became effective, excluding issues for which Compustat data are not available.

[b] TRD equals 1 for issues after the tax legislation became effective (after May 7, 1997 for the 1997 Tax Act and after May 6, 2003 for the 2003 Tax Act), and zero otherwise. Yield equals the annualized amount of the last regular dividend paid in yeart-1 / year t-1 market value of equity. Inst equals the percent of institutional ownership as of the beginning of the same quarter in the prior year. t_{cDUM} is a trichotomous variable equal to 0 if the firm had an unused NOL carryforward and negative income in the prior year, 1 if the firm had either an unused NOL carryforward or negative income in the prior year, and 2 if the firm had no unused NOL carryforward and had positive income in the prior year. PPE/TA equals net property plant and equipment/total assets. 1/ZProb is the inverse of the modified Altman's (1968) ZProb used by MacKie-Mason (1990) and Graham (1996). TobinQ equals the sum of preferred stock, market value of common equity, and net short-term liabilities divided by total assets. ΔPrice equals the percent change in the stock price per share from t-2 to t-1. Size equals the log of the market value of equity. EarnVar is earnings variance calculated as the standard deviation of ($EBIDT_t$ - $EBIDT_{t-1}$) divided by the mean of total assets, for the 10 years prior to the debt or equity issue (at least four years if data are missing).

TABLE 3
Results of Probit Estimation of the Effect of Tax Rate Changes on Firms' Choices Between Debt and Equity Around the 1997 Tax Act

$$Type = \alpha_0 + \alpha_1 TRD + \alpha_2 Yield + \alpha_3 Inst + \alpha_4 TRD*Yield + \alpha_5 TRD*Inst + \alpha_6 t_{cDUM} + \alpha_7 PPE/TA + \alpha_8 1/ZProb + \alpha_9 PPE/TA*1/ZProb + \alpha_{10} TobinQ + \alpha_{11} \Delta Price + \alpha_{12} Size + \alpha_{13} EarnVar + \alpha_{14} Regdum + \sum_{j=1}^{7} \alpha_{15,j} IND_j,$$

		(1) 6-Year Window[a]		(2) 6-Year Window[a]		(3) 13-Month Window[a]	
Variable Name[b]	*Pred. Sign*	*Coefficients*	*t statistics*	*Coefficients*	*t statistics*	*Coefficients*	*t statistics*
Intercept		-2.238***	-7.07	-2.077***	-6.48	-2.488***	-2.92
Tax Variables							
TRD	-	-0.137*	-1.87	-0.492***	-3.95	-1.043***	-3.51
Yield	-	12.930***	4.92	6.946**	2.17	31.407**	2.57
Inst	-	-0.101	-0.89	-0.353**	-2.22	-0.768**	-2.55
TRD*Yield	+			14.940***	3.23	-0.485	-0.00
TRD*Inst	+			0.470**	2.26	1.604***	3.49
Control Variables							
t_{cDUM}	+	0.094	1.44	0.110*	1.67	0.011	0.00
PPE/TA	+	0.612***	3.36	0.624***	3.41	0.926*	1.76
1/ZProb	-	0.004	0.58	0.004	0.50	-0.008	-0.00
PPE/TA*1/ZProb	-	-0.002	-0.17	-0.002	-0.10	-0.082	-0.26
TobinQ	-	-0.302***	-8.46	-0.305***	-8.48	-0.407***	-3.46
ΔPrice	-	-0.007	-0.54	-0.010	-0.74	-0.155	-0.96
Size	+	0.342***	14.45	0.343***	14.48	0.513***	7.79
EarnVar	-	-0.545	-1.46	-0.502	-1.36	2.607**	2.53
Regdum	?	-0.004	-0.00	-0.071	-0.25	-0.758	-1.01
Sample Size		1,705		1,705		372	
Log Likelihood		-830.69		-823.03		-143.55	
LR Index		0.2763		0.2830		0.4249	
% Correct		77%		78%		82%	
Naïve Model % Correct		60%		60%		60%	

***significant at 0.01; **significant at 0.05; *significant at 0.10 in two-tailed tests.

[a]The sample in Columns (1) and (2) includes debt and equity issues from May 1, 1994 through May 31, 2000. The sample in Column (3) includes debt and equity issues from November 1, 1996 through November 30, 1997.

[b]Type equals 1 for debt issues and 0 for equity issues. TRD equals 1 for issues after the tax legislation became effective (after May 7, 1997 for the 1997 Tax Act), and zero otherwise. Yield equals the annualized amount of the last regular dividend paid in yeart-1 / year t-1 market value of equity. Inst equals the percent of institutional

ownership as of the beginning of the same quarter in the prior year. t_{cDUM} is a trichotomous variable equal to 0 if the firm had an unused NOL carryforward and negative income in the prior year, 1 if the firm had either an unused NOL carryforward or negative income in the prior year, and 2 if the firm had no unused NOL carryforward and had positive income in the prior year. PPE/TA equals net property plant and equipment/total assets. 1/ZProb is the inverse of the modified Altman's (1968) ZProb used by MacKie-Mason (1990) and Graham (1996). TobinQ equals the sum of preferred stock, market value of common equity, and net short-term liabilities divided by total assets. ΔPrice equals the percent change in the stock price per share from t-2 to t-1. Size equals the log of the market value of equity. EarnVar is earnings variance calculated as the standard deviation of ($EBIDT_t$ - $EBIDT_{t-1}$) divided by the mean of total assets, for the 10 years prior to the debt or equity issue (at least four years if data are missing). Regdum is a dummy variable equal to one if the firm is in a regulated industry and zero otherwise. IND is a vector of dummy variables that correspond to 1-digit SIC codes.

TABLE 4
Results of Probit Estimation of the Effect of Tax Rate Changes on Firms' Choices Between Debt and Equity Around the 2003 Tax Act

$$Type = \alpha_0 + \alpha_1 TRD + \alpha_2 Yield + \alpha_3 Inst + \alpha_4 TRD*Yield + \alpha_5 TRD*Inst + \alpha_6 t_{cDUM} + \alpha_7 PPE/TA + \alpha_8 1/ZProb + \alpha_9 PPE/TA*1/ZProb + \alpha_{10} TobinQ + \alpha_{11} \Delta Price + \alpha_{12} Size + \alpha_{13} EarnVar + \alpha_{14} Regdum + \sum_{j=1}^{7} \alpha_{15,j} IND_j,$$

		(1) 5-Year Window[a]		(2) 5-Year Window[a]		(3) 13-Month Window[a]	
Variable Name[b]	*Pred. Sign*	*Coefficients*	*t statistics*	*Coefficients*	*t statistics*	*Coefficients*	*t statistics*
Intercept		-4.262***	-9.27	-4.244***	-9.21	-4.668***	-5.25
Tax Variables							
TRD	-	-0.252***	-3.06	-0.469**	-2.57	-0.753*	-1.77
Yield	-	10.600***	4.60	15.777***	5.12	-7.772	-1.00
Inst	-	0.338**	2.10	0.073	0.37	-0.334	-0.59
TRD*Yield	-			-10.254***	-2.71	-0.350	-0.00
TRD*Inst	+			0.792**	2.55	1.202*	1.73
Control Variables							
t_{cDUM}	+	0.214***	3.38	0.222***	3.48	0.493***	3.38
PPE/TA	+	0.793***	3.83	0.818***	3.91	1.258***	2.61
1/ZProb	-	-0.003	-0.20	-0.004	-0.20	0.026	0.26
PPE/TA*1/ZProb	-	0.019	0.62	0.020	0.61	-0.003	-0.00
TobinQ	-	-0.093***	-3.44	-0.084***	-3.13	-0.193**	-2.02
ΔPrice	-	-0.157***	-2.84	-0.147***	-2.68	0.013	0.10
Size	+	0.403***	15.48	0.399***	15.23	0.486***	7.71
EarnVar	-	-1.285***	-2.96	-1.352***	-3.07	-3.645***	-3.47
Regdum	?	0.663	1.52	0.684	1.57	0.885	1.19
Sample Size		1,818		1,818		463	
Log Likelihood		-677.09		-669.60		-149.93	
LR Index		0.4414		0.4476		0.5276	
% Correct		83%		83%		83%	
Naïve Model % Correct		61%		61%		56%	

***significant at 0.01; **significant at 0.05; *significant at 0.10 in two-tailed tests.

[a]The sample in Columns (1) and (2) include debt and equity issues from May 1 2000 through May 31, 2005. The sample in Column (3) includes debt and equity issues from November 1, 2002 through November 30, 2003.

[b]Type equals 1 for debt issues and 0 for equity issues. TRD equals 1 for issues after the tax legislation became effective (after May 6, 2003 for the 2003 Tax Act), and zero otherwise. Yield equals the annualized amount of the last regular dividend paid in yeart-1 / year t-1 market value of equity. Inst equals the percent of institutional

ownership as of the beginning of the same quarter in the prior year. t_{cDUM} is a trichotomous variable equal to 0 if the firm had an unused NOL carryforward and negative income in the prior year, 1 if the firm had either an unused NOL carryforward or negative income in the prior year, and 2 if the firm had no unused NOL carryforward and had positive income in the prior year. PPE/TA equals net property plant and equipment/total assets. 1/ZProb is the inverse of the modified Altman's (1968) ZProb used by MacKie-Mason (1990) and Graham (1996). TobinQ equals the sum of preferred stock, market value of common equity, and net short-term liabilities divided by total assets. ΔPrice equals the percent change in the stock price per share from t-2 to t-1. Size equals the log of the market value of equity. EarnVar is earnings variance calculated as the standard deviation of ($EBIDT_t$ - $EBIDT_{t-1}$) divided by the mean of total assets, for the 10 years prior to the debt or equity issue (at least four years if data are missing). Regdum is a dummy variable equal to one if the firm is in a regulated industry and zero otherwise. IND is a vector of dummy variables that correspond to 1-digit SIC codes.

TABLE 5
Estimate of the Net Tax Benefit from $1 of Leverage for Dividend Paying and Non-Dividend Paying Firms[a]

	$G_{Lpre-1997}$	$G_{Lpost-1997}$	Difference ($G_{Lpre-1997} - G_{Lpost-1997}$)	$G_{Lpre-2003}$	$G_{Lpost-2003}$	Difference ($G_{Lpre-2003} - G_{Lpost-2003}$)
(A) d = 0.40	0.275	0.223	0.052	0.232	0.150	0.082
(B) d = 0	0.225	0.139	0.086	0.153	0.150	0.003

[a] We estimate the tax gains from leverage using the equation for the net tax benefit of debt from Graham (1999): $t_c - [t_{PB} - (1 - t_c)t_{PS}]$, where t_{PB} equals the personal tax rate on interest income, t_c equals the corporate tax rate, and t_{PS} equals the personal tax rate on equity income. We define t_{PS} as $[dt_D+(1-d)t_{CG}]$ where d is the dividend payout ratio, t_D equals the personal tax rate on dividend income, and t_{CG} equals the personal tax rate on capital gains. For all calculations we assume that t_c equals 0.35, which is the corporate tax rate for the highest income bracket throughout our sample period. In Row (A) we assume d equals 0.40. In Row (B) we assume d equals zero. $GL_{pre-1997}$ is the net tax benefit of debt before the 1997 Tax Act; $G_{Lpost-1997}$ is the net tax benefit after the 1997 Tax Act; $G_{Lpre-2003}$ is the net tax benefit of debt before the 2003 Tax Act; $G_{Lpost-2003}$ is the net tax benefit after the 2003 Tax Act.

TABLE 6
Results of OLS Regression of Changes in Debt Ratios on the Personal Tax Penalty of Debt

$$\Delta debt = \alpha_0 + \alpha_1 \Delta PTP + \alpha_2 t_{cDUM} + \alpha_3 \Delta PPE/TA + \alpha_4 \Delta 1/ZProb + \alpha_5 \Delta PPE/TA * \Delta 1/ZProb + \alpha_6 \Delta TobinQ + \alpha_7 \Delta Price + \alpha_8 \Delta Size + \alpha_9 \Delta EarnVar + \varepsilon$$

		(1) Debt to Market Value[a]		(2) Debt to Total Assets[a]		(3) Net Issues from SCF[a]	
Variable Name[b]	*Pred. Sign*	*Coefficients*	*t statistics*[c]	*Coefficients*	*t statistics*[c]	*Coefficients*	*t statistics*[c]
Intercept		-0.031***	-12.54	-0.028***	-8.25	-0.041***	-13.13
Tax Variables							
ΔPTP	-	-0.046***	-3.15	-0.055***	-3.04	-0.036*	-1.83
Control Variables							
t_{cDUM}	+	0.019***	13.50	0.016***	8.59	0.022***	11.39
ΔPPE/TA	+	0.066***	4.09	0.138***	4.28	0.052**	2.28
Δ1/ZProb (x100)	-	-0.001*	-1.91	-0.001*	-1.94	-0.001***	-2.61
ΔPPE/TA*Δ1/ZProb (x100)	-	-0.008	-0.36	-0.012	-0.55	-0.008	-0.63
ΔTobinQ (x100)	-	-0.019	-0.48	0.380**	2.13	0.081***	2.98
ΔPrice (x100)	-	-0.008*	-1.69	-0.005	-1.46	-0.004**	-2.17
ΔSize	+	-0.071***	-33.06	-0.033***	-9.13	-0.011***	-5.71
ΔEarnVar	-	0.020***	4.58	-0.003	-0.41	-0.004	-0.55
Sample Size[d]		30,073		30,073		25,531	
Adjusted R^2		0.2840		0.3227		0.1332	

***significant at 0.01; **significant at 0.05; *significant at 0.10 in two-tailed tests.

[a] In Column (1) we define Δdebt as the change in the debt to value ratio calculated as long-term debt plus debt in current liabilities divided by total assets minus book value of common equity plus market value of equity. In Column (2) we define Δdebt as the change in the debt to assets ratio defined as long-term debt plus debt in current liabilities divided by total assets. In Column (3) we define Δdebt as net debt issues from the statement of cash flows (Compustat data item 111 minus Compustat data item 114) minus net equity issues (Compustat data item 108 minus Compustat data item 115) divided by total assets minus book value of common equity plus market value of equity.

[b] ΔPTP equals the change in the personal tax penalty of debt calculated as the change from the prior year to the current year of the following calculation: $t_{PB}-(1-t_c)[d(1-t_D)+(1-d)(1-t_{CG})]$ where t_{PB} is the personal tax rate on interest income, t_c is the corporate tax rate set equal to 0 if t_{cDUM} equals zero, 0.175 if t_{cDUM}=1 and 0.35 if t_{cDUM}=2, d is the dividend payout ratio defined as dividends paid in the prior year divided by average earnings over the previous three years, t_D is the personal tax rate on dividend income and t_{CG} is the personal tax rate on capital gains; t_{cDUM} is a trichotomous variable equal to 0 if the firm had an unused NOL carryforward and negative income in the prior year, 1 if the firm had either an unused NOL carryforward or negative income in the prior year, and 2 if the firm had no unused NOL carryforward and had positive income in the prior year. ΔPPE/TA equals the change from year t-1 to t in net property plant and equipment/total assets. Δ1/ZProb is the change in the inverse of the modified Altman's (1968) ZProb used by MacKie-Mason (1990) and Graham (1996). ΔTobinQ equals the change in the sum of preferred stock, market value of common equity, and net short-term liabilities divided by total assets. ΔPrice equals the percent change in the stock price per share from t-2 to t-1. ΔSize equals the change in the log of the market value of equity. ΔEarnVar is the change in earnings variance calculated as the change in the standard deviation of ($EBIDT_t$ - $EBIDT_{t-1}$) divided by the mean of total assets, for the 10 years prior to the debt or equity issue (at least four years if data are missing).

[c] t-statistics are calculated using White's (1980) heteroskedastic-consistent standard errors.

[d] The sample includes firm-years from 1994 through 2004 with data available on Compustat to calculate all variables in the empirical model.