

TAXATION AND CORPORATE USE OF DEBT: IMPLICATIONS FOR TAX POLICY

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There is growing empirical evidence showing that taxes encourage use of debt in large profitable firms and discourage it in less profitable firms. There has been debate, though, on the source of any non-tax costs from debt finance offsetting the tax advantages of debt. This paper lays out competing hypotheses, notes that the existing empirical evidence is more supportive of a “lemons” model in which lack of information about the viability of borrowing firms inhibits use of debt, and then explores how tax policy should be designed in response.

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Existing taxes on corporate and personal income in the United States create a wide variety of distortions to firm behavior. One such tax distortion that has received attention for many years is the distortion to a firm’s choice of debt versus equity finance.

Views about the effects of taxes on corporate use of debt have evolved over time. The modern discussion dates back to Modigliani and Miller (1958), who argued that firms should be indifferent between debt and equity finance, ignoring real costs of bankruptcy and ignoring taxes. Miller and Modigliani (1961) then emphasized that corporate tax provisions favor use of debt finance, since interest payments but not dividends are deductible expenses under the corporate tax. Firms, they argued, borrow to take advantage of the resulting tax savings, until the tax savings from further debt are just offset by extra costs resulting from a higher risk of bankruptcy. Later papers then emphasized that the offsetting non-tax costs arise not only during bankruptcy but also due to conflicts of interest among debt and equity holders in anticipation of the possibility of bankruptcy.¹

¹ Jensen and Meckling (1976), for example, emphasized that the optimal use of debt needs to take into account the conflicts of interest both between debt and equity and also between inside and outside equity holders. The resulting use of debt can be sizeable even ignoring tax incentives. Graham (2003) provides a recent survey of this literature.

Based on the taxes versus bankruptcy-costs model for corporate use of debt, taxes lead to an excessive use of debt.² This theory is laid out in Section I.

The corporate finance literature then focused on measuring to what degree taxes changed corporate use of debt versus equity finance. Many studies were undertaken. The basic finding was that taxes had at best modest effects on corporate financial policy.³ In fact, a common finding was that firms with tax losses if anything borrowed more than firms with taxable profits, even though their inability to make use of interest deductions to save on taxes should have led them to borrow less. Under the taxes versus bankruptcy-costs model, taxes create larger efficiency costs the more responsive corporate use of debt is to tax incentives. The modest effects of taxes on corporate financial policy that have been found empirically imply that the efficiency costs from the tax distortion favoring corporate use of debt are small.

More recent papers point out various biases that caused earlier studies to underestimate the role of taxes, however. For example, firms with tax losses (and tax loss carryforwards) may borrow more just because they have losses and therefore have greater need for supplementary funds to cover operating expenses. An indicator for the presence of tax losses captures the direct effects of losses on corporate use of debt, as well as the effects of these tax losses on the potential tax savings from additional interest deductions. As a result, the interpretation of the links between tax losses and corporate use of debt is unclear.

Two recent papers focus on a different means of identifying the role of taxes. The prior literature examined the behavior only of large corporations. If these firms earn a normal rate of return, they would all face the same corporate tax rate. Any cross-sectional variation in tax incentives across firms would then come from variation in taxable income, so mainly from whether the firm has profits or losses, leading to the biased estimates. While time-series evidence could in principle be helpful, tax rates faced by large firms have varied too little over time to identify the size of their effects on behavior. By using panel data on small as well as larger corporations, however, more recent papers can identify the role of taxes by using differences in marginal tax rates across the corporate tax schedule.⁴ The results suggest that taxes have statistically significant and economically important effects on corporate use of debt. This research on estimating the responsiveness of corporate debt to taxes is summarized in Section II.

The next issue is estimating the magnitude of the efficiency costs of the tax-induced use of corporate debt to judge whether the increased use of debt is a serious policy concern. Section III develops a standard measure of the efficiency cost, which builds on the taxes versus bankruptcy-costs framework. The efficiency gains from eliminating the tax distortion favoring use of debt finance are estimated to be trivial: roughly \$1 billion

² Later papers took into account implications of corporate borrowing for personal as well as corporate taxes, though the basic conclusions remained in force.

³ Some of the key studies are summarized briefly in Section I.

⁴ Marginal tax rates faced by small firms have varied much more over time than have the rates faced by larger firms.

to \$2 billion per year, which is well under one percent of corporate tax revenue. While there are a variety of additional complications that can lead to some modifications to this estimate, all have relatively modest effects.

As a result, it is not surprising that this particular tax distortion has not been a major focus in policy discussions. The cuts in personal relative to corporate tax rates in 1986, for example, substantially exacerbated the tax distortion favoring use of debt versus equity finance.⁵ Even if the efficiency costs of the distortion are small, though, it still seems surprising that the distortion would have remained in place, and in fact grown during recent years, given the ease of reducing or eliminating the distortion.

How confident can we be, then, in these efficiency cost calculations based on the taxes versus bankruptcy-costs model? Under the taxes versus bankruptcy-costs model, we expect that large corporations, who face the top corporate tax rate and so have the largest tax savings from interest deductions, should borrow much more than smaller firms, which face a lower corporate tax rate and so gain little from an equivalent dollar in interest deductions. The data strongly suggest the reverse, with small firms financing a far higher fraction of their capital stock with debt than do larger firms.⁶ That some of the most successful firms, such as IBM when this question first arose in the literature and Microsoft now, have little or no debt even though they are the firms that could most surely save on taxes through interest deductions raises serious questions about what factors drive corporate decisions on use of debt.

Facing these puzzles in the data, Myers and Majluf (1984) argued that when corporations seek outside finance, investors learn that the firm needs funds. While this need for funds could be due to the firm having profitable investment opportunities (or opportunities to reduce tax liabilities), it equally well could be due to its being short of cash due to poor sales. As discussed in the literature (Eckbo, 1986; Howton, Howton, and Perfect, 1996; Mikkelsen and Partch, 1986) stock prices fall when a firm announces new borrowing, suggesting that investors take this borrowing as bad news about the firm. If firms that borrow tend to be firms with poor future prospects, then the interest rates charged on the debt will also be high, reflecting the resulting pessimism about the status of the firm. Given this impact of borrowing on stock prices and interest rates, Myers and Majluf (1984) argue that firms with less pressing needs for cash (those who are doing well) will forego outside finance, even at the cost of foregoing some good investment projects. Only the weaker firms borrow.

This is a classic example of a lemons problem, noted first by Akerlof (1970). Akerlof sought to explain why the price of a used car is so low. He hypothesized that those with a lousy car are much more likely to choose to sell, so that the equilibrium price of used

⁵ See Gordon and MacKie-Mason (1991) for evidence on the effects of the 1986 tax reform on corporate use of debt finance. The cut in personal tax rates during 2001–2002, in itself favoring debt finance, was offset by further cuts in the tax rates on dividends and capital gains, leaving little net change in the tax incentives on debt versus equity finance.

⁶ Gordon and Lee (2001) report average debt-to-capital ratios of 30 percent for firms with assets below \$25 million, but only 17 percent for larger firms.

cars *should* be low. The problem is that car purchasers have incomplete information, and take the decision to sell a car as a bad signal about its quality. Those with good cars will then likely find selling their car at such a low price unattractive, even if they have legitimate reasons to sell. By analogy, investors take the decision by a firm to borrow as a bad signal about the quality of the firm. The result is too little corporate borrowing, just as there is too little trade in used cars. Companies forego good projects rather than pay too high an interest rate on new loans.

How should policy deal with such lemons problems? If there is too little trade in these markets, then policies that increase trade can generate efficiency gains. This immediately suggests providing a subsidy to trade. However, a better answer is a subsidy to borrowing by better firms, and perhaps even a tax on borrowing by weaker firms. By increasing the fraction of new issues coming from good firms and reducing the fraction coming from poor firms, interest rates charged on these bonds will fall and more firms will choose to borrow. In theory, these subsidies and taxes should be designed to reflect the externalities each borrower imposes on other borrowers, through changing the composition of borrowers that then determines market interest rates. This pattern of subsidies and taxes corresponds in many ways to what we now have in the tax law, with firms in the highest tax brackets saving taxes on net through borrowing while firms with tax losses paying more in taxes on net once we take into account the taxes paid by those receiving the interest payments.

Existing tax policy then looks much less puzzling under the Myers-Majluf (1984) model for use of debt. This model is described in Section IV, and its implications for the tax treatment of debt are analyzed in Section V.

The Myers-Majluf (1984) model is not the only alternative model for why firms borrow. Section VI describes more briefly two other models for debt finance: an agency cost model as initially described by Easterbrook (1984) and Jensen (1986), and the signaling model developed by Ross (1977). In each case, the efficiency implications of tax distortions are described. The section then reports on the consistency of the empirical evidence with these two models, and their implications for the efficiency costs of the existing tax distortions favoring use of debt finance.

The above discussion focused on the implications of tax policy for firms operating solely in the domestic economy. The effects of tax policy on multinationals bring in a variety of different considerations. These are outlined briefly in Section VII.

Section VIII then provides a brief summary of the weight of the evidence concerning the efficiency effects of the existing tax treatment of corporate debt.

I. TAXES VERSUS BANKRUPTCY COSTS

To what degree do taxes distort a corporation's choice between debt and equity finance? To judge this, consider the implications for tax payments by both the firm and its investors when the firm borrows an additional dollar in debt. Assume that it uses the proceeds to pay extra dividends or to repurchase some existing equity and will adjust future payouts to shareholders in the same proportion between dividends and repurchases so as to leave real investment unchanged.

With a dollar of extra payouts to shareholders, the immediate effect of this change in policy is extra cash receipts by shareholders equal to $\$(1 - t_e)$, where t_e is the effective personal tax rate on these payouts, based on the fraction of the dollar used to finance extra dividends versus share repurchases.

In each future period, the firm has reduced net-of-tax cash flow equal to $i(1 - \tau)$, where i denotes the interest rate. In addition, with extra debt it faces the threat of higher bankruptcy and agency costs each period. Denote the resulting overall pre-tax certainty-equivalent cost each period by $C(d, X)K$, where the function C measures the cost per dollar of capital generated by a debt-to-capital ratio different from the value that minimizes real agency and bankruptcy costs, $d = D/K$ is the firm's debt-to-capital ratio, D is the firm's overall debt, K represents the firm's capital stock, while X captures any other factors (e.g., those that are industry-specific) that affect the size of real costs to a firm from varying its debt levels. Assume that C is a convex function of d , with a minimum value when $d = d^*$. Taxes will then induce the firm to choose a debt-to-capital ratio different from the value d^* that minimizes costs.

When the firm borrows an extra dollar, the available cash flow to the firm falls by $(i + C_d)(1 - \tau)$ in each future period. This reduction in the firm's cash flow reduces the funds available each period for dividends or share repurchases, leading to a fall in the net-of-tax income to shareholders of $(1 - t_e)(i + C_d)(1 - \tau)$.⁷

In discounting to the present all of these future reductions in payouts to shareholders, we discount at the shareholders' opportunity cost of funds. Shareholders can invest in either bonds or equity, and would choose a portfolio so that they are indifferent between the two at the margin. We can therefore use either rate of return as the discount rate, and for convenience use the after-tax rate of return available on bonds. This net-of-tax rate of return equals $i(1 - m)$, where m is the tax rate the investors face on interest income. Given this discount rate, the present value of the decline in future payouts to shareholders resulting from a dollar in extra debt equals $(1 - t_e) \int_0^\infty (i + C_d)(1 - \tau)e^{-i(1-m)t} dt$.

The shareholders are then indifferent to an extra dollar of debt when the initial increase in cash receipts just equals the present value of the future drop in payouts, or

$$(1) \quad 1 - t_e = (1 - t_e) \int_0^\infty (i + C_d)(1 - \tau)e^{-i(1-m)t} dt.$$

which implies

$$(2) \quad i \frac{\tau - m}{1 - \tau} = C_d.$$

The higher are nominal interest rates or the higher is the corporate tax rate relative to the personal tax rate on interest income, the stronger are the tax incentives to increase borrowing, leading to a higher value for d .⁸

⁷ The effective tax rate that would have been paid on any such payouts is again assumed to equal t_e .

⁸ Note that the tax rate on dividends or capital gains, t_e , does not enter this expression. The logic fundamentally is the same as that in Auerbach (1979). Either the firm pays out funds now or reduces borrowing and pays funds out later, but regardless the funds are ultimately subject to the same personal tax rate.

What can we say about the size of this tax distortion, and how it varies across firms and over time? The corporate tax rate τ represents the marginal tax rate on future income accruing to the firm. By statute, this marginal tax rate depends on the firm's taxable income, denoted by π , so that we can express the firm's marginal tax rate by $\tau(\pi)$. Under current statutes, marginal corporate tax rates vary from 35 percent for firms with high incomes to zero for firms with tax losses extending into the indefinite future. The whole schedule has changed frequently over time, even though the top corporate rate has changed much less often.

We can then express taxable income by $\pi \equiv (\bar{\rho} - id)K$, where $\bar{\rho}$ represents the firm's ex post taxable rate of return. The corporate tax rate therefore varies across firms and across time due not only to differences in statutes, but also to differences in K , d , i , and $\bar{\rho}$. In the next section, we focus on the implications of using each of these sources of variation when trying to estimate the effects of taxes on corporate financial policy.

The tax rate, m , represents the personal tax rate on interest income faced by the firm's shareholders. This raises the immediate complication that shareholders are heterogeneous, and can be in very different personal tax brackets, assuming they are taxable at all. There have been various papers that explore how best to capture the personal tax incentives driving firm behavior. Miller (1977) provides a model in which investors divide into clienteles based on their personal tax rate, with those in higher tax brackets investing in stocks or municipal bonds and those in lower tax brackets buying taxable bonds. Within this model, the tax rate that drives firm behavior is that of the investor who is just indifferent between taxable and municipal bonds. Gordon and Bradford (1980) develop an alternative model in which all investors buy bonds and stocks, but in different proportions depending on their tax incentives and risk aversion. Here, the tax rate that drives firm behavior is a weighted average of the tax rates faced by all investors, with weights depending on their wealth (and degree of risk aversion). Both approaches have been used in the past literature in coming up with a plausible estimate for m .

Interest rates can also vary by firm, depending on the risks of default. Plausibly, they then depend on both d and $\bar{\rho}$, raising endogeneity problems. Interest rates also vary over time, though, providing a useful supplementary source of identification.

II. EVIDENCE ON BEHAVIORAL RESPONSES TO TAX INCENTIVES

How responsive are actual corporate financial choices to taxes? Empirical tests have focused on both time-series and cross-sectional evidence. Time-series evidence alone proved to be insufficient since tax incentives for large firms have been very stable over time, providing too little variation to identify the effects of taxes on corporate use of debt. In addition, many other factors change over time, obscuring any tax effects.⁹

⁹ For example, Taggart (1985) studied how use of debt varied over much of the twentieth century, including periods before as well as after the introduction of the corporate income tax. Contrary to the forecasts from a model focusing just on taxes, corporate use of debt was quite high prior to the introduction of the corporate tax, presumably because equity finance was much less easily available than has been true in more recent years. This variation over time in the sophistication of financial markets is hard to control for, making it difficult to extract information from time-series evidence about the effects of taxes.

The cross-sectional evidence made use of variation in tax incentives across firms at a particular date. Most of the past empirical work used Compustat data, which provides income and balance sheet information for publicly traded firms in the United States. Within this data set, all firms are large enough so that they face the top corporate tax rate unless their profit rate is unusually low. Therefore, variation in K was not a useful source of identification.

The empirical work therefore focused on the implications of variation in π for tax incentives, and then the effects of this variation in tax incentives on corporate financial policy. Effects of variation in π for tax incentives was captured in many ways, including indicators for tax loss carryforwards and measures of the size of “non-debt tax shields,” which represent key deductions (mainly depreciation) other than interest payments.¹⁰ A more ambitious approach (as in Graham (1996) for example) involved simulating the future distribution of values of π , and then calculating the effective tax rate taking account of tax-loss carryforwards and carrybacks. Using these identification procedures, little evidence was found for any important tax effects on corporate use of debt finance. Often the estimated coefficients had the “wrong” sign, since firms with tax losses commonly borrowed more than firms with profits.

That firms with tax losses borrow heavily is not surprising, of course, since these firms face financial pressures to seek outside funding to help cover essential current expenses. Firms needing extra funds can borrow from banks or issue commercial paper or corporate bonds much more easily than they can issue new equity. Formally, the problem is that π can have direct effects on a firm’s use of debt, and not simply serve as a proxy for the firm’s effective corporate tax rate. This source of variation in tax incentives therefore does not provide a convincing source of identification.

Two recent studies (Gordon and Lee, 2001, 2007) have shifted to a different source of data, the Statistics of Income, which provides income and balance sheet information for all corporations filing tax returns in each year. The data are subdivided into roughly 15 size categories, based on each firm’s total assets. This data set provides much more variation in firm size than is available in the Compustat data. It also covers a longer time period, providing more of a chance to make use of time-series evidence.

With this data set, identification can be based on variation in K across size categories of firms combined with variation in statutory tax schedules over time. Note, though, that variation in K alone is not sufficient for identification, since small firms can have very different financial policies because they have less access to the equity market. To identify tax effects therefore requires controlling flexibly for any direct effects of K on firm behavior. These papers then estimate tax effects by examining the degree to which borrowing by firms of a particular size changes over time as their tax incentives change.¹¹ While tax incentives for firms with high profits were relatively stable over the

¹⁰ Among the many references that can be included here are Auerbach (1985), Bradley, Jarrell, and Kim (1984), Graham (1996), Graham, Lemmon, and Schallheim (1998), Graham (1999), Gropp (1997), and MacKie-Mason (1990).

¹¹ These studies also include time dummies, so that the published estimates represent the relative change in the borrowing by firms of different sizes compared to the differential changes in their tax incentives.

sample period, tax incentives for firms with low profits varied substantially, providing sufficient information to identify tax effects.

Results suggested nontrivial effects of taxes on behavior. For example, the coefficient estimates in Gordon and Lee (2007) reported in column 3 of their Table 2, suggest that shifting from the average tax distortion to no tax distortion would reduce debt-to-capital ratios by 0.022, implying that an additional 2.2 percent of capital would be financed with equity rather than debt.¹² The estimates in Gordon and Lee (2001), using a somewhat different specification, suggest over twice as large a response, with a reduction in the debt-to-capital ratio of 0.047 if tax distortions were eliminated.¹³

The theory also forecasts that behavioral responses should be proportional to nominal interest rates. Gordon and Lee (2007) do in fact find clear support for tax effects being larger in years with higher nominal interest rates, with very large effects in the years with the highest nominal rates and essentially no effect in years with the lowest nominal rates.

III. ESTIMATES OF EFFICIENCY COSTS: TAXES VERSUS BANKRUPTCY MODEL

If we accept that the taxes versus bankruptcy-costs model explains observed corporate choices for debt-to-equity ratios, then it is straightforward to make use of the above estimates to calculate the efficiency gains from eliminating existing tax distortions to corporate financial policies. The key assumption is that corporate financial policies would be efficient if there were no tax distortions affecting these choices.

For any small change in tax policy, the resulting excess burden can be measured based on the resulting change in government tax revenue caused by any behavioral changes.¹⁴ If tax policies change so as to induce firms to increase their use of debt finance by a dollar, then individuals pay additional taxes on the dollar of extra payouts to shareholders. In addition, in each future period, corporate tax payments fall due to the extra deductions for interest expense and extra possible bankruptcy costs, while individuals receive interest income instead of dividends or capital gains. The present value of the resulting changes in government revenue equal

$$(3) \quad t_e - \int_0^{\infty} (i + C_d)(\tau + t_e(1 - \tau))e^{-i(1-m)t} dt + \int_0^{\infty} ime^{-i(1-m)t} dt$$

Making use of (2), it is easy to show that this expression simplifies to

$$(4) \quad \int_0^{\infty} i \frac{\tau - m}{1 - \tau} e^{-i(1-m)t} dt,$$

¹² These results are based on a year with average interest rates.

¹³ This estimate is based on the coefficient estimates in column 3 of Table 5.

¹⁴ Ignoring behavioral changes, any change in tax payments by individuals or firms just equals the increase in tax payments received by the government. These effects of a tax change involve redistribution, but no efficiency costs. In addition, though, firms and individuals can change behavior in response to the tax change. While individuals and firms should be virtually indifferent at the margin when they change behavior in response to a small tax change, since otherwise they wouldn't have waited for the tax change to alter their behavior, the government experiences a change in its tax revenue. This change in tax revenue then measures the net cost to individuals and the government together resulting from the change in tax policy.

or equivalently to a loss of $i(\tau - m)/(1 - \tau) \equiv iT^*$ in each future period. This, of course, is just what we should have expected. The real loss from a dollar of extra debt in a period equals C_d . As seen from (2), in equilibrium $C_d = iT^*$.

How would we then calculate the overall efficiency gains if we were to eliminate this tax distortion entirely?¹⁵ The overall gain in efficiency from entirely eliminating the tax distortion to corporate financial policy, assuming all firms face the same changes in incentives, equals¹⁶

$$(5) \quad -i \int_0^{T^*} T \frac{\partial D}{\partial T} dT = -.5i(T^*)^2 \frac{\partial D}{\partial T}.$$

Note that the second expression follows if the size of the behavioral response does not depend on T .¹⁷

Calculating this expression is straightforward. We report above, for example, estimates ranging from 0.022 to 0.047 for the size of the reduction in the debt-to-capital ratio resulting from reducing the average tax distortion to zero. This figure corresponds to $\Delta \equiv T^*[\partial(D/K)/\partial T]$. Expression (5) then equals $0.5iT^*K\Delta$. The average value of T^* reported in Gordon and Lee (2007) is 0.46. According to the Economic Report of the President (2007), the value of shareholders' equity as of the third quarter of 2006 was \$2.7 trillion dollars. With an average debt-to-capital ratio reported in Gordon and Lee (2007) of 0.26, this leads to an estimate of the corporate capital stock (evaluated at market prices) of $2.7/(1-.26) = \$3.6$ trillion. Given these figures and a typical market interest rate of $i \approx 0.06$, the value of expression (5) is \$1.1 billion, assuming $\Delta = 0.022$, and \$2.3 billion assuming $\Delta = 0.046$. To put this figure in context, overall revenue from the corporate tax in 2006 was \$353.9 billion. The efficiency loss is therefore one-third to two-thirds of a percent of corporate tax revenue.

These figures alone suggest that the tax distortions to corporate financial policy are not an important consideration when setting tax policy. To what degree, though, might these figures underestimate the costs of these distortions? One omission is that tax incentives vary by firm, creating misallocations as well as an average distortion. According to the figures in Gordon and Lee (2007), the average tax distortion was 0.46, but this tax distortion ranged from 0.01 to 0.92 across firms of different sizes and dates. If we assume that this tax distortion has a uniform distribution over this interval, then the average value of $(T^*)^2$ turns out to be a third larger than the value of $(T^*)^2$ evaluated at the average T^* .

Another omission is that the size of the tax distortion depends on the value of nominal interest rates. The above calculations were calculated assuming interest rates equal their average value during the sample period 1954–2000. The maximum values for

¹⁵ One approach for eliminating this tax distortion would be to eliminate both the deductibility of interest payments and the taxation of interest receipts.

¹⁶ We ignore at this point behavioral responses in other markets, an issue we return to below.

¹⁷ The estimates in Gordon and Lee (2001) suggest comparable responsiveness among firms of different sizes. This expression also ignores general equilibrium feedbacks that affect the market interest rate. To take these effects into account, a computational general equilibrium model would be needed.

nominal interest rates during this period were roughly 2.5 times as high. In those years, the estimated efficiency losses from existing taxes would then be 2.5 times as large in dollar terms, and probably a yet higher fraction of corporate tax revenue given the loss in revenue from the higher interest deductions. Currently, however, nominal interest rates are substantially below their average values during the sample period, reducing tax distortions proportionately.

The above figures also ignore any effects of a tax reform on behavior other than corporate financial policies. Other behavioral responses also have efficiency consequences to the degree that taxes distort these other decisions. The obvious response to focus on is corporate investment. The implications for corporate investment would depend on precisely how the tax distortions to corporate financial policy were eliminated. If these tax distortions were eliminated by eliminating both the deductibility of interest payments and the taxation of interest income under the personal and corporate tax while holding statutory tax rates unchanged, this would lead to an increase in the effective tax rate on corporate investment. Assuming that the existing tax structure discourages corporate investment, this implies an offsetting efficiency loss from eliminating the tax distortion favoring corporate use of debt finance. The quantitative importance of this offsetting effect can be debated,¹⁸ but its presence certainly undermines further any case for focusing on reducing existing distortions to corporate financial policy.

Note, though, that tax reforms that eliminate the deductibility of corporate interest payments often leave in place a tax penalty to interest income under the personal income tax. The result would be a shift from a tax subsidy to debt to a tax penalty, and one of roughly equal absolute value. Efficiency costs arising from distortions to sources of finance would then be little affected, but debt-equity ratios could change noticeably.

IV. ALTERNATIVE DETERMINANTS OF CORPORATE FINANCIAL POLICIES

These calculations, however, are not the end of the story. They are correct only if corporate use of debt would be efficient if there were no tax distortions. This assumption has been questioned in the more recent literature on corporate finance. The questioning initially focused on a variety of inconsistencies between the forecasts from the taxes versus bankruptcy-costs theory and observed corporate use of debt.

According to the taxes versus bankruptcy-costs theory, debt is favored to the extent that $\tau > m$ for a firm, and conversely. As a result, we should expect to see less use of debt by firms facing lower effective corporate tax rates. Given the progressive rate structure under the corporate tax, and the lack of full loss offset, small firms and larger firms with tax losses face much lower effective corporate tax rates than do larger profitable firms. By the theory, these firms should then borrow less.

¹⁸ Gordon, Kalambokidis, and Slemrod (2004a) find that tax payments under existing taxes are virtually identical overall to what would occur if we shifted to expensing of business investment and eliminated any taxation of financial income from capital (and any interest deductions), thereby eliminating all marginal distortions to savings and business investment. Gordon, Kalambokidis, and Slemrod (2004b) then argue that these small revenue effects imply a small effective tax rate on business investment.

The data very much show the reverse. According to the figures reported in Gordon and Lee (2001), firms with assets larger than \$25 million dollars financed only 17 percent of their assets with debt, whereas remaining firms financed roughly 30 percent of their assets with debt. The earlier empirical work found if anything that firms with tax losses had the same or slightly more use of debt than did profitable firms. Graham (2000) finds among publicly traded firms (those in the Compustat data set) that they and their investors could have saved additional taxes equal on average to at least 7.3 percent of firm value through expanding the use of debt finance. The firms that most forego these opportunities to save on taxes tend to be large, profitable, liquid, and in stable industries, making their behavior particularly puzzling.

In addition, while the taxes versus bankruptcy-costs model implies that bankruptcy costs should be high enough at the margin to offset any tax savings from extra debt, it is hard to find potential bankruptcy costs anywhere near this large in the data. For example, Warner (1977) could document ex-post bankruptcy costs in a sample of large railroad bankruptcies equal to only 1 percent of the market value of the firms seven years prior to bankruptcy. This figure is virtually an order of magnitude less than the foregone tax savings from extra use of debt finance, even assuming that the subsequent bankruptcy becomes certain. While high levels of debt also generate extra real costs due to increased conflicts of interest between debt and equity, as for example emphasized by Jensen and Meckling (1976), extra costs of the magnitude needed to explain the foregone tax savings seem implausible.

A further puzzling observation is that share prices fall when a firm unexpectedly announces new borrowing.¹⁹ Under the taxes versus bankruptcy-costs model, firms choose their debt levels to maximize the utility of shareholders, so that shareholders should be indifferent to any marginal changes in debt levels.

Another puzzle, given the taxes versus bankruptcy-costs model, was the sizeable use of debt finance in the early twentieth century, before tax distortions should have played any role. Taggart (1985) documents that debt-to-equity ratios were higher then than they were during many of the intervening years.

Myers and Majluf (1984) provide an intriguing explanation for these various observations, based on a “lemons” model for corporate borrowing. The lemons model dates back to Akerlof (1970), who used it to explain the low prices and small volume of trade in the market for used cars. Akerlof’s hypothesis is that people are much more likely to try to sell their car if it is a lemon, and thus performing poorly. Buyers may not be able to determine the quality of a car by visual inspection, so instead infer from the fact that the current owner wants to sell it that the car is likely to have problems.

Similarly, Myers and Majluf (1984) argue that lenders cannot easily judge the likelihood that a firm is doing well and will repay its debts, or doing poorly and likely to

¹⁹ Chaplinsky and Hansen (1993) and Howton, Howton, and Perfect (1996) provide evidence on the immediate impact of an unexpected debt issue on stock prices. Spiess and Aftleck-Graves (1999) and Datta, Iskandar-Datta, and Raman (2000) provide evidence that the longer run drop in stock prices in response to a new debt issue is even larger than the observed short run response.

default.²⁰ Facing the same interest rate, firms that are doing badly may be more inclined to borrow since it is less likely that they will end up repaying this debt, and also since they are more pressed for funds to cover current day-to-day expenses. If true, this implies that the set of firms that borrow tends to be lower quality firms. Not knowing the true quality of any particular firm, lenders need to charge a higher interest rate in order to protect themselves against the possibility that the firm borrowing money is in fact a lemon. Firms that are doing well can then find the high interest rates unattractive to the point that they may forego borrowing even at the cost of foregoing good projects or foregoing sizeable tax benefits.

This model immediately provides an explanation for why firms doing badly, who turn out to have tax losses, are the ones more likely to borrow. Myers and Majluf (1984) also use their model to explain the greater use of debt by smaller firms. They argued that these potential lemons problems are far more serious when firms use equity rather than debt finance, since then outside investors need to worry not just about the possibility of default but also about the entire distribution of possible returns. Outside investors will know much less about the situation of small firms than of large firms, given the economies of scale in collecting information on a firm. With greater asymmetric information for small firms, small firms will primarily use debt finance, if they raise outside finance at all.

This model also implies that share prices will fall in response to an unexpected use of debt finance, as seen in the data. In addition, real bankruptcy costs play no role in the model. Therefore, the insignificance of such costs in the data is entirely consistent with the model. The model also helps make sense of the sizeable use of debt in the early twentieth century, since this was a period in which lemons problems were undoubtedly more important than they are now, given more recent improvements in the quality of the information transmitted through financial markets. As a result, the model is much more consistent with the data than is the taxes versus bankruptcy-costs model.²¹

Within this lemons model for use of debt finance, taxes can still affect choices. As in the earlier model, firms with $\tau > m$ are encouraged to borrow in order to take advantage of the resulting tax savings, while firms with $\tau < m$ will be discouraged from borrowing, everything else equal. The empirical work that finds such behavioral responses can then be consistent as well with this lemons model, as long as it controls adequately for the other factors affecting borrowing decisions. The key additional control needed under the lemons model is an indicator of the severity of the asymmetric information problems. The natural control here is firm size, a control already used in the prior studies.

The main difference between the lemons model and the taxes versus bankruptcy-costs model is in the calculation of efficiency effects. In order to demonstrate the possible

²⁰ Formally, their model deals with any source of outside finance. In applying their model to debt finance, I reinterpret some of their expressions so as to reflect the particular trade-offs faced with debt.

²¹ Fama and French (2002) and Shyam-Sunder and Myers (1999) provide further empirical evidence in support of this “lemons” model.

efficiency effects of existing tax distortions favoring use of debt finance, the following section considers a variant of a lemons model.

V. LEMONS MODEL OF CORPORATE USE OF DEBT FINANCE

Consider the borrowing decisions made by a set of firms all of which look identical to outside investors but differ in their true value and in the marginal product of any additional investment, given whatever investment is feasible out of internal funds. Following Myers and Majluf (1984), assume that any outside finance will take the form of debt rather than equity.

Firms must decide whether or not to borrow from outside investors, and if they borrow how much to borrow. Shareholders require an expected rate of return of $r(1 - m)$ on any bonds they buy. The interest rate charged on such loans equals i , which is set so that lenders break even in expectation, that is $r = i\rho$, where ρ is the equilibrium fraction of the contractual interest that in fact is repaid and r is the risk-free market interest rate. To simplify the derivations, assume that i does not depend on the amount borrowed.

Funds, B , that are borrowed are in part used to finance extra capital, but can also in part be paid out directly to shareholders. Assume that αB equals the amount paid out directly to shareholders, while the rest of the amount borrowed is invested.²² The amount received by shareholders earns a rate of return of $r(1 - m)$ when invested in the financial markets.

Each firm is run by a manager who has inside information about \tilde{v} , which represents one component of the firm's cash flow. The objective of the manager is to maximize the ex-post profits accruing to the firm's shareholders. These net profits equal

$$(6) \quad (1 - \tau)[\pi(K + (1 - \alpha)B) + v + \varepsilon] + \alpha Br(1 - m) - \min(iB, \pi + v + \varepsilon)(1 - \tau)$$

Here, $\tilde{\varepsilon}$ is a second random component to profits not known by the manager when she makes decisions. The firm repays the promised amount iB as long as it has the funds. Otherwise, it pays out all of its net-of-tax cash flow to lenders. Outside lenders know K and can monitor that $(1 - \alpha)B$ was in fact invested.

The manager chooses B so as to maximize (6), subject to the constraint that the amount borrowed must be non-negative.²³ Let $P(B|\tilde{v})$ denote the probability that the loan is fully repaid (e.g. $P(\tilde{\varepsilon} > iB - \pi - \tilde{v})$), based on the information available to the manager.

The first-order condition for B can be expressed as

$$(7) \quad \pi'(K + (1 - \alpha)B) \leq i - \frac{\alpha r}{1 - \alpha} \left[\left(\frac{1}{P} - \frac{1}{\rho} \right) + \frac{\tau - m}{P(1 - \tau)} \right],$$

²² Equivalently, firms would have invested αB of their own funds if they chose not to borrow, but instead pay out these funds to shareholders if they do borrow.

²³ If the firm instead lends money, then it would earn the interest rate r rather than i . For simplicity, we ignore the possibility that firms choose to lend money at this lower interest rate.

where the equation is satisfied with equality whenever $B > 0$. The first term on the right-hand side of (7) simply equals the interest rate charged on corporate debt, i . The term inside the parentheses measures the degree to which any given firm has a probability of repaying in full that differs from the average repayment rate on the loan market as a whole.²⁴ The higher is its default rate, the stronger are its incentives to borrow. Finally, the last term measures the effects of taxes on corporate use of debt. Taxes again encourage debt to the extent that $\tau > m$.²⁵

The cost of capital varies across firms simply due to variation in P . The more likely the firm will default, the lower is P and the smaller is the cost of capital. Among firms that borrow, therefore, firms with a lower \tilde{v} borrow more, and end up with a lower equilibrium value for π' . Firms with a high enough value for \tilde{v} will find the cost of capital too high to justify any borrowing.

We therefore find a misallocation of capital, with good (high \tilde{v}) firms ending up with too little capital relative to bad (low \tilde{v}) firms. Bad firms borrow more since the cost is low, given that they are unlikely to repay the debt. On efficiency grounds, in contrast, firms should invest until $\pi' = r$. For plausible parameter values, the worst firms can even end up investing in value-reducing projects, where $\pi' < r$.

In principle, tax policy can then be used to reduce the misallocation of capital among firms. Allocations among firms would be efficient if the expression on the right-hand side of (7) equals r , regardless of P , where $r = i\rho$. Solving for the value of T^* that generates such an efficient allocation, we find that

$$(8) \quad T^* = P \frac{1-\rho}{\rho\alpha} - (1-P).$$

Assume, for example, that $\rho \approx 0.75$, so that the interest rate on corporate borrowing is a third higher than the risk-free rate. Assume, lacking empirical support, that $\alpha \approx 0.2$, so that shareholders can immediately remove 20 percent of the amount borrowed from the assets available as implicit collateral for the lenders. Then the value of T^* that induces an efficient level of investment is 0.67 for the safest firms (when $P = 1$), but equals 0.067 for a firm with a 60 percent chance of not repaying the debt in full (when $P = 0.4$). This compares with a mean value for T^* in the Gordon and Lee (2007) data set of 0.46, ranging across firms from 0.01 to 0.92.

To what degree can the tax law approximate such a tax schedule, imposing a much higher marginal tax rate on good firms than on bad firms? One crude way to do this is through no-loss-offset provisions. Firms with a worse value of P are more likely to face binding no-loss-offset provisions, and thus face a lower effective value of τ and hence a lower T^* .

²⁴ This term inside the parentheses on average is positive across firms for two separate reasons. For one, $\rho > P$ to the extent that firms make *any* repayments in the event of default. In addition, the variation in P across firms implies that $\text{avg}(1/P) > 1/\bar{P}$.

²⁵ For example, for a firm that will repay its debt with certainty so that $P = 1$, the expression in brackets is negative, discouraging use of debt, when $i - r > r(\tau - m)/(1 - \tau)$, so that the overpayment on the debt outweighs the tax advantage of debt.

Asymmetric information is likely to be a much more severe problem for smaller firms than for larger firms. Note that firms with profits below \$75,000 face a lower marginal corporate tax rate than do firms with higher profits. If the small firms likely to have access to outside credit have expected profits around \$75,000, then those firms that are in fact better than average will face a much higher value of τ than those that are worse than average. Good firms are then encouraged to borrow by the tax law, whereas weak firms may even be discouraged from borrowing. Larger firms in contrast face a constant value of τ over a much wider range of their possible incomes, leading to less of a differential impact on the borrowing of good relative to bad firms, as would be appropriate if there is less asymmetric information for these firms.

This lemons model therefore forecasts that a number of existing provisions in the tax law might have some beneficial effects. In particular, no-loss-offset provisions and the progressive rate schedule under the corporate tax may both help to discourage borrowing by firms expecting to do badly,²⁶ and to encourage borrowing by firms expecting to do well. In both cases, this helps alleviate the allocation problems arising from asymmetric information.

VI. ADDITIONAL MODELS OF CORPORATE CAPITAL STRUCTURES

While the taxes versus bankruptcy-costs and the lemons models have both received substantial attention within the corporate finance literature, they are by no means the only models of the determinants of corporate leverage that have been explored. This section describes more briefly two other models that have been taken seriously in the academic literature, to assess their consistency with the evidence, and then to sketch their implications for the measurement of the excess burden generated by the existing tax treatment of interest income and interest payments. To anticipate the discussion, both models generate a number of counterfactual forecasts, and seem dominated by the “lemons” model given the available evidence.

A. Agency-Cost Models of Debt Finance

One alternative model, first proposed by Easterbrook (1984) and Jensen (1986), focuses on an agency problem within the firm. Managers, they argue, want to build an empire, and so choose to invest more than is in the interests of shareholders. Specifically, if the firm has “free cash flow,” managers will choose to invest more of these funds than is in the interests of shareholders. Shareholders, acting perhaps through the Board of Directors, should respond by reducing the firm’s free cash flow. They can do this for example through dividend payments.²⁷ They can also do it through inducing the firm to borrow more, and then encouraging the firm to use the borrowed funds to

²⁶ Firms facing no-loss-offset provisions, though, can escape this restriction by shifting to non-corporate form (e.g., becoming a subchapter S corporation).

²⁷ See Gordon and Dietz (2009) for a formal examination of this explanation for dividends.

repurchase equity. By saddling the firm with future interest payments, managers are left with less free cash flow, reducing wasteful investment.

Under this model, we should expect to see more use of debt in: (1) publicly-traded (large) firms, where shareholders have a harder time monitoring managers so where agency problems are worse, (2) more profitable firms, with greater cash flow that can potentially be wasted, and (3) firms with lower amounts of profitable investment, implying less need to leave any cash within the firm.

These forecasts are all contradicted by the data. As noted above, small firms rely far more on debt finance than do large firms. As reported in more detail in Graham (2000) and Fama and French (2002), more profitable firms are less leveraged, everything else equal, rather than more leveraged. Firms that invest more are more leveraged, as documented for example in many of the empirical studies cited above, where leverage ratios are found to be higher in firms with more depreciable capital. Note that all three of these patterns in the data are consistent with the Myers-Majluf (1984) model.²⁸

Nonetheless, if the agency-cost model were the appropriate description of the determinants of corporate financial policy, how should the efficiency costs of the existing tax treatment of corporate interest payments be measured? Under the agency-cost model, shareholders choose a level of debt finance to maximize firm values. This would also be the efficient level of debt from an efficiency perspective. To a first approximation, the efficiency costs arising from the current tax treatment of debt would be measured in the same way as in the taxes versus bankruptcy-costs model, where debt levels were also chosen efficiently ignoring taxes.

This isn't the end of the story. At the margin, shareholders face a cost from reducing free cash flow, due to the added potential costs of bankruptcy. Free cash flow may be reduced without these offsetting real costs, though, through an added tax on corporate cash flow, such as a corporate surtax. Tax payments then go up when cash flow is high, and waste would be high, and may even fall (due to tax loss carrybacks) when cash flow is low and the firm might face a risk of default. The tax therefore not only reduces excess investment but can even potentially reduce the chance of default. This corporate surtax should be confined to firms with important agency problems, such as publicly traded firms. The existing tax code may approximate this, through the use of a higher corporate tax rate on more profitable firms.

B. Signaling Model of Debt Finance

Yet another alternative model, proposed originally by Ross (1977), argues that a firm agrees to saddle itself with debt in order to signal to outside investors that the firm is confident that it will have sufficient cash flow in order to service this debt. When firms

²⁸ Of course, there are some forecasts from the agency model that are consistent with the data. One is that firms may use debt finance even without tax distortions favoring debt, so that the model is consistent with the observed use of debt in the early 20th century when agency problems were worse.

engage in more borrowing, they trade-off the gain from convincing investors that the firm is doing better, leading to a jump in share prices, with the cost from being left with less internal cash-flow, forcing a cut-back in desired projects. The signaling model then forecasts that firms with greater cash flow and less investment needs will find it easier to signal and so take on extra debt. In addition, firms for which outside investors are less well informed would have a stronger incentive to signal. When a firm does signal, share prices should rise.

How do these forecasts match up with the data? The first two forecasts are both counterfactual. Contrary to these models, firms with greater cash flow do not have higher leverage ratios, while firms that invest less have lower rather than higher leverage ratios. Which firms face less well-informed outside investors, creating more of a price response to signaling? Presumably, outside investors are less well informed about the profitability of smaller firms, given the economies to scale in the collection of information. Smaller firms should then use more debt finance, consistent with the data. The heart of the signaling model, though, is that the signal should generate a jump in share prices. As noted above, the evidence here contradicts this forecast. Unexpected increases in the use of debt have been found to lead to a drop in share prices.

Nonetheless, if the signaling model were correct, what can we say about the efficiency effects of the current tax treatment of interest payments and income? Under the signaling model, the firm accepts real costs through reduced investment in order to signal its profitability to the market. As argued by Spence (1973) in the context of education as a signal, efficiency would improve if the overall costs of signaling could be reduced, holding fixed the information conveyed. This would occur in the context of education if people in equilibrium “waste” fewer years acquiring education as a signal. In our context, the overall costs would be reduced if in equilibrium firms use less debt, while still successfully signaling their profitability to outside investors.

Starting from a setting with no tax distortions, the use of debt as a signal would be reduced if investors were taxed on their interest income. Additional debt then implies not only foregone investment but also extra tax costs to investors. These combined costs are again traded off with the benefits resulting from the associated increase in the firm’s share price arising from the signal. By adding a tax cost, the equilibrium signal is smaller and the overall marginal cost of the signal is higher, but the marginal cost from foregone investment is smaller. As a result, the efficiency loss arising from the foregone investment is smaller, so that overall efficiency increases. In contrast, if firms receive a tax savings as a result of their interest payments, equilibrium use of debt increases to the point that equilibrium investment falls, in spite of the reduced corporate tax payments; equilibrium marginal benefits from debt are higher so that equilibrium marginal costs resulting from foregone investment should be higher.

The benefits from reducing the current tax subsidy to debt are then larger than in the taxes versus bankruptcy-costs model, and there would even be efficiency benefits from replacing these subsidies with some net tax on the use of debt. As a result, the current tax treatment of debt seems particularly puzzling if the signaling model were true, providing further evidence against this model.

VII. TAXES AND BORROWING BY MULTINATIONALS

The analysis above focuses on external borrowing decisions by U.S. domestic firms. Additional borrowing not only has implications for tax payments by the firm and its creditors but also affects possible bankruptcy related costs and may signal information about the firm to investors. In addition, given lemons problems, only those who have a higher risk of default may in fact choose to borrow.

A different set of issues arises when considering the internal borrowing decisions made within a multinational firm, with one subsidiary borrowing from the parent firm or from a different subsidiary. When subsidiaries are located in different countries, such internal borrowing affects the overall taxes owed by the multinational.²⁹ There are tax savings whenever a subsidiary in a higher-tax country borrows from one in a lower-tax country. Such internal debt does not involve any transactions with outside creditors, and thus raises none of the offsetting non-tax costs discussed above. In particular, there are no bankruptcy related costs as long as the risk of bankruptcy depends on the overall debt position of the multinational as a whole. The interest rate paid to outside creditors is not directly relevant when setting an interest rate on internal debt. There is no signal of an overall shortage or surplus of funds within the multinational, given the lack of transactions with outside creditors. With no obvious non-tax costs from this tax arbitrage, we should expect internal borrowing behavior to be extremely responsive to tax rate differences.

The empirical evidence suggests that these internal borrowing decisions are very responsive to relative tax rates in the different countries in which a multinational operates, particularly when subsidiaries are fully owned by the parent firm. Specific estimates for the elasticity vary: Huizinga, Laeven, and Nicodeme (2008) find that a 10 percent increase in the corporate tax rate faced by European multinationals raises a subsidiary's debt by 2.4 percent of capital, Desai, Foley, Hines (2004) estimate a higher response of 3.5 percent of capital for United States multinationals, while Mintz and Weichenrieder (2005) estimate a yet higher response of 5.6 percent of capital for fully owned subsidiaries of German multinationals. These figures contrast with the estimates in Gordon and Lee (2001, 2007) that a 10 percent increase in corporate tax rates in the United States would raise the debt-to-capital ratio of domestic firms from 1.0 percent to 2.2 percent of corporate capital.³⁰

That purely internal use of debt is more responsive to taxes than is external debt is not surprising. The surprise instead is that the response is as limited as is found in the data.

²⁹ Income from subsidiaries all within the United States, in contrast, is consolidated for tax purposes if cross-ownership is at least 80 percent, implying no net effects on federal revenues from internal borrowing within the United States. State corporate tax liabilities are also unaffected by such internal borrowing, since under formula apportionment the tax base equals a fraction of national consolidated income, where the fraction depends on the location of capital, payroll, or sales, but is not affected by internal borrowing.

³⁰ Their sample includes multinationals located in the United States, which presumably have larger behavioral responses to tax incentives than do purely domestic firms. Thus, the implied estimate of the behavioral response by purely domestic firms would be even lower.

One hypothesis for the limited response may be that the subsidiaries in high-tax-rate countries cannot reduce their tax liabilities further, due to no-loss-offset restrictions. Another hypothesis is that reported profits of each subsidiary may have real effects, since the same figures reported to the tax authorities may need to be used in compensation schemes for employees in the subsidiary. A third hypothesis is that bankruptcy-related costs may depend not only on the overall debt-to-capital ratio of the multinational as a whole but also on the debt-to-capital ratio of each subsidiary, as would be the case if the parent firm does not guarantee the debts of each subsidiary.

Regardless of which of these hypotheses explains why internal use of debt does not respond even more to differences in tax rates across subsidiaries, the firm's choice would be efficient from the perspective of the domestic government if there were no tax distortions, as in the taxes versus bankruptcy-costs model. As a result, the efficiency cost from the national perspective generated by corporate taxes on multinationals equals $-\int_0^{\tau_{US}} i\pi(\partial D/\partial \tau)d\tau = -.5i\tau_{US}^2(\partial D/\partial \tau)$, where D represents the internal debt of the United States firm. Efficiency costs here are potentially much greater than for domestic firms because behavior is more responsive to taxes, the behavioral response does not generate additional interest income taxable under the personal income tax, and the change in the corporate tax rate needed in order to eliminate any distortions (from the United States perspective) equals τ_{US} rather than $\tau_{US} - m$.

The economic considerations are then very different when considering tax effects on the behavior of multinationals versus domestic firms. Rather than trading off the effects on each class of firm when setting the corporate tax schedule, it is better to have additional instruments to deal separately with multinationals. Efficiency costs from the distortion to financial policy of multinationals would be entirely avoided (from the domestic perspective) when interest payments are not deductible under the corporate tax. While no country has modified their corporate tax to eliminate entirely the distortions faced by multinationals, the United States does have two provisions that at least reduce its efficiency costs.

Consider first the interest allocations rule. Under this provision, interest payments made by a U.S. firm are allocated across all the subsidiaries of the multinational in proportion to the capital stock of each subsidiary. Rather than receiving tax deductions of $i\tau_{US}D$, immediate deductions instead are reduced to $\alpha i\tau_{US}D$, where α is the fraction of the firm's capital located in the United States. If the firm is in an excess credit position, there are no further tax benefits from borrowing by the U.S. firm, so that the efficiency costs from the tax distortions to debt for this firm are reduced by α^2 . If instead the firm is in a deficit credit position, then the interest deductions allocated to the foreign subsidiaries will reduce domestic taxable income due when profits are eventually repatriated. Due to deferral, receiving these deductions at a later date is not as valuable as receiving them immediately. Tax distortions are then still reduced, but not by as much as for firms in an excess credit position.

Subpart F rules come into play when the foreign subsidiary not only has less debt than the U.S. firm but in fact has positive holdings of interest-bearing assets. Without subpart F rules, the tax savings when a U.S. firm borrows from a foreign subsidiary

remain the same, regardless of the sign of the subsidiary's net holdings of interest-bearing securities. With subpart F rules, though, the interest income on positive holdings of interest-bearing securities is immediately taxable in the United States. Taxes are still paid abroad on this interest income, resulting on net in a tax loss from use of debt when subpart F applies.³¹ As a result, this provision places a ceiling on the feasible extent of tax arbitrage through use of debt.

In spite of the presence of these extra provisions, Desai, Foley, and Hines (2004) still estimate that borrowing decisions by U.S. multinationals are very responsive to relative tax rates. This additional consideration therefore makes it more costly to use the corporate tax as a tool to alleviate lemons problems faced by domestic firms in the credit market.

VIII. SUMMARY

There is a huge academic literature investigating how taxes affect corporate use of debt. When companies borrow, their corporate tax liabilities fall due to the resulting interest deductions. Those financing the firm, though, may well face personal taxes on the resulting interest income. The tax law subsidizes debt finance to the extent that the resulting fall in corporate tax liabilities exceeds the resulting extra taxes paid on this interest income under the personal tax.

How important have these tax incentives been in practice, and how responsive have investors been to these incentives? What have been the resulting efficiency costs from these distortions to market incentives?

The most recent empirical evidence suggests that the tax incentives to borrow are often large. Graham (2000) reports that large U.S. corporations could save on average at least 11.6 percent of firm value in the combined tax liabilities of the firm and shareholders through use of debt. These large tax distortions encouraging more debt, however, have had only modest effects on use of debt finance. The estimates suggest that the tax incentives observed over time in the United States have been sufficient to induce firms to increase the fraction of capital financed with debt by up to 4.7 percentage points, relative to a mean of 26 percent.

The remaining debate revolves around how to infer the efficiency effects of such changes to corporate financial choices. The standard presumption has been that corporations would choose the efficient use of debt, ignoring taxes, so that any tax distortion results in efficiency costs. Based on this starting point, the overall excess burden from the tax distortion to financial choices is well under one percent of overall corporate tax revenue.

This standard presumption that corporations would choose the efficient use of debt, ignoring taxes, has often been questioned in the recent academic literature, however.

³¹ These foreign taxes can eventually be claimed as a credit against United States tax liabilities for those firms in a deficit credit position. However, due to deferral, there remains a net tax cost of the extra debt.

While Graham argues that large U.S. firms could have saved at least 11.6 percent of firm value in taxes, he finds that they in fact saved only 4.3 percent of firm value in taxes. Why do some of the most profitable firms borrow so little, given the large foregone tax savings that would result from any interest deductions? Why do firms with tax losses, where taxes discourage borrowing, nonetheless borrow as much as they do?

A commonly proposed answer in the academic literature is that firms borrow relatively little on average because of lemons problems in the loan market. Lenders cannot easily distinguish between good and bad firms, so must set one interest rate for both. At this interest rate, bad firms can easily find it attractive to borrow, since they often do not end up repaying the debt. Good firms, in contrast, may well find the interest rate too high to justify borrowing. Consistent with this hypothesis, the evidence shows that a firm's share price falls when it unexpectedly chooses to borrow. With such a lemons problem, good firms face a cost of capital in the bond market above that faced by bad firms. Investment is then misallocated, with too little investment in the good firms.

The tax law can, and to some degree has, been designed to alleviate the resulting misallocations. To do so, it should encourage borrowing by good firms, who borrow too little on efficiency grounds, and perhaps even discourage borrowing by bad firms. The current law does this in part through no-loss-offset provisions, which prevent a firm with tax losses from saving on taxes through additional interest deductions. The progressive corporate tax schedule also encourages profitable firms to borrow, while potentially discouraging unprofitable firms from borrowing. In both cases, these differential incentives on good versus bad firms help alleviate the misallocations that result from lemons problems in the loan market.

While there is suggestive empirical evidence in support of this lemons model, direct evidence on the implied misallocation of capital is limited. Fazzari, Hubbard, and Peterson (1988) find evidence that small firms with high market values relative to their book values rely primarily on retained earnings for additional investment, consistent with the hypothesis that good firms find the interest rate on corporate loans too high to be attractive. The observed variation in market to book values for the firms in their sample is substantial. If the marginal return on additional investment is linked to the average value of the firm's existing capital, then their evidence implies substantial variation in the marginal products of capital as well. This type of evidence provides the most support for the importance of the corrective measures under the tax law laid out in this paper.

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