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DEBT AND TAXES*

MERTON H. MILLER**

THE SOMEWHAT HETERODOX VIEWS about debt and taxes that will be presented here have evolved over the last few years in the course of countless discussions with several of my present and former colleagues in the Finance group at Chicago—Fischer Black, Robert Hamada, Roger Ibbotson, Myron Scholes and especially Eugene Fama. Charles Upton and Joseph Williams have also been particularly helpful to me recently in clarifying the main issues.[1] My long-time friend and collaborator, Franco Modigliani, is absolved from any blame for the views to follow not because I think he would reject them, but because he has been absorbed in preparing *his* Presidential Address to the American Economic Association at this same Convention.

This coincidence neatly symbolizes the contribution we tried to make in our first joint paper of nearly twenty years ago; namely to bring to bear on problems of corporate finance some of the standard tools of economics, especially the analysis of competitive market equilibrium. Prior to that time, the academic discussion in finance was focused primarily on the empirical issue of what the market *really* capitalized.[2] Did the market capitalize a firm's dividends or its earnings or some weighted combination of the two? Did it capitalize net earnings or net operating earnings or something in between? The answers to these questions and to related questions about the behavior of interest rates were supposed to provide a basis for choosing an optimal capital structure for the firm in a framework analogous to the economist's model of discriminating monopsony.

We came at the problem from the other direction by first trying to establish the propositions about valuation implied by the economist's basic working assumptions of rational behavior and perfect markets. And we were able to prove that when the full range of opportunities available to firms and investors under such conditions

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** University of Chicago.

1. More than perfunctory thanks are also due to the many others who commented, sometimes with considerable heat, on the earlier versions of this talk: Ray Ball, Marshall Blume, George Foster, Nicholas Gonedes, David Green, E. Han Kim, Robert Krainer, Katherine Miller, Charles Nelson, Hans Stoll, Jerold Warner, William Wecker, Roman Weil, and J. Fred Weston. I am especially indebted (no pun intended) to Fischer Black.

2. To avoid reopening old wounds, no names will be mentioned here. References can be supplied on request, however.

are taken into account, the following simple principle would apply: in equilibrium, the market value of any firm must be independent of its capital structure.

The arbitrage proof of this proposition can now be found in virtually every textbook in finance, followed almost invariably, however, by a warning to the student against taking it seriously. Some dismiss it with the statement that firms and investors can't or don't behave that way. I'll return to that complaint later in this talk. Others object that the invariance proposition was derived for a world with no taxes, and that world, alas, is not ours. In our world, they point out, the value of the firm can be increased by the use of debt since interest payments can be deducted from taxable corporate income. To reap more of these gains, however, the stockholders must incur increasing risks of bankruptcy and the costs, direct and indirect, of falling into that unhappy state. They conclude that the balancing of these bankruptcy costs against the tax gains of debt finance gives rise to an optimal capital structure, just as the traditional view has always maintained, though for somewhat different reasons.

It is this new and currently fashionable version of the optimal capital structure that I propose to challenge here. I will argue that even in a world in which interest payments are fully deductible in computing corporate income taxes, the value of the firm, in equilibrium will still be independent of its capital structure.

I. Bankruptcy Costs in Perspective

Let me first explain where I think the new optimum capital structure model goes wrong. It is not that I believe there to be no deadweight costs attaching to the use of debt finance. Bankruptcy costs and agency costs do indeed exist as was dutifully noted at several points in the original 1958 article [28, see especially footnote 18 and p. 293]. It is just that these costs, by any sensible reckoning, seem disproportionately small relative to the tax savings they are supposedly balancing.

The tax savings, after all, are conventionally taken as being on the order of 50 cents for each dollar of permanent debt issued.[3] The figure one usually hears as an estimate of bankruptcy costs is 20 percent of the value of the estate; and if this were the true order of magnitude for such costs, they would have to be taken very seriously indeed as a possible counterweight. But when that figure is traced back to its source in the paper by Baxter [5] (and the subsequent and seemingly confirmatory studies of Stanley and Girth [36] and Van Horne [39]), it turns out to refer mainly to the bankruptcies of individuals, with a sprinkling of small businesses, mostly proprietorships and typically undergoing liquidation rather than reorganization. The only study I know that deals with the costs of bankruptcy and reorganization for large, publicy-held corporations is that of Jerold Warner [40]. Warner

3. See, among others, Modigliani and Miller [27]. The 50 percent figure—actually 48 percent under present Federal law plus some additional state income taxes for most firms—is an upper bound that assumes the firm always has enough income to utilize the tax shield on the interest. For reestimates of the tax savings under other assumptions with respect to availability of offsets and to length of borrowing, see Kim [21] and Brennan and Schwartz [12]. The estimate of the tax saving has been further complicated since 1962 by the Investment Tax Credit and especially by the limitation of the credit to fifty percent of the firm's tax liability. Some fuzziness about the size of the tax savings also arises in the case of multinational corporations.

tabulated the direct costs of bankruptcy and reorganization for a sample of 11 railroads that filed petitions in bankruptcy under Section 77 of the Bankruptcy Act between 1930 and 1955. He found that the eventual cumulated direct costs of bankruptcy—and keep in mind that most of these railroads were in bankruptcy and running up these expenses for over 10 years!—averaged 5.3 percent of the market value of the firm's securities as of the end of the month in which the railroad filed the petition. There was a strong inverse size effect, moreover. For the largest road, the costs were 1.7 percent.

And remember that these are the *ex post*, upper-bound cost ratios, whereas, of course, the *expected* costs of bankruptcy are the relevant ones when the firm's capital structure decisions are being made. On that score, Warner finds, for example, that the direct costs of bankruptcy averaged only about 1 percent of the value of the firm 7 years before the petition was filed; and when he makes a reasonable allowance for the probability of bankruptcy actually occurring, he comes up with an estimate of the expected cost of bankruptcy that is, of course, much smaller yet.

Warner's data cover only the *direct* costs of reorganization in bankruptcy. The deadweight costs of rescaling claims might perhaps loom larger if measures were available of the indirect costs, such as the diversion of the time and energies of management from tasks of greater productivity or the reluctance of customers and suppliers to enter into long-term commitments.[4] But why speculate about the size of these costs? Surely we can assume that if the direct and indirect deadweight costs of the ordinary loan contract began to eat up significant portions of the tax savings, other forms of debt contracts with lower deadweight costs would be used instead.[5]

An obvious case in point is the income bond. Interest payments on such bonds need be paid in any year only if earned; and if earned and paid are fully deductible in computing corporate income tax. But if not earned and not paid in any year, the bondholders have no right to foreclose. The interest payments typically cumulate for a short period of time—usually two to three years—and then are added to the principal. Income bonds, in sum, are securities that appear to have all the supposed tax advantages of debt, without the bankruptcy cost disadvantages.[6] Yet, except for a brief flurry in the early 1960's, such bonds are rarely issued.

The conventional wisdom attributes this dearth to the unsavory connotations that surround such bonds.[7] They were developed originally in the course of the railroad bankruptcies in the 19th century and they are presumed to be still associated with that dismal process in the minds of potential buyers. As an

4. For more on this theme see Jensen and Meckling [20].

5. A similar argument in a somewhat different, but related, context is made by Black [6, esp. pp. 330–31]. Note also that while the discussion has so far referred exclusively to "bankruptcy" costs fairly narrowly construed, much the same reasoning applies to the debt-related costs in the broader sense, as in the "agency" costs of Jensen and Meckling [20] or the "costs of lending" of Black, Miller and Posner [9].

6. Not quite, because failure to repay or refund the principal at maturity could trigger a bankruptcy. Also, a firm may have earnings, but no cash.

7. See Esp. Robbins [31], [27].

investment banker once put it to me: "They have the smell of death about them." Perhaps so. But the obvious retort is that bit of ancient Roman wisdom: *pecunia non olet* (money has no odor). If the stakes were as high as the conventional analysis of the tax subsidy to debt seems to suggest, then ingenious security salesmen, investment bankers or tax advisers would surely long since have found ways to overcome investor repugnance to income bonds.

In sum, the great emphasis on bankruptcy costs in recent discussions of optimal capital structure policy seems to me to have been misplaced. For big businesses, at least (and particularly for such conspicuously low-levered ones as I.B.M. or Kodak), the supposed trade-off between tax gains and bankruptcy costs looks suspiciously like the recipe for the fabled horse-and-rabbit stew—one horse and one rabbit.[8]

II. Taxes and Capital Structures: The Empirical Record

Problems arise also on the other side of the trade-off. If the optimal capital structure were simply a matter of balancing tax advantages against bankruptcy costs, why have observed capital structures shown so little change over time?[9]

When I looked into the matter in 1960 under the auspices of the Commission on Money and Credit (Miller [24]), I found, among other things, that the debt/asset ratio of the typical nonfinancial corporation in the 1950's was little different from that of the 1920's despite the fact that tax rates had quintupled—from 10 and 11 percent in the 1920's to 52 percent in the 1950's.[10] Such rise as did occur, moreover, seemed to be mainly a substitution of debt for preferred stock, rather than of debt for common stock. The year-to-year variations in debt ratios reflected primarily the cyclical movements of the economy. During expansions debt ratios tended to fall, partly because the lag of dividends behind earnings built up internally generated equity; and partly because the ratio of equity to debt in new financings tended to rise when the stock market was booming.

My study for the CMC carried the story only through the 1950's. A hasty perusal of the volumes of Statistics of Income available for the years thereafter suggests that some upward drift in debt ratios did appear to be taking place in the 1960's, at least in book-value terms. Some substantial portion of this seeming rise, however, is a consequence of the liberalization of depreciation deductions in the early 1960's. An accounting change of that kind reduces reported taxable earnings and, barring an induced reduction in dividend policy, will tend to push accumulated retained earnings (and total assets) below the levels that would otherwise have been

8. In this connection, it is interesting to note that the optimal debt to value ratio in the hypothetical example presented in the recent paper by E. Han Kim [21] turns out to be 42 percent and, hence, very substantially higher than the debt ratio for the typical U.S. corporation, even though Kim's calculation assumes that bankruptcy costs would eat up no less than 40 percent of the firm's assets in the event of failure.

9. A related question is why there appears to be no systematic cross-sectional relation between debt ratios and corporate tax rates in the countries of the European Economic Community. See Coates and Wooley [13].

10. The remarkable stability of corporate debt ratios in the face of huge increases in tax rates was noted by many other writers in this period. See, e.g., Sametz [22, esp. pp. 462–3] and the references there cited.

recorded.[11] Thus, without considerable further adjustment, direct comparison of current and recent debt ratios to those of earlier eras is no longer possible. But suppose we were to make the extreme assumption that all the rise in debt ratios genuinely reflected policy decisions rather than changes in accounting rules. Then that would still have meant that the average nonfinancial corporation raised its ratio of long-term debt from about one-fifth to only about one-fourth of total assets during the decade.[12]

Whatever may have been the case in the 1960's, the impression was certainly widespread in the early 1970's that corporate debt ratios were rising rapidly and ominously. This was a period, after all, in which *Business Week* could devote an entire and very gloomy issue (October 12, 1974) to the theme "The Debt Economy."

Looking back now, however, with all the advantages of hindsight, the increases in debt of such concern in 1974 can be seen to be a transitory response to a peculiar configuration of events rather than a permanent shift in corporate capital structures.[13] A surge in inventory accumulation was taking place as firms sought to hedge against shortages occasioned by embargoes or price controls or crop failures. Much of this accumulation was financed by short-term borrowing—a combination that led to a sharp deterioration in such conventional measures of financial health as "quick ratios" and especially coverage ratios (since little of the return on the precautionary inventory buildup was showing up in current earnings and since inflation *per se* will automatically reduce the ratio of earnings to interest payments even with no change in the interest burden in real terms).

But this inventory bubble burst soon after the famous doomsday issue of *Business Week* hit the stands—providing one more confirmation of Allen Wallis' dictum that by the time journalists become interested in an economic problem, the worst is already over. In the ensuing months, inventories have been pared, bank loans have been repaid and conventional measures of corporate liquidity have been restored to something closer to their old-time vigor. New common stock issues have been coming briskly to market as always in the past when the stock market was bouyant. Thus, when the returns for the first half of the 1970's are finally in, we are likely to be facing the same paradox we did in the 1950's—corporate debt ratios only marginally higher than those of the 1920's despite enormously higher tax rates.[14]

11. Also acting in the same direction were the liberalized rules for expensing rather than capitalizing outlays for research and development. On the other hand, debt ratios would tend to be understated by the growth during the decade of off-balance-sheet debt financing, such as leasing and unfunded pension liability.

12. For manufacturing corporations, Federal Trade Commission reports indicate that long-term debt rose during the 1960's from 12.2 percent of reported total assets to 16.6 percent. Short-term debt rose from about 7 percent to 12 percent of reported total assets over the same period. The corresponding figures for the end of 1975 were 17.9 percent for long-term debt and 10.2 percent for short-term debt. The figures here and throughout refer of course, to gross debt without allowing for the substantial amounts of debt securities that are owned by manufacturing and other nonfinancial corporations.

13. For an independent reading of these events that is similar in most essential respects, see Gilbert [16].

14. The discussion in the text has focused mainly on debt/asset ratios at book value, in the hope that

Actually, the cognitive dissonance is worse now than it was then. In the 1950's it was still possible to entertain the notion that the seeming failure of corporations to reap the tax advantages of debt financing might simply be a lag in adjustment. As corporate finance officers and their investment bankers sharpened their pencils, the tax savings they discovered would eventually wear down aversions to debt on the part of any others in the Boardroom still in a state of shock from the Great Depression. But hope can no longer be expected from that quarter. A disequilibrium that has lasted 30 years and shows no signs of disappearing is too hard for any economist to accept.[15] And since failure to close the gap cannot convincingly be attributed to the bankruptcy costs or agency costs of debt financing, there would seem to be only one way left to turn: the tax advantages of debt financing must be substantially less than the conventional wisdom suggests.[16]

III. The Tax Advantages of Debt Financing Reexamined

That the solution might lie in this direction was hinted at, but alas only hinted at, in the original 1958 MM paper. If I may invoke the Presidential priviledge of being allowed to quote (selectively) from my earlier work, we said there in the 57th footnote:

> It should also be pointed out that our tax system acts in other ways to reduce the gains from debt financing. Heavy reliance on debt in the capital structure, for example, commits a company to paying out a substantial proportion of its income in the form of interest payments taxable to the owners under the personal income tax. A debt free company, by contrast, can reinvest in the business all of its (smaller) net income and to this extent subject the owners only to the low capital gains rate (or possibly to no tax at all by virtue of the loophole at death).

We alluded to the same line of argument again briefly in the correction paper in 1963.[17] The point was developed in a more extensive and systematic way by Farrar and Selwyn [15]. Further extensions were made by Myers [30], Stapleton [37],

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book value measures might give better insight to corporate capital structure objectives than would market value measures of leverage, which are highly sensitive to changes in the level of stock prices. As of the end of 1975, tabulations prepared by Salomon Brothers in their volume *The Supply and Demand for Credit, 1976*, indicate a ratio of long-term debt to market value for all U.S. corporations (including public utilities) of 27.1 percent. (Actually, even this is a bit on the high side since the debt is measured at face value and thus does not reflect the substantial fall in the value of outstanding debt in the 1st half of the 1970's.) In 1972, at the height of the boom, the long-term debt ratio at market value was only about 17 percent. The highest recent level reached in recent years was 30 percent at the end of 1974 after a two-year fall of $500 billion in the market value of common and preferred stock.

15. There are certainly few signs that firms were rushing to close the gap by methods as direct as exchanges of debt for their common shares. Masulis [22] was able to find only about 60 such cases involving listed corporations in the 1960's and 1970's. Most of these were concentrated during an 18-month period after the drop in the stock market in 1973; and some of these, in turn, appear more to be attempts to "go private" than to adjust the capital structure.

16. The resolution of the paradox offered in the CMC paper [24] was essentially one of agency costs and, in particular, that the costs of monitoring risky debt made such debt uneconomic as a market instrument.

17. In that paper, the major weight in resolving the paradox was placed on what might be called a "precautionary" motive. Corporations were presumed to want to maintain substantial reserves of high-grade borrowing power so as not to be forced to float common stocks when they believe their stock to be undevalued. Such motives are by no means inconsistent with the explanation to be offered here.

Stiglitz [38], and in two important papers by Fischer Black [7], [8]—papers still unpublished but whose contents were communicated to me, sometimes in very forceful fashion, in the course of many arguments and discussions.

When the personal income tax is taken into account along with the corporation income tax, the gain from leverage, G_L, for the stockholders in a firm holding real assets can be shown to be given by the following expression:

$$G_L = \left[1 - \frac{(1-\tau_C)(1-\tau_{PS})}{1-\tau_{PB}}\right] B_L$$

where τ_C is the corporate tax rate, τ_{PS} is the personal income tax rate applicable to income from common stock, τ_{PB} is the personal income tax rate applicable to income from bonds and B_L is the market value of the levered firm's debt. For simplicity at this stage of the argument, all the taxes are assumed to be proportional; and to maintain continuity with the earlier MM papers, the expression is given in its "perpetuity" form.[18]

Note that when all tax rates are set equal to zero, the expression does indeed reduce to the standard MM no-tax result of $G_L = 0$. And when the personal income tax rate on income from bonds is the same as that on income from shares—a special case of which, of course, is when there is assumed to be no personal income tax at all—then the gain from leverage is the familiar $\tau_C B_L$. But when the tax rate on income from shares is less than the tax on income from bonds, then the gain from leverage will be less than $\tau_C B_L$. In fact, for a wide range of values for τ_C, τ_{PS} and τ_{PB}, the gain from leverage vanishes entirely or even turns negative!

Let me assure you that this result is no mere sleight-of-hand due to hidden trick assumptions. The gain evaporates or turns into a loss because investors hold securities for the "consumption possibilities" they generate and hence will evaluate them in terms of their yields net of all tax drains. If, therefore, the personal tax on income from common stocks is less than that on income from bonds, then the *before-tax* return on taxable bonds has to be high enough, other things equal, to offset this tax handicap. Otherwise, no taxable investor would want to hold bonds. Thus, while it is still true that the owners of a levered corporation have the advantage of deducting their interest payments to bondholders in computing their corporate income tax, these interest payments have already been "grossed up," so to speak, by any differential in the taxes that the bondholders will have to pay on their interest income. The advantage of deductibility at the one level thus merely

18. The expression can be derived in a number of ways of which the simplest is perhaps the following variant on the MM reply to Heins and Sprenkle [29]. Ownership of the fraction α of the levered corporation yields a return to the investor of $\alpha(\tilde{X} - rB_L)(1-\tau_C)(1-\tau_{PS})$ where $\tilde{X}$ is the uncertain return on firm's real (as opposed to financial) assets. This can be duplicated by the sum of (a) an investment of αS_U in the shares of the twin unlevered corporation, which yields $\alpha X(1-\tau_C)(1-\tau_{PS})$; plus (b), borrowing $\alpha B_L[(1-\tau_C)(1-\tau_{PS})/(1-\tau_{PB})]$ on personal account. Since interest is deductible under the personal income tax, the net cost of the borrowing is $\alpha r B_L(1-\tau_C)(1-\tau_{PS})$ and thus the original levered stream has been matched.

Here and throughout, the tax authorities will be presumed to have taken the steps necessary to prevent taxable individuals or firms from eliminating their tax liabilities or converting them to negative taxes by "tax arbitrage" dodges (such as borrowing to hold tax-exempt securities) or by large-scale short-selling.

serves to offset the disadvantages of includability at the other.[19] When the rates happen to satisfy the equation $(1-\tau_{PB})=(1-\tau_C)(1-\tau_{PS})$, the offset is one-for-one and the owners of the corporation reap no gain whatever from their use of tax-deductible debt rather than equity capital.

But we can say more than this. Any situation in which the owners of corporations could increase their wealth by substituting debt for equity (or vice versa) would be incompatible with market equilibrium. Their attempts to exploit these opportunities would lead, in a world with progressive income taxes, to changes in the yields on stocks and bonds and in their ownership patterns. These changes, in turn, restore the equilibrium and remove the incentives to issue more debt, even without invoking bankruptcy costs or lending costs as a *deus ex machina.*

IV. Taxes and Market Equilibrium

Like so many other propositions in financial economics this, too, is "obvious once you think of it." Let me belabor the obvious a bit, however, by a simple graphical example that will serve, I hope, both to illustrate the mechanism that brings the equilibrium about and to highlight some of the implications of that equilibrium.

Suppose, for simplicity that the personal tax rate on income from stock were zero (and we'll see later that this may be a less outrageous simplification than it looks). And suppose further, again strictly for simplicity of presentation, that all bonds are riskless and that there are no transaction costs, flotation costs or surveillance costs involved in their issuance. Then in such a world, the equilibrium of the market for bonds would be that pictured in Figure 1. The quantity of bonds outstanding is measured along the horizontal axis and the rate of interest along the vertical. The demand for bonds by the investing public is given by the upward sloping curve labeled $r_d(B)$. (Yes, it *is* a demand curve even though it slopes up.) Its intercept is at r_0 which measures the equilibrium rate of interest on fully tax-exempt bonds (such as those of state and local governments). The flat stretch of the curve immediately to the right represents the demand for fully taxable corporate bonds by fully tax-exempt individuals and organizations. Clearly, these investors would be the sole holders of corporate bonds if the market interest rate on corporate debts were only r_0. Any taxable investor who wanted to hold bonds in his or her portfolio would find it preferable to buy tax-exempt bonds.

To entice these taxable investors into the market for corporate bonds, the rate of interest on such bonds has to be high enough to compensate for the taxes on interest income under the personal income tax. More precisely, for an individual whose marginal rate of personal income tax on interest income is τ_{PB}^{α}, the "demand rate of interest" on taxable corporate bonds would be the rate on tax exempts grossed up by the marginal tax rate, i.e., $r_0(1/(1-\tau_{PB}^{\alpha}))$. Since the personal income tax is progressive, the demand interest rate has to keep rising to pull in investors in

19. An analogous argument in the context of the lease-or-buy decision is given in Miller and Upton [26]. Reasoning of essentially this kind has also long been invoked to explain the otherwise puzzling survival of preferred stock (see, among many others, Miller [24, esp. note 40, p. 431]). The fact that 85 percent of any dividends received by a taxable corporation can be excluded in computing its taxable income, pushes down the yields on preferred stocks and thereby offsets the disadvantage of nondeductibility.

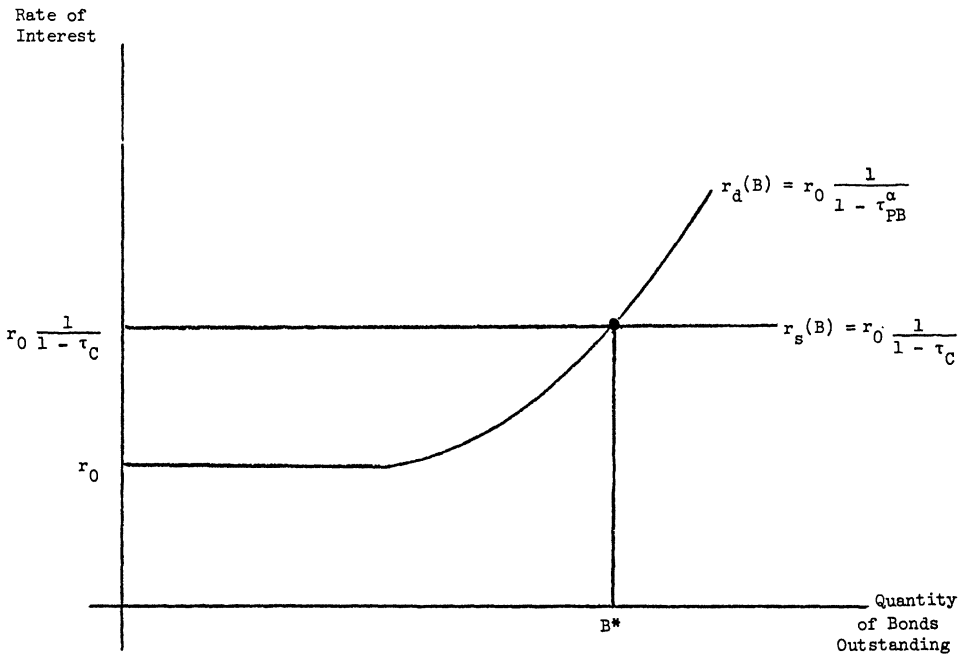

FIGURE 1. Equilibrium in the Market for Bonds

higher and higher tax brackets, thus giving the continuous, upward sloping curve pictured.

The intersection of this demand curve with the horizontal straight line through the point $r_0/1-\tau_C$, i.e., the tax-exempt rate grossed up by the corporate tax rate, determines the market equilibrium. If corporations were to offer a quantity of bonds greater than B^*, interest rates would be driven above $r_0/1-\tau_C$ and some levered firms would find leverage to be a losing proposition. If the volume were below B^*, interest rates would be lower than $r_0/1-\tau_C$ and some unlevered firms would find it advantageous to resort to borrowing.

The market equilibrium defined by the intersection of the two curves will have the following property. There will be an equilibrium level of aggregate corporate debt, B^*, and hence an equilbrium debt-equity ratio for the corporate sector as a whole. *But there would be no optimum debt ratio for any individual firm.* Companies following a no-leverage or low leverage strategy (like I.B.M. or Kodak) would find a market among investors in the high tax brackets; those opting for a high leverage strategy (like the electric utilities) would find the natural clientele for their securities at the other end of the scale. But one clientele is as good as the other. And in this important sense it would still be true that the value of any firm, in equilibrium, would be independent of its capital structure, despite the deductibility of interest payments in computing corporate income taxes.[20]

One advantage of graphical illustration is that it makes it so easy to see the

20. The details of corporate strategy and investor valuation at the micro level implied by this model are interesting in their own right, but further analysis is best deferred to another occasion.

answer to the following inevitable question: If the stockholders of levered corporations don't reap the benefits of the tax gains from leverage, who does? Professors of finance, of course—though only indirectly and only after cutting in their colleagues in other departments. As Figure 1 shows, universities and other tax exempt organizations, as well as individuals in low tax brackets (widows and orphans?) benefit from what might be called a "bondholders' surplus." Market interest rates have to be grossed up to pay the taxes of the marginal bondholder, whose tax rate in equilibrium will be equal to the corporate rate.[21] Note that this can cut both ways, however. Low bracket individuals (and corporations) have to *pay* the corporate tax, in effect, when they want to borrow.

An equilibrium of the kind pictured in Figure 1 does not require, of course, that the effective personal tax rate on income from shares of the marginal holder be literally zero, but only that it be substantially less than his or her rate on income from bonds. As a practical matter, however, the assumption that the effective rate at the margin is close to zero may not be so wide of the mark. Keep in mind that a "clientele effect" is also at work in the market for shares. The high dividend paying stocks will be preferred by tax exempt organizations and low income investors; those stocks yielding more of their return in the form of capital gains will gravitate to the taxpayers in the upper brackets.[22] The tax rate on such gains is certainly greater than zero, in principle. But holders need pay no taxes on their gains until realized and only a small fraction of accumulated gains are, in fact, realized and taxed in any year (see, e.g., Bhatia [4, esp. note 12] and Bailey [2]). Taxes on capital gains can not only be deferred at the option of the holder—and remember that by conventional folk wisdom, 10 years of tax deferral is almost as good as exemption —but until the recent Tax Reform Act of 1976, could be avoided altogether if held until death, thanks to the rules permitting transfer of the decedent's tax basis to his or her heirs.

To the extent that the effective tax rate on income from shares is greater than zero, the horizontal line defining the equilibrium interest rate will be above that pictured in Figure 1. In the limiting case where the tax concessions (intended or unintended) made to income from shares were either nonexistent or so small that $(1-\tau_C)(1-\tau_{PS})$ implied a value for τ_{PB}^{α} greater than the top bracket of the personal

21. In point of fact, the spread between municipals and corporates has typically been within shouting distance of the corporate rate, though comparisons are difficult because of differences in risk (including, of course, the risk that the tax status of municipals will be changed) and though, admittedly, mechanisms of a different kind might also be producing that result. The recent study of the yield curve of U.S. Government securities by McCulloch [23] gives estimates of the marginal tax rate of holders of such bonds that are close to, but usually somewhat below the corporate rate.

22. The data presented in the study of stock ownership by Blume, Crockett and Friend [11, esp. Table G, p. 40] are consistent with this form of clientele effect, though its magnitude is perhaps somewhat smaller than might have been expected *a priori*. They estimate, for example, that in 1971, the ratio of dividends to the market value of holdings was about 2.8 percent for individual investors with adjusted gross income of less than $15,000 as compared to 2.1 percent for those with adjusted gross incomes of $100,000 or more.

By invoking this dividend clientele effect, an argument analogous to that in Figure 1 can be developed to show that the value of a firm could be invariant to its dividend policy despite the more favorable tax treatment of capital gains than of dividends. Some gropings in that direction were made in the MM dividend paper [25, esp. pp. 431–2]. A more explicit analysis along those lines was given by Black and Scholes [10]. For a related model dealing with tax shelters on real investment see Bailey [3].

income tax, then no interior market equilibrium would be possible. Common stock would indeed be a dominated security from the purely financial point of view, exactly as the standard micro model of the tax effect suggests. Common stock could continue to exist only by virtue of special attributes it might possess that could not be duplicated with bonds or with other forms of business organization, such as co-ops.

The analysis underlying Figure 1 can be extended to allow for risky borrowing, but there are complications. What makes things difficult is not simply a matter of risk *per se*.[23] Default risk can be accommodated in Figure 1 merely by reinterpreting all the before-tax interest rates as risk-adjusted or certainty-equivalent rates. The trouble is, rather, that bonds of companies in default will not, in general, yield the issuing stockholders their full tax shield (see MM [27, esp. note 5], Kim [21] and Brennan and Schwartz [12]). Unless the firm has past profits against which its current losses can be carried back, or unless it can escape the vigilance of the I.R.S. and unload the corporate corpse on a taxable firm, some of the interest deduction goes to waste. To entice firms to issue risky bonds, therefore, the risk-adjusted supply-rate would have to be less than $r_0(1/(1-\tau_C))$, and presumably the more so the greater the likelihood of default.[24]

An essentially similar effect will be produced by the bankruptcy costs discussed earlier. And this will imply, among other things, that the full burden of the bankruptcy costs or lending costs is not necessarily borne by the debtors as is frequently supposed. Part of the costs are shifted to the bond buyers in the form of lower risk-adjusted rates of interest in equilibrium.

A model of the kind in Figure 1 could, in principle, clear up most of the puzzles and anomalies discussed in Sections I and II above—the seeming disparity between the tax gains of debt and the costs of bankruptcy particularly for large low-levered corporations; the lack of widespread market interest in income bonds; and especially the failure of the average corporate debt ratio to rise substantially in response to the enormous increase in tax rates since the 1920's (because these increases in rates in the late 1930's as well as subsequent decreases and reincreases have generally moved both the corporate and individual rate schedules in the same direction). The model could also account as well for other of the stylized facts of corporate finance such as the oft-remarked dramatic transition of the bond market from an individual to an institution-dominated market in the late 1930's and early 1940's.[25] On the other hand, many questions clearly still remain to be answered.

23. For the specialists in these matters, suffice it to say that in the equilibrium of Figure 1, the capital markets are, of course, assumed to be "complete." For a discussion of some of the implications of corporate taxes the deductibility of interest payments under conditions of "incomplete markets" see Hakansson [18].

24. These effects, however, do not imply the existence of "super-premiums" for riskless bonds of the kind visualized recently by Glenn [17] and earlier by Durand [14]. Those were presumed to arise from the segmentation of the bond market and especially from the strong preferences of the institutional sector for low-risk securities. In terms of Figure 1, any such increase in the demand for safe securities would show up in the first instance as a lower value for r_0 and, hence a lower value for the equilibrium corporate borrowing rate, $r_0/1-\tau_C$. (See the MM 1958 article [28, especially pp. 279–80]. See also Hamada's discussion of Glenn's paper [19].)

25. For an early account of that transition that stresses precisely the kind of tax effects that underlie Figure 1, see Shapiro [35].

What about cross-sectional variations in debt ratios, for example—a subject on which surprisingly little work has yet been done?[26] Can they be explained convincingly by the market equilibrium model presented here or some variant of it? Or do the variations observed reflect some systematic part of the equilibrating process that escapes the kind of aggregate market models discussed here? What about the distribution of stocks and bonds among investors? Does ownership sort out in terms of tax status as sharply as emphasized here? Or does the need for diversification swamp the tax differences and thereby throw the main burden of the equilibration onto other factors, such as agency costs?

The call for more research traditionally signals the approaching end of a Presidential Address; and it is a tradition that I know you will want to see preserved. Let me conclude, therefore, by trying to face up, as I promised in the beginning, to the kind of complaint so often raised against market equilibrium analysis of financial policy of the type here presented: "But firms and investors don't behave that way!"

V. Market Equilibrium and the Behavior of Firms and Individuals

If the phrase "don't behave that way" is taken to mean that firms and individuals don't literally perform the maximizing calculations that underlie the curves in Figure 1, then it is most certainly correct. No corporate treasurer's office, controller's staff, or investment banker's research team that I have ever encountered had, or could remotely be expected to have, enough reliable information about the future course of prices for a firm's securities to convince even a moderately skeptical outside academic observer that the firm's value had indeed been maximized by some specific financial decision or strategy. Given the complexities of the real-world setting, actual decision procedures are inevitably heuristic, judgmental, imitative and groping even where, as with so much of what passes for capital budgeting, they wear the superficial trappings of hard-nosed maximization. On this score, has there ever been any doubt that the Harvard cases (and the work of Herbert Simon and his followers) give a far more accurate picture of the way things really look and get done out on the firing line than any maximizing "model of the firm" that any economist ever drew?

Why then do economists keep trying to develop models that assume rational behavior by firms? They are not, I insist, merely hoping to con their business school deans into thinking they are working on problems of business management. Rather they have found from experience—not only in finance, but across the board—that the rational behavior models generally lead to better predictions and descriptions at the level of the industry, the market and the whole economy than any alternatives available to them. Their experience, at those levels, moreover, need involve no inconsistency with the heuristic, rule-of-thumb, intuitive kinds of decision making they actually observe in firms. It suggests rather that evolutionary mechanisms are at work to give survival value to those heuristics that are compat-

26. One of the few studies of cross-sectional differences in debt ratios is that of Schwartz and Aronson [34], but it really does little more than document the fact that utilities and railroads have substantially higher debt ratios than firms in manufacturing and mining.

ible with rational market equilibrium, however far from rational they may appear to be when examined up close and in isolation.[27]

But we must be wary of the reverse inference that merely because a given heuristic persists, it must have some survival value and, hence, must have a rational "explanation." The MM and related invariance propositions, for example, are often dismissed on grounds that corporate finance officers would surely not show so much concern over decisions that really "don't matter." The most, however, that we can safely assert about the evolutionary process underlying market equilibrium is that harmful heuristics, like harmful mutations in nature, will die out. Neutral mutations that serve no function, but do no harm, can persist indefinitely. Neither in nature nor in the economy can the enormous variation in forms we observe be convincingly explained in simple Darwinian terms.[28]

To say that many, perhaps even most, financial heuristics are neutral is not to suggest, however, that financial decision making is just a pointless charade or treat the resources devoted to financial innoviations are wasted. A mutation or a heuristic that is neutral in one environment may suddenly acquire (or lose) survival value if the environment changes. The pool of existing neutral mutations and heuristics thus permits the adaptation to the new conditions to take place more quickly and more surely than if a new and original act of creation were required. Once these types and roles of heuristics in the equilibrating process are understood and appreciated, the differences between the institutionalist and theorist wings of our Association may be seen to be far less fundamental and irreconcilable than the sometimes ferocious polemics of the last 20 years might seem to suggest.

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27. Has anyone a better explanation for the puzzle of why the pay-back criterion continues to thrive despite having been denounced as Neanderthal in virtually every textbook in finance and accounting over the last 30 years?

28. Any experienced teacher of corporate finance can surely supply numerous examples of such neutral variations. My own favorite is the captive finance company. See, e.g., the perceptive discussion in Andrews [1].

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