WHEN ARE PREFERRED SHARES PREFERRED? THEORY AND EMPIRICAL EVIDENCE

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ABSTRACT

This paper demonstrates that preferred stock may arise as an optimal security in a tax-induced equilibrium. This result is driven by graduated tax schedules and by uncertainty. In a more general sense, our results can be interpreted as a template for including any security with a different tax treatment in a firm's capital structure. The first part of the paper demonstrates that the Miller (1977) equilibrium framework can accommodate more than two securities if different investor classes are taxed differently on each security and the tax schedule for each investor group is upward sloping. We then simplify the tax schedule, but introduce uncertainty, which implies the possibility of bankruptcy and the possible loss of tax shelters. The interaction of tax rates and seniority now affects the contribution of each security to after-tax firm value, as in some states the firm may not be able to pay either interest (or dividends) or even principal to its various claimholders. It is shown why and how these features, i.e. the various tax rates and seniority, determine the financing equilibrium, which is obtained by equating the expected marginal tax benefit of all securities. We demonstrate that non- profitable firms will tend to issue preferred shares whereas profitable firms will not find preferred stock advantageous in our framework. Comparative statics with respect to various tax rates are derived as well. These predictions are tested using a large sample of firms from the late 90's. The empirical testing broadly confirms the theoretical predictions.

I. INTRODUCTION AND LITERATURE REVIEW

In this paper, we show how the interaction of corporate taxes, personal taxes, tax shelters and bankruptcy affects the choice among equity, debt and preferred shares as instruments of financing. Specifically, we relate tax rates and profitability to the choice of preferred stock as part of the financing mix. In the second part of the paper, we test our propositions and find results that are consistent with our theoretical model. In a more general sense, our results can be interpreted as a template for including any security with a different tax treatment in a firm's capital structure.

Preferred stock has been used as means of financing for a long time, yet the existing literature provides few convincing explanations for issuing this security by non-regulated firms. Preferred stock resembles debt in that it promises pre-determined levels of dividends. However, unlike interest on debt, preferred dividends are not tax-deductible to the issuing firms. On the other hand, omission of dividends will not result in bankruptcy. Empirical studies (see for example Masulis (1983)) show that when a firm repurchases equity and increases the proportion of preferred shares in the capital structure, the stock price impact is similar but of a lower magnitude than that resulting from retiring equity so as to increase debt. In other words, preferred stock seems to be viewed as a partial substitute for debt.

The traditional literature suggests two motives for issuing preferred stock by utilities (see, e.g., Brealey and Myers (2000), Copeland and Weston (1988)). First, preferred stock is considered equity by the regulators, but provides a pattern of payments similar to that of debt. It is therefore advantageous for utilities to issue preferreds instead of debt, thus meeting regulators' equity constraints. Secondly, utilities can pass their costs on to the consumers and hence are less affected by the tax disadvantages of preferreds.

Most issuers of preferred stocks are, however, industrial firms (See Houston and Houston (1990)). Thus, explaining what motivates such firms to issue preferred stock is quite important. Issuing preferred stocks by non-regulated firms can be justified by clientele effects. Seventy percent of dividends received by corporations (85 percent according to the former U.S. tax law) are tax-exempt. Thus corporations will be better off receiving dividends of preferred stock rather than interest on debt or capital gains.[1] Linn and Pinegar (1988) find that issuance of preferred stock by frequent issuers, such as utilities was anticipated by the market and hence provided no new information; issuance by financials provided tax benefits; and issuance by industrials conveyed new, and negative, information regarding the firm's prospects.

Since 1993 some firms (in particular, Enron and Texaco) have been issuing a new type of preferred stock: "Structured Preferred Stock" (also referred to as monthly income preferred stock, MIPS). Firms that issue MIPS create subsidiaries that raise money via preferred shares. That money is then loaned to the original company. The latter pays interest to the subsidiary. The subsidiary in turn passes the cash through to investors as preferred dividends (see Irvine and Rosenfeld, 2000). MIPS are treated as preferred stock for financial statements and as debt for tax purposes. Practitioners attribute the popularity of this instrument to the fact that it lowers the debt-equity ratios, providing the issuer with better credit ratings with some credit rating agencies (see Engle, Erickson, and Maydew, 1999). However, ever since its inception, the favorable tax treatment of this hybrid has been called into question by the government and the IRS2. In the aftermath of the Enron bankruptcy in 2002 it seems MIPS may indeed by on the way out. Also, clearly, MIPS can be treated analytically as preferred stock for one firm and debt for the other.

Most of the earlier papers discussing preferred stock have been fairly descriptive in nature, and usually ignored taxation issues altogether. They include Fisher and Wilt (1968), Bildersee (1973), and Winger, Chen, Martin, Petty and Hayden (1986). Some elegant theoretical models include the option pricing framework developed by Emmanuel (1983), and papers by Titman (1984), and Heinkel and Zechner(1990). Emmanuel (1983) points out that a key feature of preferred stock, from the common equity-holders' point of view, is its dividend flexibility. That is, the preferred stock dividend can be omitted by the firm without penalty, as opposed to omission of interest payment on debt. Similarly, Titman (1984), suggests that preferred stock can be used to eliminate stockholders' incentive to liquidate in sub-optimal states of nature without causing

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2 *A nice description of the history of MIPS in the context of the Enron bankruptcy can be found in the Wall Street Journal (see Mckinnon and Hitt (2002).*

bankruptcy and in that sense can be an optimal security. Heinkel and Zechner (1990) present an informational equilibrium with preferred stock. They show that preferred stock enhances the firm's debt capacity, because it creates additional incentives to invest. Debt and preferred stock are therefore complementary securities according to their model.

Two contributions (Fooladi and Roberts (1986) and Trigeorgis (1988)) discuss some extensions of Miller's (1977) framework to include preferred stock. The two papers provide useful empirical insights which relate preferred stock and taxes: Fooladi and Roberts show that in Canada, where preferred stock income enjoyed a more favorable tax treatment (by virtue of dividend tax incentives) during the time period they discuss, preferreds' proportion in the financing mix is four times higher than in the U.S. Trigeorgis considers a sample of utilities, and shows that tax rates and dividend payments are statistically related to the weight of preferred stock in the capital structure. More recently, Hovakimian, Opler and Titman (2001) consider firms, which issued securities to raise external capital. They find that issuers of preferred stock tend to be highly leveraged. This also implies, empirically, that debt and preferred shares are complementary assets, since the more debt a firm uses, the higher the probability it will issue preferreds and vice versa. Some of their other empirical results concerning the relationship between the ratio of preferred shares in the capital structure and profitability, are consistent with our theoretical work and our empirical findings in this paper.

Finally, there are two papers, which provide additional empirical support for the tax hypothesis that we develop in the current study. The first study (Houston and Houston (1990)) sought to identify issuing firms and firms which purchase preferred stock. Most issuing firms in their sample had a lower effective tax rate than industry and market averages. Corporations purchasing preferreds, on the other hand, had a significantly higher tax rate than industry averages. In a latter paper (Houston and Houston,2002), the authors find a significant correlation between a tax variable and the probability of issuing preferreds.

The purpose of this paper is to provide an integrative and more robust tax-based model, which can explain the inclusion of preferred stock in the financing mix. This latter phenomenon is explained in two ways. First, if a graduated tax system is assumed, then Miller's (1977) model can be extended to include preferred stock as well. Second, if we introduce uncertainty, then the resulting possibility of bankruptcy and loss of tax shelters (even without assuming graduated tax schedules) may establish preferred stock as part of the optimal financing mix. Our theory implies that less profitable firms will tend to use preferred stock in their financial mix. We also provide some insights concerning the effect of taxation on the simultaneous choice of debt and preferred stock, and therefore provide clues as to whether preferred stocks complement or are substitutes for debt. We test our conjectures on a recent sample of firms, relating the percentage of preferred shares to profitability, to the tax rates, to the firm's leverage, and to several control variables. The results support the views expressed in the theory part of the study.

The paper is organized as follows. The next section offers a discussion of the differences between the three types of securities: equity, debt and preferred stock. The advantages and disadvantages to the issuers and buyers of each type of security as functions of their tax status are addressed. In Section III we discuss direct extensions of Miller's model, assuming a graduated tax schedule and no bankruptcy. The existence of equilibrium with positive amounts of each security is demonstrated. In section IV the case where the firm may not be able to meet its full contractual obligations is considered. Here we assume the same tax rates on each security for all investors, however, we allow for different tax rates across securities. Section V contains the empirical analysis. Section VI concludes.

II. ON DIFFERENCES OF TAXATION AND SENIORITY BETWEEN SECURITIES

Most income to preferred shareholders is in the form of dividends, whereas common stockholders obtain a large percentage of their income in the form of capital gains. Prior to the enactment of the 1986 tax law, there was a clear differentiation between the taxation of capital gains on the one hand, and preferred income (dividends) and interest income on the other hand. For a while, the statutory rates were closer, but in the 90's, while the top personal rate kept going up, the long-term capital gains rate remained at 20%. Furthermore, one can defer capital gains, but not interest or dividend income. Another important issue is corporate tax deductibility. U.S. corporations are allowed to deduct 70% (85% according to the old law) of the dividends they receive from other corporations for tax purposes. This differentiation leads again, to different effective taxation on preferred and common stock for different tax clienteles. Individuals may observe lower effective tax rates on total equity income, whereas for corporations effective tax payments on total preferred income may be lower.

There is also a difference in the tax effects of each type of financing for the issuer of the securities. Dividend payments are not deductible, whereas interest payments are (MIPS, discussed earlier, are an interesting hybrid, but for analytical purposes they can be viewed as debt for one corporation and preferred stock for another). The tax advantage of debt to the issuer, however, depends upon its tax status. This advantage will be more important for a profitable firm than for a non-profitable firm.

In addition to the different tax treatments, there are differences in the seniority structure of claims that separate the three types of securities. Bondholders must receive their income first. Next come preferred shareholders, and finally equity holders, who are the residual claimants. As we shall demonstrate, such tax and seniority differentials may lead to equilibria, which include debt, equity, and preferred stock.

III. THE CASE OF NO BANKRUPTCY

In this section, the Miller (1977) model is extended to include preferred stock.[3] Similar to Miller, we assume no bankruptcy. The only reason for the potential existence of any security in equilibrium is thus the differential statutory marginal tax rates of investors, and the marginal corporate tax rates of the issuers of securities. To simplify the presentation, we assume a risk-neutral, one period framework. Consider a firm that consists of a project requiring an investment of I. It is financed in general by an amount D of debt, S of equity and P of preferred stock, where $I = P+S+D$. Similar to Miller, investors are in different tax brackets. Also, the same investor may face different tax rates on the income from different securities. Denote the tax rate of investors in preferred stock by t_p, the tax rate of investors in common stock by t_g, and the tax rate on interest income as t_b[4]. Given a corporate tax rate of t_c, the after tax cash flows to the firm's claimants are as follows:

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[3] *In addition to extending and generalizing studies such as Fooladi and Roberts (1986) and Trigeorgis (1988), the analysis is constructive as a preliminary step towards the uncertainty model in the ensuing section.*

[4] *In principle, each tax rate on a given security must be indexed also by investor type i. However, again following Miller, we shall abstract from this notation for now. Later we introduce the required indices.*

To bond holders $D+DR\ (1-t_b)$

To preferred shareholders $P+PR_p(1-t_p)$

To common shareholders[5] $\{[(X-I-RD)(1-t_c)+I-P-D-PR_p]-S\}(1-t_g)+S$

R and R_p denote the promised rates of return on debt and preferred stocks, respectively. The depreciation allowance is exogenous to the model and equal to the entire investment, I. X denotes the cash flows resulting from the project. We assume that all cash flows available in Period 1 are treated as taxable income by the tax authorities. By assumption X is large enough so that all security holders pay taxes.

The value a firm financed by common stock, preferred stock and equity is given by[6]

$$V_L = V_U + \{RD\ [(1-t_b) - (1-t_c)(1-t_g)] + PR_p(t_g-t_p)\}/(1+R) \qquad (3.1)$$

where V_u is the value of the unlevered firm. The second term, $RD\ [(1-t_b) - (1-t_c)(1-t_g)]$, is the one period gain from using debt (as in Miller (1977)), whereas the last term, $PR_p(t_g-t_p)$, represents the one period gain from using preferred stock.[7]

The linearity of the value function (3.1) implies that if there is no graduated tax schedule across individuals and the rates t_p, t_g, t_b, and t_c are the same for all investors, a corner solution will usually emerge. Securities with lower tax rates will prevail and others will be eliminated.

Under a graduated tax system however, strict clienteles may form, where each investor group will hold the combination of debt and non-debt security, which it finds optimal. This will

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[5] *Note that S is not the market value of equity but the residual portion of investment contributed by common stockholders.*

[6] *Note that for an unlevered firm I=S, whereas for the levered firm, per definition, I = S+D+P.*

[7] *Similar to Miller and his followers, we assume no tax-arbitrage via short-sales of any security. Also note that in a risk neutral framework where everybody gets paid all rates of return are essentially equal to the risk free rate. We could either allow for risk aversion or else write R everywhere, but since in later sections the distinction between the various rates of return becomes important, we preferred to keep the presentation consistent and retain the present notation.*

occur under the following assumption (Assumption A): Suppose investors can be grouped into two groups I and J. For investors in group I, equity is taxed less than preferred stock, i.e. $t_{pi} > t_{gi}$ for each investor i in this group. For investors in group J, the opposite holds true, i.e. $t_{gj} > t_{pj}$ for each investor j in this group. The above assumption fits the pattern of taxation in the U.S. Investors in class I can be considered as individuals for whom taxes on preferred stock are higher than taxes on capital gains. Investors in class J can be considered as firms for whom taxes on preferred stock are lower than taxes on interest.

Proposition 3.1 states conditions under which only two securities will survive, and conditions that will allow for the three types of securities to be held in equilibrium.

Proposition 3.1

a) If for all investors, i, $t_{pi} > t_{gi}$ only equity and debt will be issued in equilibrium. If $t_{gi} > t_{pi}$ only preferreds and debt will be held.

b) Under Assumption A, equilibrium clienteles form as follows: Low tax bracket (on interest income) investors (to be precisely defined below) from both groups will invest in debt. High tax bracket investors in group I will invest in equity whereas high tax bracket investors in group J will invest in preferred shares. Two marginal investors i* and j* will emerge for whom $t_{gi*} = t_{pj*} = t_b$.

Proof: The first part of the proposition is essentially a re-statement of Miller's equilibrium, except that one additional security is available. Specifically, assume that the tax rate on preferred dividend is higher for all investors than the tax rate on common shares income. Following Miller, we can now normalize the tax rate on common stock income to zero. If we assume a graduated tax rate schedule for interest income, then the Miller equilibrium can be re-derived. Given the option of tax-free equity and a tax advantage to debt on the corporate level, no investor will buy preferreds, which are assumed to be taxed higher on the personal level without any offsetting corporate tax benefit.

The above argument can be reversed to demonstrate that if equity is taxed higher it will not be included in the financing mix (or perhaps one controlling share will remain, the same way that the Modigliani-Miller model predicts 100% debt). This demonstrates the first part of the proposition.

We now turn to the second part. Suppose that for some investors in group I the normalized tax rate on equity income is zero, the tax rate on preferred dividend is positive, and a graduated tax schedule exists for interest income. Then these investors whose tax rate is lower than the corporate tax rate will invest in debt, whereas investors in this group who are at a higher tax bracket than the corporate tax rate will invest in equity. Nobody will buy preferred stock, which is taxed higher than equity and offers no tax advantage to the issuer. Similarly, suppose that for the other group, J, the normalized tax rate on preferred dividend is zero, whereas the constant tax rate on equity is positive. The members of this group who are in a tax bracket below the corporate tax rate will invest in debt, whereas the ones in a higher tax bracket will invest in preferreds.

The "marginal investors" from groups I and J will feature equal tax rates which, in the normalized case developed in the proof, will also be equal to the corporate rate, as stated in the proposition. Note however that these two marginal investors will be taxed differently on both equity and preferreds.

If the base tax rate in the lower tax security is non-zero a similar analysis will apply, except that the tax rate of the marginal investor will differ from the corporate tax rate[9].

QED.

Proposition 3.1 shows that in equilibrium, groups with different tax rates will gravitate towards the instrument which provides this group with a superior tax treatment. In a graduated enough tax system, as per Assumption A, there will be a clientele for each type of security. In the following section, we show that uncertainty about future income, which may lead to the loss of tax shelters, allows firms to influence the expected tax rate of the marginal investors. This, in a way, creates differential effective tax rates to different groups of investors, and hence in equilibrium, each firm may issue positive amounts of debt, preferred shares and equity, even if the statutory tax rates on individuals are the same.

IV. OPTIMAL LEVELS OF STOCK, PREFERRED STOCK AND DEBT WHEN BANKRUPTCY IS POSSIBLE

[9] *Note that the description above is as general as the Miller model. Even in Miller's model, if tax schedules are completely independent of each other, then many equilibria are possible, and the well known results may not hold.*

In the previous section we have demonstrated that preferred stock may be issued in equilibrium even under certainty (or certainty equivalence) as long as graduated tax rates are allowed. This section focuses on the impact of bankruptcy and the loss of tax shelters on firms' decisions to issue preferreds. To that end, we simplify the tax structure, assuming now that all investors are in the same tax bracket for each of the three securities (although these tax rates may be different for different securities). While one cannot derive general solutions, we propose several scenarios under which preferreds will be issued as part of the optimal security mix. The model presented is a one period, risk neutral[10] model. Thus the value of the firm (with an exogenous investment decision) is equivalent to the expected after tax value of cash flows to all security holders. The firm receives a stochastic operating income distributed over the support (0,), and then divides up cash flows according to strict seniority rules. Similar to several other papers (see for example Kraus and Litzenberger (1973); Dotan and Ravid (1985)), it is assumed that upon bankruptcy, a fixed bankruptcy cost, B, is incurred. We further assume, for simplicity sake, that both debt and preferred stock are issued at par, and all market value adjustments are made through the promised rate of interest.

We now detail the ranges of cash flows to claimants. In the uncertainty case, dividend, interest and principal may or may not be paid depending on the realization of the stochastic cash flow X. The ranges are also functions of the decision variables: P, D and S, and the promised interest rate, R, on debt, the promised preferred dividend R_p[11] and the tax rates. These ranges are presented below.

Definition of the limits:

$$X_0 = I + RD + PR_p/(1-t_c)$$

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[10] *State prices such as introduced by De-Angelo and Masulis (1980) could be incorporated into this model as well. This would render the model slightly more general, but it would complicate the presentation a great deal without substantially altering the results.*

[11] *Since there is a possibility of non-payment, the promised interest and preferred dividend rates will differ from the risk free rate even under a risk-neutral scenario.*

[12]$X_1 = I + RD$

$X_2 = P(1+R_p) + D\,(1+R)$

$X_3 = P + D(1+R)$

$X_4 = D(1+R)$

$X_5 = D$

$X_6 = B$

<u>First Range</u> $X \quad X_0$

Income is high enough so the firm pays all taxes and uses both depreciation and interest tax shields.

Stockholders income is

$$(1\text{-}t_g)\,[(1\text{-}t_c)\,(X\text{-}I\text{-}RD) + I - PR_p\text{-}P\text{-}D\text{-}S] + S$$

Bondholders income is

$$D + RD\,(1\text{-}t_b)$$

Preferred-holders income is

$$P + PR_p\,(1\text{-}t_p)$$

(Note that $I = P + D + S$)

Stockholders pay taxes on the difference between their income and the amount initially invested, S. Bondholders pay taxes on the interest, and preferred -holders pay taxes only on the preferred dividends.

<u>Second Range</u>[13] $X_0 > X \quad X_1$

X is somewhat lower. Now shareholders receive an amount lower than their initial investment, and hence pay no taxes. The firm still pays income tax.

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[12] *If $P > (I\text{-}D)/(1+R_p)$ then X_1 and X_2 are switched and cash flows are somewhat different. Propositions 3.1 will usually hold however. Also, $P > (I\text{-}D)/(1+R_p)$ implies $S < PR_p$ which is usually not the case.*

[13] *While in principle when capital losses occur tax carry-forwards and carry-backs can offset the losses, there is never full offset. To simplify the presentation somewhat, we assume that in the case of capital losses there is no refund. A more accurate tax code would only make the presentation cumbersome while adding no new insight. This approach is common in papers which discuss tax issues, see for example De-Angelo and Masulis (1980) or Dotan and Ravid (1985).*

Stockholders now receive

$$(1-t_c)(X-I-RD) + (I-P-D) - PR_p$$

Bondholders' income is

$$D + RD\,(1-t_b)$$

Preferred-holders income is

$$P + PR_p\,(1-t_p)$$

<u>Third Range</u> X_2 $X < X_1$

Now the firm's income is less than the value of its tax shelters, I + RD. The firm and its shareholders pay no taxes. Preferred stock-holders and debt-holders are still paid in full.

Stockholders receive

$$X - D - RD - P - PR_p$$

Bondholders' income is

$$D + RD\,(1-t_b)$$

Preferred-holders income is

$$P + PR_p\,(1-t_p)$$

<u>Fourth Range</u> X_3 $X < X_2$

The firm cannot pay its obligations to both preferred shareholders and bondholders in full. Shareholders receive no income, preferred-holders get all the principal owed and some dividend. Bondholders are not affected.

Here Stockholders income is 0. This range is important to our analysis. To appreciate the importance of this range note that the total taxes paid in this range are:

$(X-D-RD-P)t_p + RDt_b$

An increase in P for this range of earnings decreases the total taxes of the firm, increasing the value of the firm, which is instrumental in establishing the possibility of including P in the financial mix.

Stockholders get	0
Preferred-holders receive	$P + (X - D - RD - P)\,(1-t_p)$
Bondholders get	$D + RD(1-t_b)$

<u>Fifth Range</u> X_4 $X < X_3$

Similar to the previous range, except that the firm cannot even pay the preferred principal. Here only bondholders pay any taxes.

Stockholders get 0

Preferred-holders get $X - RD - D$

Bondholders get $D + RD\,(1\text{-}t_b)$

<u>Sixth Range[14]</u> $X_5 \quad X < X_4$

In this and the following range, only bondholders receive any income. Specifically, debt principal is paid but interest cannot be repaid in full.

Stockholders get 0

Preferred-holders get 0

Bondholders get $D + (X - D)\,(1\text{-}t_b)$

<u>Seventh (last) Range</u> $B = X_6 \quad X < X_5$

Bondholders take control of the firm and its residual cash flows. A bankruptcy cost (B) is paid.

Stockholders get 0

Preferred-holders get 0

Bondholders get $X\text{-}B$

Since we are assuming a risk neutral world, the value of the firm is computed as the expected value of all cash flows according to the cumulative distribution function F(X). Technically, we integrate the cash flows over all ranges. This is presented in appendix A.

The optimal amounts of debt and preferred stocks are obtained by differentiating the firm value expression in Appendix A with respect to D and P, and equating the derivatives to zero.[16]

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[14] *Technically speaking, the firm is already bankrupt in this range. However, in order not to over-burden the paper with assumptions about the magnitude of the bankruptcy cost, we preferred to assume that bankruptcy occurs only when principal can't be paid. Thus all we need to assume is that B   D and of course B   X.*

[15] *If $P > (I\text{-}D)/(1+R_p)$ then X_1 and X_2 are switched and cash flows are somewhat different. Propositions 3.1 will usually hold however. Also, $P > (I\text{-}D)/(1+R_p)$ implies $S < PR_p$ which is usually not the case.*

[16] *The equations in the appendix implicitly derive the required rate of return for bondholders and preferred shareholders respectively. While an explicit calculation of these rates requires specific assumptions, all we need for the subsequent results is the signs of the derivatives. Clearly, as D goes up, the <u>promised</u> rate of return to*

We obtain:[17]

$$d\,V_L / d\,P = \{ t_g [1 - F(X_0)]\,(R_p P)' \} - \{ t_p [1 - F(X_2)] \}\,(R_p P)'$$

$$+ [F(X_2) - F(X_3)]\, t_p = 0$$

Where (RD)' is $\left(\frac{d\,R}{d\,D}\right) D + R$ and $(R_p P)' \equiv R_p + \frac{d\,R_p P}{d\,P}$.

$$d\,V_L / d\,D = (R\,D)' \,[(1 - t_b) - (1 - t_c)(1 - t_g)](1 - F(X_0))$$

$$- [F(X_0) - F(X_4)](R\,D)' t_b$$

$$+ (F(X_0) - F(X_1))\, t_c + (F(X_2)$$

$$- F(X_3))(t_p + (R\,D)' t_g) + (F(X_4) - (F(X_5))\, t_b$$

$$- (F(X_0) - F(X_2))\, P\, t_p \frac{d\,R_p}{d\,D} + P \frac{d\,R_p}{d\,D}(1 - F(X_0))(t_g - t_p)$$

$$- B\, f(X_5) = 0\,.$$

The equation above provides important intuitive insights into the role of preferred shares

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bondholders goes up as the probability of full payment declines. Similarly, as P goes up, R_p goes up, since the probability of paying principal and interest declines.

[17] *It is assumed that the second order conditions are satisfied. Also note that while the decision variables appear in the limits, the derivatives with respect to the limits often cancel.*

in a tax and seniority equilibrium. An increase in P, the principal amount of preferreds, leads to three different effects.

First, an increase in the principal increases the dividend paid, R_p. Because PR_p is higher, cash flows left over for shareholders in states in which they pay taxes (states in which $X>X_0$)) are lower. Hence, they pay less taxes. Secondly and conversely, for preferred shareholders, an increase in principal (and the induced increase in dividends) implies higher dividend payments in states in which they get paid in full ($X> X_2$). More payments imply higher taxes.

This trade-off is reflected in the first two terms of the first order condition. Clearly, tax rates and distribution functions will determine the sign and the magnitude of this combined effect.

Thirdly, an increase in P decreases the portion of payment considered taxable dividends in states in which preferred shareholders are not paid in full. These additional tax savings are reflected in the third term of the first order conditions. The fact that all three effects are not in the same direction leads to the possibility of an interior solution, which is explored below.

Note, that if $t_g = t_p$ then the sum of the first two terms must be negative, since preferred shareholders get paid in more states.

This discussion leads to the following Proposition.

Proposition 4.1

In the case of uncertainty, even without progressive taxation, if equity and preferred shares are taxed differentially, an interior optimal level of preferred shares may obtain in equilibrium.

Proof:

See Appendix B where we derive sufficient conditions for an interior optimum to obtain.

Note that proposition 4.1 and the following discussion should be viewed as specific examples for cases in which taxes (we do not require graduated schedules) and the effect of seniority of the various financial instruments on payments in different states of nature lead firms to choose preferreds as part of their financing mix.[18]

We now proceed to discuss some interesting special cases where preferred shares may or may not be issued. These cases are corollaries to proposition 4.1.

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[18] *For a discussion of the role of seniority and taxes in the determination of the value of residual securities in a similar framework, see Ravid (1994).*

Corollary 1

If the firm is sufficiently unprofitable (in a sense to be defined below), it may optimally issue only preferred shares

Proof:

By F.O.C. (first order conditions). If the firm is sufficiently unprofitable in the sense that $F(X_2) = 1$, then equation (4.1) becomes $\delta V_L/\delta P = [F(X_2) - F(X_3)]t_p > 0$. In this case the firm will increase P as much as possible. Whereas this result is quite intuitive when taxation of capital gains is higher than taxation of interest, it holds also when the opposite is true and may even hold when $t_g = 0$ and $t_p > 0$.

QED.

Further intuition for the corollary is as follows: if the firm is sufficiently unprofitable, it is less likely to be able to pay its obligations in full. As noted, an increase in preferred principal will thus reduce the tax burden in states where only part of the dividend is paid.

Corollary 2

If the firm is sufficiently profitable, but (at least weakly) there is some probability that shareholders' taxable income will not be positive, preferred shares will not be issued. This occurs even if $t_p = t_g$.

Proof:

If the firm is very profitable, the third term in the F.O.C. will approach 0, and the first two terms will always be negative. It therefore follows that

$\frac{d\,V_L}{d\,P} < 0$. Issuing preferreds is never optimal since it reduces the value of the firm. Q.E.D.

The intuition is the following. Increasing payoffs to preferred shareholders will (weakly) increase the tax burden in states in which common shareholders pay no taxes, whereas preferred shareholders who are still paid in full, receive taxable dividends. If the firm is sufficiently profitable, but shareholders do not always pay taxes, it may be advantageous to transfer cash to shareholders, since lower taxes will be paid in that case. If the firm is likely to always pay preferred shareholders in full, then states in which only preferred principal and no dividend is paid ($X_2 > X > X_3$)) are unlikely. Hence, the tax consequences of increased principal in such states matters less (see Ravid (1994) for further discussion of this issue).

Under uncertainty, different priorities in cash flow distribution may cause the expected marginal tax rates to differ even when statutory tax rates are the same[20]. A change in the amount of any security issued will therefore change these expected rates, creating room for several tax-deductible and several non-tax-deductible securities at equilibrium. This contrasts with the certainty case where, if tax rates on each security are the same for all investors, equilibrium will result in only one security being issued.

It is thus the prediction of this model that moderately profitable companies will tend not to issue preferred shares whereas less profitable firms will tend to issue more preferreds. A test of the model would be to relate these facts to the corporate tax structure and profitability[20].

We now turn to some additional comparative statics. Specifically, we analyze the effects of changes in tax rates on the optimal amounts of debt and preferred stock. Exact derivations and proofs are relegated to Appendix B.

Claim 1

If debt and preferreds are "complement assets", i.e. if the cross derivative of a change in firm value with respect to the two assets is positive, then an increase in the rate of taxation on equity will increase both the optimal level of debt and the optimal level of preferred shares.

Proof: See Appendix B.

The intuition is the following: an increase in the tax rate on equity makes both preferred stock and debt more desirable. Note that if the securities are "substitutes" then conclusions could be reversed, since the change in the optimal level of one non-equity security could inversely affect the benefits of the other.

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[20] *We note also that as we change the amounts of debt and preferreds, the* <u>*expected*</u> *return on these securities does not change. It is guaranteed by the equations in Appendix A. However, changing the amounts of debt and preferred stock changes the total tax liability and the after tax expected cash flows to shareholders, thus affecting equity value.*

[20] *The empirical analysis in Houston and Houston (1990) agrees with this prediction. The tax rates of firms which issue preferreds (except to some extent, utilities) tend to be lower than industry and market medians and means. This seems to imply lower profitability. However, Heinkel and Zechner's (1990) conclusion, i.e. that firms with "moderate growth opportunities" will tend to issue preferred shares is somewhat at odds with our analysis. The model is of course very different.*

Claim 2

An increase in the corporate tax rate will increase the optimal level of debt. It will increase the optimal level of preferred stock only if the two securities are "complements".

Proof: See Appendix B.

The intuition is this: An increase in the corporate tax rate will increase the optimal level of debt because of the increase in the value of tax benefits. The change in the level of preferred stock depends on the substitution between the two securities.[21]

If the two securities are complements, then, as the marginal value of debt rises, so will the marginal value of preferred shares, and more of the latter security will be issued.
This is in spite of the fact that preferreds, like equity, are not tax-deductible.

This point, and the pervasive influence of the cross derivative between the two securities are important aspects of the comparative statics analysis since they highlight the inter-dependence between debt and preferred stock. In other words, because of the tax interactions, corporate taxes will affect the optimal levels of all securities. One should note that if Heinkel and Zechner (1990) hypothesis holds, then an increase in debt issuance will also increase the optimal level of preferred stock in the firm capital structure.

V. EMPIRICAL IMPLICATIONS AND RESULTS

The theory has two main predictions regarding the percentage of preferred stock in the corporate capital structure. The first prediction concerns the relationship between preferred stock and profitability. The more profitable the firm, the less preferred stock should be issued in equilibrium. Put differently, the percentage of preferred stock in the capital structure should decrease with profitability, everything else equal.

The second prediction concerns preferred stock and corporate tax rates. The relationship

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[21] *This claim should be interpreted carefully - although the absolute quantities of both preferreds and debt may increase, the relative use of debt vs. preferred may change in either direction (see Trigeorgis (1988) for an empirical investigation of this issue).*

between the percentage of preferred stock in the capital structure and the corporate tax rate depends on whether preferred stock and debt are substitutes or complements. If they are complements, then a higher tax rate should result in an increase in the percentage of preferred stock in the capital structure. If, on the other hand, debt and preferred stock are substitutes, a higher tax rate results in a decrease in the percentage of preferred stock in the capital structure. Even if we cannot directly establish whether the two securities are substitutes or complements, a significant correlation between tax rates and the share of preferreds in the capital structure would provide conditional support to the predictions of the model.

We test these predictions on a large sample of firms in the late 1990's.

Our dependent variable is the percentage of preferred stock in firms' capital structure. The important independent variables include proxies for profitability and for the corporate tax rate. Control variables, from other studies, include firm size and tangibility of assets (see, for example, Titman and Wessels (1988), Rajan and Zingales (1995)). We also include the percentage of debt in the capital structure. Our basic regression equation is therefore:

$$\frac{\%\,preferred}{assets} = C + b_1 * profitability + b_2 * taxrate + b_3 * debtratio + b_4 * size + b_5 * \tan gibility + e$$

We expect a negative sign for the proxy for profitability, whereas the sign of the coefficient on the tax rate variable depends on the relationship between debt and preferred stock. This relationship is not easy to test, either way the model does predict that the coefficient should be significantly different than zero.

Description of the Data

Our data source is the Compustat database, which contains annual data for various accounting variables. We ran our tests on annual data as well as on averages of the data items for different years. As is well known, financial reporting by firms is subject to many arbitrary choices. Hence, results from any given year could suffer from biases. Also, most of our variables, for example, the percentage of debt or preferred stock in the capital structure, may be sticky (see Welch (2003)).

To address this issue, we follow Rajan and Zingales (1995) and Titman and Wessels (1988), and run cross-sectional tests on averages of the variables (in addition to individual years). The results for the averages are expected to be more statistically significant than those for the annual regressions (in other words, we expect higher t-statistics and lower P-values for the regression on the averages than for the annual regressions)[22].

The individual years we selected were 1996, 1997 and 1998, and the averages are taken for these three years. To be included in the average regression, a firm has to have data for all three individual years, and thus we lose a number of observations in that regression. The basic regressions, however, include all firms for which data is available.

We then run the tests on sub-samples to check robustness of our results. The first robustness check excludes the smallest firms, i.e. those with less than ten million dollars in annual sales (ten million dollars is the typical threshold as defined in most empirical studies).
Excluding the smallest firms resulted in a loss of about 20% of the data points.

A second reasonable screen is excluding utilities. Utilities are typically excluded from empirical tests because they are subject to regulation, in much the same way that financial firms are typically excluded from empirical studies because of their specialized balance sheets. However, our case is different because utilities used to be the primary issuer of preferred stock (although there is some evidence that this is not the case anymore - see Houston and Houston (1990) and (2002)). Therefore we did not want to exclude utilities in most of our work. However, following the common practice in empirical work, we did try to run regressions without utilities. Excluding utilities results in a loss of a few dozens of observations. We also run the tests for the sub-sample, which excludes both the smallest firms and utilities.

Methodology

The estimation procedure we use is Tobit because some of our variables are censored. I.e. the percentage of preferred stock in the capital structure cannot be negative and cannot exceed 1.

Our proxies for profitability are return on assets (ROA) and return on equity (ROE). Our

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[22] *An alternative could have been dealing with panel data. However, in our case, panel data may be problematic, because the time series of observations for any one firm is not independent.*

proxies for size are logarithm of assets and the logarithm of sales. To proxy for tangibility we use the ratio of fixed assets to total assets. Our dependent variable is the book value of preferred shares divided by the total assets, where debt is taken at book value and equity is taken at market value. This approach is known as a quasi-market approach and is important since book values for equity are very different from market values from equity and meaningless. Quasi-market values are commonly used in empirical literature because of data limitations (see, for example, Hovakimian, Opler and Titman (2001), Gilson (1997), Rajan and Zingales (1995), and Titman and Wessels (1988)).

Similarly, our leverage ratio is the book value of debt divided by the market value of assets, also in the quasi-market form. One should note that debt ratios often exceed one when equity is taken in book values, and this should be taken into account.

For the tax rate, our proxy is taxes paid over pre-tax income. Graham (1996, 2000) uses an innovative simulation methodology to better approximate the marginal tax rate firms are paying. His work is highly complex and involves forecasting income (based on a random walk with a drift assumption) 15 years forward. Such an endeavor would be difficult for our data, but more importantly, most of Graham's criticism refers to the relationship between the marginal tax rate and incremental debt financing. Here we have cross-section (rather than time series) data, and further, we average our variables over several years. Thus we should avoid most, if not all, of the pitfalls Graham's methodology seeks to correct. We also use different subsets sorted by tax rates. A detailed description of the variables is delegated to appendix C.

Results

Tables 1-5 show the results of some of the different regressions for the three individual years as well as for the averages across the years. Table 1 details the results for the sample which includes all firms. Table 2 contains the results for the sub-sample which excludes the smallest firms (about 20% of the observations). Table 3 shows the results for the sub-sample which does not include utilities. Table 4 contains the results for the sub-sample which includes neither the utilities nor the smallest firms. Table 5 contains the results of some of the regressions where extreme outliers of the tax rates were excluded.

The findings are consistent across the different sub-samples and the different proxies and appear to be robust. First, with respect to profitability we find the pattern predicted by our theory. As profitability increases, the percentage of preferred stock in the capital structure decreases. This holds true for the individual years as well as for the averages, using ROA and ROE (the results for ROA and ROE are very similar, and we present in the tables the results for ROA only), for all firms as well as the larger ones, and with and without utilities. Moreover, the relationship is usually highly statistically significant. This verifies the main result of our theoretical model.

With respect to our second prediction, concerning the effect of corporate tax rate on the use of referred stock, we find (again, consistently across sub-samples and proxies), that as the tax rate increases, the percentage of preferred stock in the capital structure decreases. However, the tax rates as retrieved from Compustat have extreme outliers, (e.g., tax rates larger than 1 and negative tax rates). Inclusion of such outliers produces results that are not always statistically significant, especially for the individual years. Once we exclude the outliers the results become highly statistically significant. We present two variants on this theme: first, we exclude all observations with tax rates below –0,2 and above 0.65, and in the second case we exclude observations with tax rates below –0.02 and above 0.36.

We also observe that the coefficient of the debt ratio (DR) is statistically significant and positive. This implies that the more leveraged the firm the more likely it is to issue preferred stock. This points to a complementarity between the two forms of capital. It also agrees with the univariate results of Hovakimian, Opler, and Titman (2001), and with the theoretical predictions of Heinkel and Zechner (1990).

VI. CONCLUSIONS

This paper presents a theoretical model that shows how tax and bankruptcy considerations alone, may lead firms to include preferred stocks in the optimal financing mix. We provide several predictions, relating the percentage of preferred stock to variables such as profitability, tax rates, and the percentage of debt in the capital structure. We then test our predictions on a sample of firms from the late 90’s.

By and large, the results from our regressions are consistent with the model. We find that as profitability increases, the percentage of preferred stock in the capital structure decreases. We also find that as the tax rate increases, the percentage of preferred stock in the capital structure decreases. Our results are robust to the inclusion of the smallest firms, utilities or both. They are also robust to the use of different proxies and improve as we limit the tax rate to its statutory levels. Our work does not resolve the issue of whether debt and preferred shares are substitutes or complements, and how should such relationships be defined. We share this with all previous empirical research, including for example, Hovakimian, Opler, and Titman (2001).

Finally, it should be clear that our framework can be extended to include any type of security with different tax and legal treatment. In that sense, our contribution can be summarized as follows: even if one only cares about taxes and bankruptcy costs, the optimal capital structure may include several non-tax deductible securities, as long as non-tax-paying and bankruptcy states are possible.

Appendix A

Calculation of the value of the firm:

f(X) is the density function of cash flows over the support [0, ∞]. We are taking the expected value of cash flows to all claim-holders.

$$F(X_i) = \int_{-\infty}^{x_i} f(X)\,dx.$$

$$V_L = \int_{x_0}^{\infty} \{ [(X-I)(1-t_c)(1-t_g)+I] + RD[(1-t_b)-(1-t_c)(1-t_g)]\}$$

$$+ P R_p (t_g - t_p)\} f(X)\,dX$$

$$+ \int_{x_1}^{x_0} \{ (1-t_c)(X-I) + I + RD(t_c - t_b) - P R_p t_p \} f(X)\,dX$$

$$+ \int_{x_2}^{x_1} \{ X - P R_p t_p - RD t_b \} f(X)\,dX$$

$$+ \int_{x_3}^{x_2} \{ X(1-t_p) + D[R(t_p - t_b) + t_p] + Pt_p \} f(X)\,dX$$

$$+ \int_{x_4}^{x_3} (X - RDt_b) f(X)\,dX + \int_{x_5}^{x_4} [X(1-t_b) + Dt_b]\, f(X)\,dX$$

$$+ \int_{x_6}^{x_5} (X-B) f(X)\,dX$$

Note that the tax differentials play an important role in the determination of firm value since in different intervals, different claimholders are responsible for the tax liabilities relevant for the same cash flow. We now compute the required rate of interest on bonds and on preferred stocks respectively. These rates are the solutions of the following implicit equations:

$$\int_{X_2}^{\infty} [P + P R_p (1 - t_p)]\, f(X)\, dX + \int_{X_3}^{X_2} [P + (X - D - RD - P)(1 - t_p)$$

$$f(X)]\, dX + \int_{X_4}^{X_3} (X - D - RD)\, f(X)\, dX = P + P R_0 (1 - t_p) \quad \text{(for preferreds)}$$

$$\int_{X_4}^{\infty} [D + RD(1 - t_b)]\, f(X)\, dX + \int_{X_5}^{X_4} [D + (X - D)(1 - t_b)]\, f(X)\, dX$$

$$+ \int_{0}^{X_5} (X - B)\, f(X)\, dX + D = D R_0 (1 - t_b) \quad \text{(for debt)}$$

where R_0 is the interest rate on risk free taxable bonds. One notes from the equations and the definition of the limits of integration that R (the promised rate of interest on bonds) is a function of D, and R_p (the promised preferred dividend) is a function of D and P. Since all investors are assumed to be risk neutral, the equations promise both preferred shareholders and bondholders expected returns equal to the risk free rate.

Proof of Proposition (4.1)

Both the distribution function and $(R_pP)'$ are non-linear functions of P. A sufficient condition for a positive amount of preferred stock to be issued is that $\frac{dV}{dP} > 0$ at $P = 0$. Using Equation (4.1), the requirement $\left.\frac{dV}{dP}\right|_{P=0} > 0$ translates into the following sufficient condition.

$$\frac{t_g}{t_p} > \left.\frac{1-F(X_2)}{1-F(X_0)}\right|_{P=0} .$$

This clearly requires: $\frac{t_g}{t_p} > 1.$

To prevent a corner solution, we must require that at P=I the derivative with respect to P will be less than zero.

For P > (I-D)/(1+R_p) the following is the derivative in question:

$$\frac{dV}{dP} = [t_g(1-F(X_0)) - t_p(1-F(X_1)]\ (PR_p)'$$

$$- t_p(F(X_1) - F(X_3))$$

For the above derivative to be negative at P=I, we require:

$$\frac{t_g}{t_p} < \left.\frac{(1-F(X_1))(PR_p)' + (F(X_1)-F(X_3))}{(1-F(X_0))\ (PR_p)'}\right|_{P=I}$$

Combining the inequalities above for t_g/t_p we obtain that the necessary condition for a positive P becomes:

$$\left.\frac{(1-F(X_2))}{(1-F(X_0))}\right|_{P=I} < \left.\frac{(1-F(X_1))}{(1-F(X_0))}\right|_{P=I} + \left.\frac{(F(X_1)-F(X_3))}{(1-F(X_0))(PR_p)'}\right|_{P=I}$$

This inequality will be true if $(PR_p)'$ is very small, in which case, we can find $t_g > t_p$ such that $\frac{dV}{dP} > 0$ at $P = 0$, and hence a positive amount of P will be issued.

Appendix B

<u>Proofs of comparative statics results:</u>

All derivatives will be taken with respect to a tax rate, and the proofs will utilize the following derivations:

$$\frac{dD^*}{dt_i} = -\left[\frac{d^2V}{dD\,dt_i}\frac{d^2V}{dP^2} - \frac{d^2V}{dP\,dD}\frac{d^2V}{dP\,dt_i}\right]/H$$

$$\frac{dP^*}{dt_i} = -\left[\frac{d^2V}{dP\,dt_i}\frac{d^2V}{dD^2} - \frac{d^2V}{dP\,dD}\frac{d^2V}{dP\,dt_i}\right]/H$$

Where H is the determinant of the second order conditions which must be positive for a maximum to exist.

Second order conditions also imply that:

$$\frac{d^2V}{d\,D^2} < 0\,;\ \frac{d^2V}{d\,P^2} < 0\,.$$

We can now demonstrate claim 1:

Claim 1

If $\frac{d^2\,\mathrm{V}}{d\,\mathrm{P}\,d\,\mathrm{D}} \geq 0$ then $\frac{\mathrm{d\,P}^*}{\mathrm{d}\,t_g} > 0$; $\frac{\mathrm{d\,D}^*}{\mathrm{d}\,t_g} > 0$.

<u>Proof</u>: differentiating F.O.C with respect to t_g and using the derivation of H above, one obtains:

$$\frac{d^2\,\mathrm{V}}{d\,\mathrm{P}\,d\,t_g} = (1-\mathrm{F}(X_0))(R_p + \frac{d\,R_p}{d\,\mathrm{P}}\mathrm{P}) > 0$$

$$\frac{d^2\,\mathrm{V}}{d\,\mathrm{D}\,d\,t_g} = (1-t_c)(\mathrm{R\,D})'(1-\mathrm{F}(X_0)) + \mathrm{P}\frac{d\,R_p}{d\,\mathrm{D}}(1-\mathrm{F}(X_0)) > 0\,.$$

The result now follows from inserting the derivatives in the equations for dP/dt and dD/dt respectively.

$$\frac{d\,D^*}{d\,t_c} > 0 \quad ; \; \mathrm{SGN}\ \frac{d\,P^*}{d\,t_c} = \mathrm{SGN}\ \frac{d^2 V}{d\,P\,d\,D}$$

Claim 2

Proof:

Similar to the proof of claim 1, the result follows from the following derivation

$$\frac{d^2 V}{d\,D\,d\,t_c} = (R\,D)'\ t_c\,(1 - F(X_0)) + F(X_0) - F(X_1) > 0\,.$$

Appendix C.

Description of the Variables

We start with the description of the Compustat variables we used to construct our variables. Because some variable definitions in Compustat are similar to one another, we provide the mnemonics of the variables we used in addition to their brief descriptions from Compustat. We then describe our composite variables.

The description of the Compustat variables is the following:

1) Assets - Total (AT) represents current assets plus net property, plant, and equipment plus other non-current assets (including intangible assets, deferred items, and investments and advances).

2) Debt - Total (DT) represents the sum of Total Long-Term Debt, which is defined as debt obligations due more than one year from the company's balance sheet date, plus Debt in Current Liabilities, which is defined as the total amount of short-term notes and the current portion of long-term debt (debt due in one year).

3) Return on Assets (ROA) represents Income before Extraordinary Items - Available for Common, divided by Total Assets. This is then multiplied by 100.

4)Tax Rate (TR) represents Total Income Taxes, which include income taxes imposed by federal, state, and foreign governments, divided by Pretax Income, which is operating and nonoperating income before provisions for income taxes and minority interest. This is then multiplied by 100.

5) Fixed Assets – Total (PPEGT) represents the cost of tangible fixed property used in the production of revenue.

6) Sales – Net (SALE) represents gross sales - the amount of actual billings to customers for regular sales completed during the period reduced by cash discounts, trade discounts, and returned sales and allowances for which credit is given to customers.

7) Common Shares Outstanding – Company (CSHO) represents the net number of all common shares outstanding at yearend, excluding treasury shares and scrip.

8) Price - Calendar Year - Close (PRCC) represents the absolute close transactions during the year for companies on national stock exchanges and bid prices for over-the-counter issues. Prices are reported on a calendar-year basis. Prices are adjusted for all stock splits and stock dividends.

9) Preferred Stock (PSTK) represents the net number of preferred shares at yearend multiplied by the par or stated value per share as presented in the company's Balance Sheet.

From these Compustat variables we construct our own variables. We adjust our variables to represent the equity in market value, according to the quasi-market approach. We also divide the Tax Rate and ROA by 100.

Our variables are therefore:

Equity: defined as number of shares times price per share (CSHO*PPRC).

Total Assets: defined as the sum of Debt – Total and Equity – Market.

The dependent variable is the percentage of preferred stock in the capital structure (PSM). This is the ratio of Preferred Stock (PSTK) to Total Assets – Market defined above. We have five independent variables:

ROA, Return On Assets

TR, Tax Rate

DR, Debt Ratio.

TANG, ratio of Fixed Assets (PPEGT) to Total Assets - Market

SIZE, natural log of Sales (SALE).

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Table 1

Regression results for averages of data for the years 1996, 1997 and 1998 and for the individual years. The dependent variable is the percentage of preferred stock in the capital structure and the independent variables are ROA, tax rate, debt ratio, percentage of tangible assets and size. Utilities are included and the sample includes all firms for which data is available.

Panel	**Averages of Data for 1996, 1997 and 1998**		**1996 Data**		**1997 Data**		**1998 Data**	
Number of Obs.	5094		6252		6323		6031	
	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]
C	-.328	-18.89 [.000]	-.399	-24.13 [.000]	-.504	-22.46 [.000]	-.518	-20.54 [.000]
ROA	-.147	-10.71 [.000]	-.133	-11.06 [.000]	-.138	-8.96 [.000]	-.141	-9.04 [.000]
TR	-.059	-3.83 [.000]	-.033	-2.22 [.026]	-.044	-2.11 [.035]	-.095	-4.15 [.000]
DRM	.300	12.08 [.000]	.304	14.13 [.000]	.379	12.91 [.000]	.349	11.68 [.000]
TANG	.021	1.61 [.106]	.029	2.61 [.009]	.0079	.48 [.625]	.023	1.31 [.187]
SIZE	-.0021	-.78 [.432]	.0038	1.57 [.115]	.00066	.20 [.839]	-.00531	-1.42 [.155]

Table 2

Regression results for averages of data for the years 1996, 1997 and 1998 and for the individual years. The dependent variable is the percentage of preferred stock in the capital structure and the independent variables are ROA, tax rate, debt ratio, the percentage of tangible assets and size. Utilities are included and the sample excludes the smallest firms – those with sales less than 10 million dollars.

Panel	**Averages of Data for 1996, 1997 and 1998**		**1996 Data**		**1997 Data**		**1998 Data**	
Number of Obs.	4092		5084		5237		5060	
	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]
C	-.289	-16.85 [.000]	-.344	-19.97 [.000]	-.456	-18.57 [.000]	-.432	-17.27 [.000]
ROAR	-.292	-10.81 [.000]	-.174	-8.74 [.000]	-.202	-9.42 [.000]	-.134	-6.29 [.000]
TRR	-.015	-1.33 [.184]	-.020	-1.65 [.100]	-.012	-.64 [.519]	-.059	-3.47 [.001]
DRM	.222	11.32 [.000]	.249	13.61 [.000]	.335	12.57 [.000]	.285	11.90 [.000]
TANG	.016	1.51 [.132]	.034	3.30 [.001]	.022	1.412 [.158]	.021	1.47 [.139]
SIZE	.00740	2.93 [.003]	.00867	3.53 [.000]	.00561	1.57 [.116]	.00459	1.28 [.199]

Table 3

Regression results for averages of data for the years 1996, 1997 and 1998 and for the individual years. The dependent variable is the percentage of preferred stock in the capital structure and the independent variables are ROA, tax rate, debt ratio, the percentage of tangible assets and size. Utilities are excluded and the sample includes all firms for which data is available.

Panel	**Averages of Data for 1996, 1997 and 1998**		**1996 Data**		**1997 Data**		**1998 Data**	
Number of Obs.	4931		6064		6143		5866	
	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]
C	-.318	-17.05 [.000]	-.402	-22.23 [.000]	-.501	-20.5693 [.000]	-.510	-18.80 [.000]
ROA	-.148	-10.11 [.000]	-.136	-10.44 [.000]	-.142	-8.51829 [.000]	-.143	-8.56 [.000]
TR	-.066	-4.05 [.000]	-.043	-2.64 [.008]	-.057	-2.57604 [.010]	-.113	-4.59 [.000]
DRM	.404	11.37 [.000]	.309	13.01 [.000]	.388	12.0629 [.000]	.367	11.32 [.000]
TANG	-.00398	-.27 [.780]	.00332	.26 [.793]	-.036	-1.93723 [.053]	-.017	-.86 [.390]
SIZE	-.00710	-2.36 [.018]	-.00072	-.26 [.789]	-.00589	-1.60616 [.108]	-.013	-3.31 [.001]

Table 4

Regression results for averages of data for the years 1996, 1997 and 1998 and for the individual years. The dependent variable is the percentage of preferred stock in the capital structure and the independent variables are ROA, tax rate, debt ratio, the percentage of tangible assets and size. Utilities are excluded, as are the smallest firms – those with sales less than 10 million dollars.

Panel	**Averages of Data for 1996, 1997 and 1998**		**1996 Data**		**1997 Data**		**1998 Data**	
Number of Obs.	3930		4897		5058		4896	
	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]
C	-.280	-14.74 [.000]	-.345	-17.63 [.000]	-.444	-16.16 [.000]	-.422	-15.16 [.000]
ROA	-.309	-10.52 [.000]	-.189	-8.56 [.000]	-.213	-9.04 [.000]	-.146	-6.28 [.000]
TR	-.020	-1.65 [.099]	-.027	-2.00 [.045]	-.023	-1.15 [.249]	-.072	-3.85 [.000]
DRM	.224	10.35 [.000]	.252	12.20 [.000]	.342	11.48 [.000]	.301	11.32 [.000]
TANG	-.00953	-.74 [.455]	.00531	.43 [.666]	-.028	-1.47 [.140]	-.015	-.90 [.364]
SIZE	.00394	1.38 [.167]	.00496	1.74 [.081]	-.00076	-.18 [.853]	-.00268	-.65 [.512]

Table 5

Comparison of the regression results for three cases. The first is the original case, which includes all tax rates as reported by Compustat, excluding extreme outliers. ; The second is an intermediate case, where tax rates are limited to the interval [-0.2, 0.65]; The third case limits the sample to firms with tax rates in the interval [-0.02, 0.35]. Results are reported for 1997, including utilities, and excluding small firms.

Panel	**1997 Original Results – tax rates as reported by Compustat excluding extreme outliers**		**Intermediate case - tax rate limited to the interval [–0.2,0.65]**		**Strict case - tax rate in the interval [–0.02,0.36]**	
Number of Obs.	5237		4913 (= 94% of total)		2541 (= 48% of total)	
	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]	Estimate	t-statistic [P-value]
C	-.455	-18.57 [.000]	-.419	-17.64 [.000]	-.454	-13.60 [.000]
ROA	-.202	-9.41 [.000]	-.168	-8.02 [.000]	-.169	-6.70 [.000]
TR	-.011	-.64 [.519]	-.198	-5.05 [.000]	-.315	-4.10 [.000]
DRM	.334	12.56 [.000]	.282	10.97 [.000]	.312	8.68 [.000]
TANG	.022	1.41 [.158]	.030	1.99 [.046]	.00444	.19 [.842]
SIZE	.00561	1.57 [.116]	.013	3.80 [.000]	.018963	3.31 [.001]