Theories of Corporate Debt Policy: A Synthesis

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Since Modigliani and Miller (MM) published their landmark papers [30, 31] on the theory of corporate capital structure, there have been numerous extensions of their work. These extensions have followed two largely distinct paths. Researchers following one path have sought to demonstrate the validity of the MM leverage irrelevance theorem [30] under an increasingly relaxed set of assumptions using a variety of equilibrium approaches (e.g., [17], [15], [39], [41], [35], [1], [38], [10]). Researchers following the other have sought to reconcile the MM maximum leverage prediction [31] with observed capital structure (e.g., [33], [2], [13], [4], [5], [40], [25]). Recently, these separate paths have merged and many researchers have offered several distinct explanations for prevailing capital structures within various equilibrium frameworks.

The purpose of this paper is to synthesize these studies and to provide an integrated perspective on these efforts. Because the existence of risky debt is essential to most of the recent explanations offered for observed capital structures, we begin with an examination of the impact of risky corporate debt on the welfare of the firm's security holders in Section I. In Section II we introduce various market imperfections and integrate several equilibrium theories which purport to explain observed capital structures. These models are based on the notion of shareholder-wealth-maximization. Section III examines some recent papers which are based on the notion of managerial welfare maximization. A final section contains some concluding remarks.

I. Risky Debt, Me-First Rules, and The Irrelevance Theorem

One of the frequently discussed assumptions of MM's original proof of the irrelevance theorem is that corporate debt is default free. Stiglitz [39, 41] has argued that this assumption is necessary for corporate financing decisions to be a matter of indifference to investors. Fama and Miller [12] have shown that the theorem holds even when firms have risky debt outstanding if there is a perfectly enforceable "me-first" rule. This leaves one with the impression that corporate debt policy might matter even in a perfect market if there are no perfect "me-first" rules.

To examine this issue, we consider a multiperiod setting where the capital market is perfect and the values of all securities depend only upon the distribution of cash earnings which they confer upon their owners. At time t, the firm has

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decided on its value maximizing future investment strategy for all periods which will provide a stochastic value of $\bar{X}_{t+1}$ at time $t + 1$. $\bar{X}_{t+1}$ is the sum of the firm's cash earnings between $t$ and $t + 1$, $\bar{Z}_t$, and the market value at time $t + 1$ of all future earnings that will be generated from current as well as future investments. That is, $\bar{X}_{t+1} = \bar{Z}_t + \bar{V}_{t+1}(\bar{X})$, where $\bar{V}_{t+1}(\bar{X})$ is the market value at time $t + 1$ of all future earnings, $\bar{Z}_{t+1}, \bar{Z}_{t+2}, \ldots$. We shall call the equilibrium market value of $\bar{X}_{t+1}$ at time $t$, $V_t(\bar{X})$, the pure value of investment to stress that this is the value that can be obtained by the suppliers of capital when there are no market imperfections and firms follow the optimal investment strategy. (When we introduce market imperfections or the possibility of suboptimal investment decisions in later sections, the market value of the firm will differ from this value.) The firm has both stocks and bonds outstanding from time $t - 1$, bonds maturing at $t + 1$. The total debt obligation at maturity is $\bar{Y}_{t+1}$. If default occurs at $t + 1$, ownership of the firm is transferred to bondholders without cost. In this setting, we can define the gross returns to the firm's stockholders and bondholders at $t + 1$ as:

$$\begin{align*}
\tilde{Y}_{t+1}^S &= \begin{cases} 
\bar{X}_{t+1} - \bar{Y}_{t+1} & \text{if } \bar{X}_{t+1} \geq \bar{Y}_{t+1} \\
0 & \text{if } \bar{X}_{t+1} < \bar{Y}_{t+1}
\end{cases} 
\quad (1) \\
\tilde{Y}_{t+1}^B &= \begin{cases} 
\bar{Y}_{t+1} & \text{if } \bar{X}_{t+1} \geq \bar{Y}_{t+1} \\
\bar{X}_{t+1} & \text{if } \bar{X}_{t+1} < \bar{Y}_{t+1}
\end{cases} 
\quad (2)
\end{align*}$$

where the superscripts $S$ and $B$ denote stockholders and bondholders and tildes "~" indicate random variables.

Adding (1) and (2), we obtain

$$\tilde{Y}_{t+1}^S + \tilde{Y}_{t+1}^B = \bar{X}_{t+1}. \quad (3)$$

Let $S_t$ and $B_t$ be the equilibrium market values at time $t$ of $\tilde{Y}_{t+1}^S$ and $\tilde{Y}_{t+1}^B$. Then in equilibrium the market value of the firm is

$$V_t = S_t + B_t = V_t(\bar{X}). \quad (4)$$

If (4) does not hold, then (3) implies that there will be opportunities for arbitragers and financial institutions to make costless and instantaneous profits by repackaging financial claims. The existence of such opportunities is inconsistent with equilibrium in a perfect capital market. Thus, the total market value of the firm should be equal to the pure value of investments. Because $V_t(\bar{X})$ is independent of the firm's financing decisions when the firm's investment decisions have already been determined, the market value of the firm is also independent of financing decisions.

**Me-First Rules**

Suppose at time $t$ the firm issues bonds with market value $B_{t}^n$ by making an additional promise to pay $\tilde{Y}_{t+1}^n$ in $t + 1$, and subsequently pays out the proceeds to its stockholders as dividends. The stockholders' wealth and the value of old bonds will become $S_t' + B_t^n$ and $B_t'$, respectively. Since the investment decisions have already been made, the distribution of $\bar{X}_{t+1}$ will be unchanged, and the post-financial rearrangement gross returns to the firm's stockholders, old bondholders,
and new bondholders will still sum to $X_{t+1}$. Thus, the postfinancial rearrangement market value of the firm will be equal to the pure value of the investment.

$$V_t = S_t' + B^o_t + B^n_t = V_t(X).$$  

(5)

Comparing (4) and (5), we obtain

$$S_t' + B^o_t - S_t = B_t - B_t'. $$

(6)

Thus, although the total market value of the firm will remain unchanged, the shareholders' wealth will increase (i.e., $S_t' + B^o_t > S_t$) if the market value of old bonds decreases (i.e., $B_t' < B_t$).

Suppose that new bondholders are given a claim that is equivalent to the claim of old bondholders. Then, the old bondholders' postrearrangement return $Y_t'_{t+1}$ can never be greater than their prerearrangement returns $Y_t^B_{t+1}$ and they will be less whenever $X_{t+1} < Y_t^B_{t+1} + Y_t^o_{t+1}$. That is, $Y_t'^B_{t+1}$ will be stochastically dominated by $Y_t^B_{t+1}$ and the market value of old bonds will decline. A perfect me-first rule in this case means a full side-payment of $B_t - B_t'$ by shareholders to old bondholders. This will leave both shareholders' and old bondholders' wealth unchanged. But what if there are no such me-first rules? Obviously, one can think of all kinds of wealth transfers that may arise from various types of financial arrangements.2

The Irrelevance Theorem without Me-first Rules

Does the absence of perfect me-first rules mean that the MM irrelevance theorem no longer holds in a perfect market? From the bondholder's perspective the possibility that the firm may create a wealth transfer from bondholders to stockholders through financial rearrangements adds an additional element of risk to the bonds if they are not protected by me-first rules. In a competitive capital market bondholders must be compensated for bearing this added risk in the form of higher interest payments. Because the additional risk premium that the firm must pay to its bondholders will be priced fairly in a perfect capital market, at the time of new bond issue shareholders' wealth will be unaffected by the firm's decision of whether or not to include me-first rules.3

Furthermore, Fama [10] shows that if either (1) investors and firms have "equal access" to capital markets, or (2) no firm is allowed to issue a security for which there are no perfect substitutes, corporate financing decisions do not affect investors' portfolio opportunities. If investors have "equal access" to capital markets, any financing action a firm takes cannot affect portfolio opportunities available to investors, because investors can either do or undo it on personal accounts. In order to have equal access to capital markets when firms issue risky debt without me-first rules, investors must have the ability to create "homemade" limited liability. This "homemade" limited liability enables the investor to issue risky debt without a me-first rule and duplicate the firm's action. Thus, he can do

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1 See Kim, McConnell, and Greenwood [24, pp. 792–93].

2 See, for example, [14], [23], [24], and [21].

3 Kim, Lewellen, and McConnell [21] demonstrate essentially this point in their analysis of sale-and-leasebacks.
or undo the wealth transfer engendered by the firm's financing decision, and the firm's financing decision should be of no consequence to him. Similarly, if no firm is allowed to issue a security for which there are no perfect substitutes, any changes in the financing decisions of a firm will be immediately undone by another firm and hence it will not affect portfolio opportunities available to investors. When firms issue risky debt without me-first rules, the definition of perfect substitutes includes one more dimension—identical types of wealth transfers for all perfect substitutes in any given state of the world. When such perfect substitutes are available, if a firm does not provide what the investor wants, he can always switch to a perfect substitute which does. As a result, corporate financing decisions will be of no consequence to investors.

II. Optimal Corporate Debt Policy

In the previous section we demonstrated that the existence of risky debt and the possibility of wealth transfers by themselves do not invalidate the MM irrelevance theorem. However, risky debt gives rise to various market imperfections that have been suggested as the keys to explain observed capital structures. This section examines the impacts of these imperfections and corporate and personal income taxation on firm valuation.

The Tax-Advantage-Bankruptcy-Cost Tradeoff

One of the explanations for observed capital structures is that corporate debt policy requires an optimal tradeoff between the present value of tax savings from tax deductibility of interest payments and the present value of potential bankruptcy costs ([33], [2], [17], [25], [19], [36], [6]). To illustrate, consider firm U which is identical to the firm in the previous section, except for its financial leverage. At time t the firm U has no debt outstanding, but starting at time t + 1 it will adopt a debt policy identical to that of the first firm. We may think of this future debt policy as a (unspecified) future optimal capital structure. Since both firms' debt policy as well as their investment strategies will be identical after t + 1, their market values at t + 1 will be the same, i.e., $V_{t+1}^U = V_{t+1}^{\text{U'}},$ where superscript U denotes the currently unlevered firm. If the levered firm does not go bankrupt at t + 1, the gross after-tax return to shareholders will be $(Z_t - It)(1 - Tc) + V_{t+1}^U - B_t,$ where $It = Y_{t+1} - B_t$ is the total interest payments on $B_t$ from t to t + 1 and $Tc$ is the corporation income tax rate. The firm will be bankrupt if the gross after-tax return to shareholders is negative, or equivalently,

4 The "homemade" wealth transfers can be demonstrated by considering an investor who at time t owns a fraction of the firm's stocks and bonds which entitles him to gross returns $aX_{t+1}.$ Suppose that he bought these stocks and bonds on margin and made a promise to pay $aY_{t+1}$ in t + 1 with his liability limited to these stocks and bonds. The capital market must have lent him exactly $aB_t,$ because the quality of his promise was identical to that of the firm. Thus, his net investment and returns are identical to those of an investor who just holds a fraction of $S_t.$ However, when the firm issues new bonds with claims equal to those of the old bondholders and creates wealth transfers from bondholders to stockholders, it will have no effect on the investor's wealth. Thus, he can undo what the firm did by simply doing nothing. He can also replicate what the firm did by making an additional promise of $aY_{t+1}$, with claims equal to those of his original creditors. This will reduce the value of his original creditors' claims to $aB_t$ and will create a "homemade" wealth transfer, $a(B_t - B'_t).$
The gross return to the currently unlevered firm's shareholders is

\[ Y_{t+1}^U = Z_t(1 - T_c) + \hat{V}_{t+1} = Z_t(1 - T_c) + \hat{V}_{t+1}, \tag{7} \]

and the gross returns to security holders of the levered firm are

\[ Y_{t+1}^S = \begin{cases} (Z_t - \hat{I}_t)(1 - T_c) + \hat{V}_{t+1} - B_t & \text{if } \hat{X}_{t+1}^T \geq \hat{Y}_{t+1} \\ 0 & \text{if } \hat{X}_{t+1}^T < \hat{Y}_{t+1} \end{cases} \tag{8} \]

\[ \hat{Y}_{t+1}^B = \begin{cases} Y_{t+1}^U & \text{if } \hat{X}_{t+1}^T \geq \hat{Y}_{t+1} \\ \hat{Z}_t + \hat{V}_{t+1} - \hat{C}_{t+1} & \text{if } \hat{X}_{t+1}^T < \hat{Y}_{t+1} \end{cases} \tag{9} \]

where \( \hat{X}_{t+1}^T = Z_t(1 - T_c) + \hat{I}_tT_c + \hat{V}_{t+1} \); and \( \hat{C}_{t+1} \) is the explicit bankruptcy costs which comprise (1) the difference between the market value of the firm as a going concern and its value in reorganization or in liquidation and (2) various administrative expenses arising in the course of bankruptcy proceedings. The limited liability of bondholders means that \( \hat{C}_{t+1} \leq \hat{Z}_t + \hat{V}_{t+1} \).

Adding (8) and (9) and substituting (7), we obtain

\[ Y_{t+1}^S + \hat{Y}_{t+1}^B = Y_{t+1}^U + T_c[V_t(\hat{I}_t(1 - \hat{b}) + \hat{Z}_t\hat{b}) - \hat{C}_{t+1}]. \tag{10} \]

where \( \hat{b} \) is the bankruptcy operator which is one if \( \hat{X}_{t+1}^T < \hat{Y}_{t+1} \), and zero otherwise. Thus, in equilibrium the market value of the firm is

\[ S_t + B_t = V_t^U + T_c[V_t(\hat{I}_t(1 - \hat{b}) + \hat{Z}_t\hat{b}) - \hat{C}_{t+1}] = 0. \tag{11} \]

Equation (11) illustrates that when debt is risky, the present value of tax savings (PVTS) due to the tax deductibility of interest payments, \( T_cV_t[\hat{I}_t(1 - \hat{b})] \), becomes risky because the probability that \( \hat{b} = 1 \) is positive. More importantly, it shows that PVTS will be off set by the present value of the loss of tax credits in bankruptcy, \( T_cV_t(\hat{Z}_t\hat{b}) \). As (9) indicates, when firms go bankrupt, they lose tax credits for the operating loss \( \hat{Z}_t \) which they would have been entitled to had they not gone bankrupt. This loss of tax credit is an implicit bankruptcy cost. With positive explicit bankruptcy costs, i.e., \( \hat{C}_{t+1} > 0 \), we define the total bankruptcy costs as \( BC_{t+1} = -T_c\hat{Z}_t\hat{b} + \hat{C}_{t+1}\hat{b} \) and the present value of bankruptcy costs (PVBC) as \( V_t(BC) = -T_cV_t(\hat{Z}_t\hat{b}) + V_t(\hat{C}_{t+1}\hat{b}) \). Thus, (11) illustrates that any change in financial leverage has both a positive and a negative effect on the market value of the firm. On the one hand, an increase in financial leverage, \( \Delta Y_{t+1} \), means an increase in \( \hat{I}_t \) and hence an increase in PVTS. On the other hand, it also means an increase in the probability that \( \hat{b} = 1 \) and hence an increase in the present value of tax savings (PVTS).

If debt is riskless, \( \hat{b} = 0 \) for all states, \( \hat{I}_t = B_t(R_F - 1) \) where \( R_F \) is one plus the riskless interest rate, and (11) reduces to \( S_t + B_t = V_t^U + T_cB_t(R_F - 1)/R_F \). Note that the present value of the interest tax shield is substantially smaller than that in the MM tax model [31]. This is because we assume that the currently unlevered firm will remain unlevered for only one period, while MM assume that the current capital structures of the levered and the unlevered firm will be maintained forever. If we add this perpetuity assumption, the present value of the interest tax shield becomes

\[ \sum_{i=1}^{\infty} T_cB_t(R_F - 1)/(R_F)^i = T_cB_t. \]

See Kim [19] for further discussions.

For further analysis of the effect of the loss of tax credits in bankruptcy on firm valuation, see Kim [19] and Brennan and Schwartz [6].
PVBC. When the financial leverage is low, an increase in \( \hat{Y}_{t+1} \) means a greater increase in PVTS than in PVBC, and hence the market value of the firm increases. As the financial leverage becomes extreme, the increase in PVBC will dominate the increase in PVTS, and the market value of the firm will decline. The optimal capital structure that maximizes the market value of the firm is \( \hat{Y}^*_{t+1} \) at which \( \Delta \text{PVTS}/\Delta \hat{Y}^*_{t+1} = \Delta \text{PVBC}/\Delta \hat{Y}^*_{t+1} \); i.e., the marginal increase in PVTS equals the marginal increase in PVBC.\(^7\)

The basic premises of this line of argument are that the bankruptcy costs are large enough to be economically significant and that the corporate tax savings from interest payments benefit investors at the individual level. We will take a closer look at both of these premises.

**Bankruptcy Costs**

Whether bankruptcy costs are large enough to be economically significant is essentially an empirical question. Unfortunately, there are no reliable empirical estimates of the magnitude of total bankruptcy costs.\(^8\) Consequently, some authors have expressed their scepticism about the premise that bankruptcy costs are the major determinant of corporate capital structure. For example, Miller [28] argues that bankruptcy costs should be economically insignificant because it is in the best economic self-interest of all security holders to reduce them.\(^9\) Recently however, another type of bankruptcy cost (we are now defining bankruptcy costs more broadly) which stems from agency relationships between shareholders and bondholders has received a great deal of attention.

Jensen and Meckling [18] point out that when risky debt is outstanding, there is an incentive for shareholders to expropriate debtholders' wealth through investment decisions that will increase the default risk of existing debt. Other things being equal, shareholders will prefer risky investments to safe ones. They may reject valuable safe assets in favor of riskier assets with lower, even negative, net present values. Such suboptimal investments mean smaller future earnings and a decline in the current market value of the firm. Jensen and Meckling argue that as the firm issues more debt, the incentive to make suboptimal investments will increase and the market value of the firm will decrease.

Myers [32] points out another incentive effect of the existence of debt on corporate investment decisions. He argues that, when firms are in financial

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\(^7\) For a rigorous proof of the existence of such an optimal capital structure, see Kim [19]. He also shows that the optimal capital structure occurs before the debt capacity (the maximum amount the firm can borrow in the capital market) such that a shareholder-wealth-maximizing firm will always search for the optimal capital structure rather than simply maximize its borrowing.

\(^8\) While Baxter [2] and Stanley and Girth [37] report that the administrative expenses arising in the course of bankruptcy proceedings approximate 20% of the estate, Warner [42] reports that it is only 5.3%. Although Warner attributes this discrepancy to the fact that he deals with entities of greater dollar size than Stanley and Girth's sample, perhaps a large portion of the discrepancy can also be attributed to the extremely small sample sizes and the poor qualities of samples in all of these estimates. More importantly, these estimates include neither the difference between the market value of the firm as a going concern and the realized firm value in bankruptcy nor the loss of tax credits in bankruptcy.

\(^9\) More recently, Haugen and Senbet [16] restate essentially what has already been said by Miller [28].
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distress, the existence of risky debt (which matures after the investment decisions) may induce shareholders to reject an investment even though it has a positive net present value. To illustrate, consider the firm in Section I which is not subject to corporate taxes or bankruptcy costs. Suppose that the firm has no assets in place, but it has one future investment opportunity. Just before time $t + 1$ (at which the bonds mature), it finds out the gross value of the investment, $V^G_{t+1}$, and must decide whether to make an investment outlay $I_{t+1}$. If it invests, the firm’s net investment value is $X_{t+1} = V^G_{t+1} - I_{t+1} > 0$, i.e., the investment has a positive net present value. If it does not invest, the investment opportunity expires and has no value to the firm or to anyone else. Had the firm been all-equity financed, the project would have been undertaken and the market value of the firm at time $t$ would have been $V_1^U = V_t(V^G_{t+1} - I_{t+1}) = V_t(X)$.

However, the firm has bonds outstanding with total promised payment $Y_{t+1}$. Myers [32] argues that shareholders will be better off making the investment only if

\[ v_t > Y_{t+1} + I_t. \]

If $V^G_{t+1} < Y_{t+1} + I_{t+1}$, we have $I_{t+1} > V^G_{t+1} - Y_{t+1}$, i.e., the required investment outlay will be greater than the amount that shareholders would receive after paying off the bondholders. If side payments between the bondholders and stockholders are ruled out, a shareholder-wealth-maximizing firm would not undertake the investment. Because the investment opportunity expires before bondholders take over the firm, bondholders will get nothing if $I_{t+1} > V^G_{t+1} - Y_{t+1}$, or equivalently, if $X_{t+1} < Y_{t+1}$. The gross return to bondholders at $t + 1$ will be

\[ \gamma^B_{t+1} = \begin{cases} \gamma^B_{t+1} & \text{if } X_{t+1} \geq Y_{t+1} \\ 0 & \text{if } X_{t+1} < Y_{t+1}. \end{cases} \]  

Adding (1) and (12), we obtain

\[ S_t + B_t = V_t(X) - V_t(X\delta) = V^L_t - V_t(X\delta). \]  

Since an increase in $\gamma^B_{t+1}$ increases the probability that $\delta = 1$, the loss of value due to suboptimal investment decisions, $V_t(X\delta)$, increases and the market value of the firm decreases with increased leverage.

Comparing (12) with (2), we see that this scenario makes an implicit assumption that the difference between the realized value of the firm in bankruptcy and the market value of the firm as a going concern amounts to the entire $\hat{X}_{t+1}$. Since this difference is a component of the explicit bankruptcy costs, the scenario assumes essentially that bankruptcy costs amount to one hundred percent of the terminal value of the firm. This is an extreme assumption which is not very realistic. The possibility of future suboptimal investment decisions is reflected in the pricing of debt at the time of new issue, and hence it is in the economic self-interest of all security holders to avoid making suboptimal investment decisions. Furthermore, there are various ways to reduce the incidence of suboptimal investments. (See Jensen and Meckling [18] and Myers [32].) For example, when $0 < X_{t+1} < Y_{t+1}$, bondholders can make side payments to shareholders through renegotiation of debt contracts and thereby provide them with an economic incentive to undertake the investment. However, Myers argues that renegotiation of debt contracts is not frictionless and is costly. Alternatively, shareholders can avoid the incentive
problem in its entirety by creating perfectly and costlessly enforceable “me-first” rules protecting bondholders against the possibility of future suboptimal investments. However, Jensen and Meckling [18] and Myers [32] argue that me-first rules are not perfect and that they require costly monitoring and bonding activities. The actual level of the monitoring and bonding activities undertaken will reflect an optimal tradeoff between the positive effects of these activities (i.e., smaller loss of value) and the negative effect (i.e., higher monitoring and bonding expenditures). The sum of the loss of value, $\Delta V_t(\bar{x})$, and the present value of monitoring and bonding costs, $V_t(AC)$, will increase as the firm issues more debt.

In this setting, the pure value of investment is divided into six components: stockholders’ claims, bondholders’ claims, the government’s claim, the present value of bankruptcy costs, the negative value from suboptimal investments, and the present value of monitoring and bonding costs. That is, $V_t(\bar{x}) = S_t + B_t + V_t(G) + V_t(BC) + \Delta V_t(\bar{x}) + V_t(AC)$, where $V_t(G)$ is the value of the government’s claim. The part of the pure value of investments that belongs to the suppliers of capital is $S_t + B_t = V_t(\bar{x}) - [V_t(G) + V_t(BC) + \Delta V_t(\bar{x}) + V_t(AC)]$ Since $V_t(\bar{x})$ is independent of financing decisions, the financial structure that maximizes the sum in the brackets will maximize the market value of the firm. Since $V_t(BC)$, $\Delta V_t(\bar{x})$, and $V_t(AC)$ all increase and $V_t(G)$ decreases with increased leverage, the optimal capital structure will involve trading off $V_t(BC) + \Delta V_t(\bar{x}) + V_t(AC)$ against $V_t(G)$. The only positive incentive for corporate leverage in this setting is the tax advantage associated with corporate debt.

**Personal Income Taxes**

However, Miller [28] shows that the above setting omits an important market imperfection. He argues that the differential tax treatment between personal incomes from stocks and bonds offsets the favorable tax treatment of corporate interest payments such that when both are integrated within a general equilibrium context, the tax incentive for corporate leverage will disappear altogether for any individual firm, even though there will still exist an optimal debt-equity ratio for the corporate sector as a whole.\(^{10}\)

Miller makes the following three assumptions: (1) personal income from stocks is not taxed; (2) the tax rate on income from bonds, $T_p$, is progressive and extends on either side of the corporate rate, $T_c$; and (3) all debt is riskless. However, this last assumption of riskless debt is superfluous. Even with a positive probability of bankruptcy, his new proposition will hold if creditors are allowed to use firms’ operating losses to reduce their personal income tax obligations when they take over bankrupt firms; i.e., bondholders can recapture the tax credits at the individual level if the firm loses them in bankruptcy.\(^{11,12}\)

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\(^{10}\) Earlier attempts to integrate personal income taxes into the theory of capital structure include [13], [4], [5], and [40]. Subsequent to Miller’s paper, several authors have attempted to reexamine and extend his model. These authors include [9], [29], [27], [20], [22], and [8].

\(^{11}\) The tax laws permit debtholders to treat the difference between their claims and the amount received on distribution of the bankrupt firm’s assets as a loss against their income. Although the loss is a capital loss to individual bondholders, banks and trust companies can deduct the loss from their current income as bad debt. This provision provides a way in which creditors can recapture the tax credits (which firms lose in bankruptcy) at the individual level.

\(^{12}\) Alternatively, the proposition will also hold if we assume that bankrupt firms do not lose tax
Since there are no personal taxes on income from stocks, the return distributions to shareholders in (7) and (8) are still valid. However, personal taxes on income from bonds are positive. The gross after-tax return to a bondholder who owns the fraction $\alpha$ of the firm’s outstanding bonds is\(^{13}\)

$$
\alpha \hat{Y}^B_{t+1} = \begin{cases} 
\alpha \hat{I}_t (1 - T_p) + aB_t & \text{if } \hat{X}^T_{t+1} \geq \hat{Y}_{t+1} \\
\alpha \hat{Z}_t (1 - T_p) + aV_{t+1} & \text{if } \hat{X}^T_{t+1} < \hat{Y}_{t+1}
\end{cases}
$$

(14)

where $-\alpha \hat{Z}_t T_p$ is the amount of personal tax credit the bondholder will receive if the firm goes bankrupt. If the bondholder also owns the fraction $\alpha$ of the firm’s outstanding stocks, by adding (8) and (14) and substituting (7), we obtain his total return from the firm:

$$
\alpha \hat{Y}^S_{t+1} + \alpha \hat{Y}^B_{t+1} = \alpha \hat{Y}^U_{t+1} + (T_c - T_p)\alpha [\hat{I}_t (1 - \hat{b}) + \hat{Z}_t \hat{b}]
$$

(15)

Unlike our previous analyses, we cannot draw firm valuation implications directly from the above cashflow analysis. Since different bondholders have different $T_p$'s, a given pre-personal-tax cashflow means different after-tax cashflows to different bondholders.

Suppose that for every corporate bond, there is a municipal bond of equivalent risk that provides the tax-free yield $r_o$. Then the rate of interest on taxable corporate bonds, $r$, must include compensation for the personal tax burden that these bonds impose on investors. Furthermore, the progressive personal tax structure means that the compensation, $r - r_o$, must increase as larger quantities of corporate bonds are issued. Only in that way will investors in progressively higher tax brackets be induced to purchase corporate bonds. Firms will continue to supply bonds only so long as the savings provided by tax-deductible interest payments, $T_c r B_t$, exceed the compensation, $(r - r_o) B_t$. The firm will stop issuing additional bonds when $T_c r B_t = (r - r_o) B_t$, or $r_0 = r (1 - T_c)$. On the demand side, investors will be indifferent between holding tax-free bonds and corporate bonds if $r (1 - T_p) = r_0$. Since equilibrium allows only one $r_0$, to reach an equilibrium the personal tax rate of the investor who must be induced to purchase the last unit of additional debt should be equal to the corporate rate, i.e., $T_p = T_c$. To this marginal bondholder, (15) reduces to

$$
\alpha \hat{Y}^S_{t+1} + \alpha \hat{Y}^B_{t+1} = \alpha \hat{Y}^U_{t+1}.
$$

(16)

But this marginal investor is the price setter. Thus, in equilibrium,

$$
S_t + B_t = V^U_t.
$$

(17)

Corporate leverage will not provide a tax advantage to any individual firm and the value of any firm will be independent of the specific capital structure that it happens to adopt.

This conclusion raises an important issue: If, in fact, there are no tax advantages associated with corporate leverage, but bankruptcy costs, the negative value from suboptimal investments, and monitoring and bonding costs add up to an economically significant force, why do firms that seek to maximize shareholder wealth

\(^{13}\) For the time being, we ignore bankruptcy costs and agency costs.
issue risky debt? At the macro level, there still is an optimal level of aggregate borrowing for the corporate sector as a whole. This optimal aggregate corporate borrowing may be viewed as an optimal tradeoff between the economy-wide tax savings from corporate borrowing\(^\text{14}\) and the economy-wide loss of value due to bankruptcy costs, leverage-induced suboptimal investments, and monitoring and bonding costs. However, it is not obvious what causes individual firms to issue risky debt when there are no tax advantages at the individual firm level. It might be argued that some firms issue risky debt in response to the demand arising from the financial leverage clientele phenomenon (see Kim, Lewellen, and McConnell [22]). Another possibility, of course, is that there exist other incentives for firms to issue risky debt besides the traditional tax advantage. It is to analyses of this possibility that we turn next.

III. Managerial Incentives and Corporate Debt Policy

Recently, some authors have incorporated managerial self-interest within the theory of capital structure and have offered two largely distinct explanations as to why firms might issue risky debt even when there is no tax advantage associated with it. The first explanation considers firms that are managed by owner-managers who are irreplaceable (Jensen and Meckling [18]). Such owner-managers will not be concerned about the welfare of suppliers of outside capital once the capital is raised. They will expropriate the wealth of suppliers of outside capital whenever they can. If the outside capital takes the form of equity, expropriation of outside stockholders' wealth will take the form of excessive nonpecuniary benefits (i.e., corporate perks, fringe benefits, and shirking) beyond the level necessary to achieve maximum efficiency. If the outside capital takes the form of risky debt, expropriation of outside debtholders' wealth will take the form of (1) wealth transfers through investment decisions, some of which are suboptimal, and (2) excessive nonpecuniary benefits.\(^\text{15}\)

At the time of new issue, suppliers of outside capital will take account of the future expropriation of their wealth in pricing corporate securities. In this way the owner-manager will be required to pay in advance for future expropriations. Furthermore, he will lose something in the process: Excessive nonpecuniary benefits beyond the level the owner-manager considers optimal means misallocation of resources. When these nonpecuniary benefits cannot be converted back

\(^{14}\) Kim, Lewellen, and McConnell [22] provide a detailed demonstration of how corporate borrowing still generates tax savings to investors within Miller’s framework.

\(^{15}\) This possibility was overlooked by Jensen and Meckling. When risky debt is outstanding, the cost of nonpecuniary benefits will be paid by shareholders only to the extent that the firm does not go bankrupt. In the event of bankruptcy, bondholders have to bear most of these costs, because suppliers of nonpecuniary benefits typically have claims to the terminal value of the firm that are senior to the claims of bondholders. If the owner-manager owns a fraction of the firm’s equity, the expected cost to him of consuming $1 of nonpecuniary benefits is $a multiplied by the probability of not going bankrupt, which must be less than $a when there is a positive probability of bankruptcy. Thus, the presence of risky debt will induce the owner-manager to consume a higher level of nonpecuniary benefits than he would in the absence of it. To bondholders, an increase in nonpecuniary benefits means a reduced coverage in the case of bankruptcy and hence a decrease in the market value of their holdings.
to monetary units to correct the misallocation of resources, a reduction in the owner-manager's welfare results. As discussed earlier, the possibility of leverage-induced suboptimal investment decisions also creates a loss of value. To reduce the welfare loss and the loss of value due to suboptimal investments requires costly monitoring and bonding activities.

However, if the owner-manager finances the firm entirely with internal equity and riskless debt, he will bear no such agency costs. Thus, internal equity and riskless debt dominate outside equity and risky debt as a source of capital. When firms have insufficient internal equity and are unable to issue riskless debt, the optimal capital structure will involve trading off the agency costs from outside equity against those from risky debt. The optimal capital structure may include some amount of risky debt because it may be the lesser evil.

The basic premise of this approach is that the manager's money wage is unaffected by the level of nonpecuniary benefits he chooses. Fama [11] argues that in a well-functioning market for managers, managers must pay for their nonpecuniary benefits and the monitoring and bonding costs through adjustments of their money wages. Thus, the manager will not consume excessive nonpecuniary benefits beyond the level he considers optimal; there will be no misallocation of resources; and no welfare loss due to outside equity will result. Even outside equity will dominate risky debt as a source of capital, and no firm will ever issue risky debt.

The second explanation offers a more positive role for risky debt. It focuses on the existence of asymmetric information between insiders and outsiders: Managers and entrepreneurs possess inside information, and conveying information to investors about the firm's business risk and profitability requires financial signalling (Ross [34] and Leland and Pyle [26]). To induce valid signals it is necessary to establish incentive schedules for managers. Ross [34] suggests one such incentive schedule: (1) At time 0, the manager gets paid a wage which is proportional to the current market value of the firm, \( V_0 \); and (2) at time 1, he receives a compensation which depends on the terminal value of the firm, \( X \). The total compensation to the manager is \( M = y_0 V_0 + \bar{Y}^M \), where

\[
\bar{Y}^M = \begin{cases} 
\gamma_1 \bar{X} & \text{if } \bar{X} \geq \bar{Y} \\
\gamma_1 \bar{X} - L & \text{if } \bar{X} < \bar{Y},
\end{cases}
\]

\( y_0 \) and \( \gamma_1 \) are constants, and \( L \) is the penalty assessed to the manager if the firm goes bankrupt at the end of the period.

The penalty, \( L \), is the key to the notion of financial leverage signalling. With this penalty term, a higher leverage, \( \bar{Y} \), implies a higher probability that the manager has to pay the penalty and a smaller present value of time 1 compensation. Since the market knows that it is in the manager's self-interest to avoid the penalty, higher leverage has positive informational content. Without perfect information, it is the market's perception about the firm that determines \( V_0 \). Hence, an increase in \( \bar{Y} \) will increase \( V_0 \) which, in turn, will increase the manager's current wage. Thus, an increase in leverage means an increase in the present value of the penalty, \( \Delta V(L \delta) \), while, on the other hand, it means an increase in his current wage, \( y_0 \Delta V_0 \). The optimal leverage to the manager is the \( \bar{Y}^* \), at which
\( \gamma_0 \Delta V_0 / \Delta \hat{Y} = \Delta V(L\delta) / \Delta \hat{Y}; \) i.e., the marginal increase in the manager's current wage equals the marginal increase in the present value of the penalty.

If the manager's optimal capital structure gives out correct signals, firm types will be correctly identified by the capital market and the current market value of \( \hat{X} \) must equal the pure value of investment, \( V(\hat{X}) \). However, this does not mean that the firm value, \( V_0 \), will be equal to \( V(\hat{X}) \). As we have demonstrated in Section II, if no suppliers of capital receive the penalty to the manager, \( V_0 \) must be strictly less than \( V(\hat{X}) \), i.e., \( V_0 = V(\hat{X}) - V(L\delta) \). However, Ross [34] argues that \( V_0 \) will be equal to \( V(\hat{X}) \). To make his model internally consistent, we need to add the assumption that the penalty goes to bondholders in the event of bankruptcy and we need a new definition for the market value of the firm which includes the present value of the manager's future compensation. In that case, \( \delta \) does not represent bankruptcy costs. The gross returns to stockholders and bondholders may be expressed as:

\[
\begin{align*}
\hat{Y}^S &= \begin{cases} 
(1 - \gamma_1) \hat{X} - \hat{Y} & \text{if } \hat{X} \geq \hat{Y} / (1 - \gamma_1) \\
0 & \text{if } \hat{X} < \hat{Y} / (1 - \gamma_1)
\end{cases} \\
\hat{Y}^B &= \begin{cases} 
\hat{Y} & \text{if } \hat{X} \geq \hat{Y} / (1 - \gamma_1) \\
(1 - \gamma_1) \hat{X} + \delta & \text{if } \hat{X} < \hat{Y} / (1 - \gamma_1).
\end{cases}
\end{align*}
\]

Adding (19), (20), and (18) (with appropriate modification for the bankruptcy condition), we obtain \( \hat{Y}^M + \hat{Y}^S + \hat{Y}^B = \hat{X} \). Thus, in equilibrium,

\[
V(\hat{Y}^M) + S + B = V(\hat{X}).
\] (21)

If the present value of the manager's future compensation, \( V(\hat{Y}^M) \), is a part of the market value of the firm, then the market value of the firm will always be equal to the pure value of investment. However, this does not mean that corporate debt policy will be irrelevant. Financial managers will search for optimal capital structures to maximize their own wealth. Only when managers find their optimal capital structure will capital markets be able to discriminate among different firms.

Although this is an interesting scenario, there is a fundamental problem with this approach. Ross' model may break down because there is an economic incentive for shareholders to make side payments to managers to induce false signalling (see Bhattacharya [3]). Because Ross' model assumes no drains in the system (i.e., no bankruptcy costs or agency costs), an increase in financial leverage means only an increase in shareholders' wealth with no offsetting effects. The penalty to the manager, \( \delta \), is likely to be of insignificant magnitude relative to the market value of the firm. Thus, when the firm increases its financial leverage, its effect on shareholders' wealth may completely dominate the effect on the present value of the penalty. The sum of the manager's and shareholders' wealth will increase if the manager chooses a higher financial leverage than \( \hat{Y}^* \) which would give the correct signal. If shareholders make side payments to the manager, which can be easily disguised as a part of the normal managerial compensation, both will be better off giving false signals to the market. If firms give out false

\[16\text{ We also add the assumption that the manager's claim to } \hat{X} \text{ is superior to the claim of shareholders.}\]
signals, the capital market will be unable to identify firm types correctly and there will be no financial signalling equilibrium.

IV. Conclusions

If we were to view the search for a theory of optimal capital structure as an obstacle course, we would now be in the position of having successfully passed one severe obstruction—the corporate benefit of tax-deductible interest payments—only to look over our shoulders to discover that Miller [28] has removed it and placed an equally challenging one before us: Why do individual firms issue risky debt in the absence of positive tax incentives at the individual firm level? It may be still too early to accept his new proposition without any reservation. The various parts of it may have to be dissected and carefully scrutinized, but it is safe to say that his proposition will not allow us to rest. It presents a new obstacle, and like the old one, it too will be attacked and refined. Whether recent contributions invoking managerial incentives will aid in that task is also open to question. We hope that with this paper we have at least traced out the nature of the accomplishments that have been achieved in the development of the theory of optimal capital structure and have outlined the shape of the obstacles to be confronted.

REFERENCES


