Economics 230a, Fall 2018
Lecture Note 11: Taxation and Corporate Financial Policy

We have discussed how household portfolio choices are influenced by taxation. But what determines the supply of different assets by firms, in particular their debt-equity ratios? We will ultimately want to know how taxation affects both the financial and real decisions of firms, that is, how they raise funds and how (and where) they invest them, but we will start by holding the real side fixed and consider financial policy on its own, for a firm subject to the corporate tax.

When thinking about a corporation's choice between issuing debt and issuing equity to finance its operations, an important consideration is that interest payments are tax deductible, whereas payments to equity holders in the form of dividends are not. This seems to favor debt over equity finance. Also, corporations can generate earnings for equity holders in the form of capital gains, rather than dividends, by retaining and reinvesting earnings. Since capital gains are effectively taxed at a lower rate than dividends (even if they face the same statutory tax rate, because of deferral and other provisions), this seems to favor retentions over the payment of dividends. Thus, from a first look, one should to see mostly debt finance and, to the extent that equity exists, equity returns mostly in the form of capital gains rather than dividends. Yet, the value of equity far exceeds that of debt for the nonfinancial corporate sector, and a significant share of corporate earnings is distributed annually as dividends. How should we think about these outcomes? We follow the discussion and notation in Auerbach's *Handbook* chapter.

Dividend Policy

We start by considering the dividend policy of a representative firm and shareholder, whose tax rates on dividends and capital gains are, respectively, $\theta > c$. For simplicity, we assume that the capital gains tax is assessed on accrual, and that the rate c already incorporates the benefits of deferral. How will the firm's dividend policy affect the firm's value maximization problem? Assume that the shareholder has a time preference rate ρ. Then, in equilibrium, the value of the firm must be such that the after-tax rate of return at any instant equals ρ; that is:

$$(1) \qquad \rho = \frac{D_t}{V_t}(1-\theta) + \frac{\dot{V}_t - S_t}{V_t}(1-c)$$

where $\dot{V}_t$ is the change in the firm's value at date t, and S_t is the portion of that change in value that comes from issuing new shares. That is, the firm's intensive growth in value at date t is $\dot{V}_t - S_t$ and its extensive growth is S_t. Only the former represents income (since the shareholder must contribute funds in exchange for the new shares) and is taxable. Expression (1) is a first-order differential equation in V, which can be solved using a "no bubble" terminal condition as:

$$(2) \qquad V_t = \int_t^\infty e^{-\frac{\rho}{1-c}(s-t)} \left[D_s \left(\frac{1-\theta}{1-c} \right) - S_s \right] ds$$

Now, consider the firm's dividend policy, holding the net cash flows to equity-holders at each date s, say $G_s = D_s - S_s$, constant. It is clear that reducing dividends and new share issues dollar for dollar will increase market value, since $\theta > c$. Thus, it would seem that firms should reduce dividends until they are zero (since dividends cannot be negative). But there are other possible

constraints that might bind before dividends reach zero. In particular, if $G_s > 0$, then setting dividends equal to zero would require negative share issues, $S_s < 0$, that is, share repurchases. But there are limits on share repurchases that reduce their attractiveness. In the United States, for example, repurchases from shareholders in proportion to share ownership are treated and taxed as dividends, but the anticipation of repurchases from only some shareholders can reduce the value of shares to the extent that there is asymmetric information about firm's prospects and shareholders fear that firm insiders will repurchase shares opportunistically. Thus, it is common to assume that there is some constraint on share repurchases; we will simply assume that

(3) $S_t \geq 0$

Also, the literature on dividend policy suggests a signaling value to dividends, that firms may pay dividends to signal their underlying profitability. To represent this argument, we simply assume that dividends must represent at least a certain fraction of overall returns, i.e.:

(4) $D_t \geq p\left(D_t + \dot{V}_t - S_t\right)$

As to which of these two constraints is more likely to bind, the answer will depend on the type of firm. Firms with a lot of cash flow (G) due to high earnings and/or relatively low investment costs, will hit (3) before they hit (4). The opposite will be true for firms with fast growth and/or low current earnings. We may think of firms as passing through a life-cycle in which first (4) and then (3) applies, but for simplicity let us assume that either one or the other is always binding. (We know that at least one will bind, because it is in the interest of a firm to reduce its dividends until one does.) We then have two cases; in each, we combine the restriction imposed by the binding constraint with the valuation expression (2) to obtain the value of the firm:

"Immature" firms (constraint (4) binds):

(5) $V_t = \int_t^\infty e^{-\frac{\rho}{1-p\theta-(1-p)c}(s-t)} G_s ds$

"Mature" firms (constraint (3) binds):

(6) $V_t = \int_t^\infty e^{-\frac{\rho}{1-c}(s-t)} D_s \left(\frac{1-\theta}{1-c}\right) ds$

where in (6) we have used the fact that $D = G$ when (3) binds. It is common to refer to (5) as the "traditional" view of firm valuation; it says that the value of the firm equals the discounted value of its cash flows, where the discount rate is increased by the average rate of tax on equity earnings, $p\theta+(1-p)c$. Expression (6), incorporates the "new" view of equity valuation, with two somewhat surprising characteristics. First, the discounting of future cash flows incorporates only the capital gains tax rate, not the dividend tax rate. Second, the entire valuation expression is multiplied by the factor $\frac{1-\theta}{1-c}$ (which, if constant, can be taken outside the integral in (6)). These two results are closely tied: the portion of the dividend tax in excess of the capital gains tax, which one may think of as the extra tax due when earnings are distributed (since all earnings are subject to at least the capital gains tax), is capitalized into the value of shares, rather than appearing in the discount rate.

What makes this capitalization occur? The key insight is that, when the firm faces constraint (3), all of its decisions affecting the path of G, such as investments that reduce G in the present and increase it in the future, have offsetting effects on dividends; investments are financed by reducing current dividends, and the additional earnings they generate in the future are paid out as dividends. Reducing dividends by a dollar today costs shareholders $1-\frac{\theta-c}{1-c}=\frac{1-\theta}{1-c}$ dollars after tax, because it lessens dividend taxes but raises capital gains taxes, since retentions increase firm value. By the same logic, increasing dividends by a dollar in the future gives shareholders $\frac{1-\theta}{1-c}$ dollars after tax. Thus, the dividend tax reduces inflows and outflows by the same fraction; therefore it has no effect on the rate of return. Only the capital gains tax, which applies regardless of whether earnings are distributed, affects the rate of return. Since the dollar being invested is worth only $\frac{1-\theta}{1-c}$ to the current (or any other) shareholder, this must be its market value.

Expression (6) has several implications. First, dividend taxes do not distort firm decisions. Also, the overall tax wedge facing corporate equity may be smaller than traditionally thought, because only the capital gains tax rate, which may be very low, applies at the individual level. Finally, the level of dividend taxes should not affect dividend payout decisions, since reduced payouts today do not reduce the present value of shareholder taxes. This last result may not seem consistent with evidence that firms increase their dividends in response to tax rate reductions (as in Chetty and Saez), but it would be if dividend tax reductions were perceived as temporary, for then increasing payouts today would reduce the present value of dividend taxes. Other evidence on the "traditional" vs. "new" view comes from Auerbach and Hassett, who look at the linkage between dividends and investment. Under the new view, dividends are the source of equity funds and therefore should fluctuate with investment. They find that this is true for some firms and not for others, with firm maturity and capital market access playing a role.

The Debt-Equity Decision

Now, let us take the firm's dividend policy as determined and ask about the leverage decision, i.e., how much of its investment it will finance by borrowing. Without going through the formal optimization, it should be intuitive that the firm will find it cheaper to finance with debt (equity), if the following condition is satisfied:

(7) $\quad (1-\tau)(1-\varphi) < (>)\ (1-\psi)$

where τ is the corporate tax rate, φ is the effective tax rate on equity earnings (depending on whether (5) or (6) holds, either $p\theta+(1-p)c$ or c) and ψ is the tax rate on interest income. Expression (7) compares the return to a dollar of before-tax equity earnings, which faces both corporate and individual tax rates, to the return to a dollar of interest, which is taxed only at the individual level.

It would seem that the inequality in (7) would, at least until the 2017 tax reform, have favored borrowing, especially under the traditional view. Why, then, is debt less important than equity in the typical corporate capital structure? There are a number of possible explanations:

1. Under the new view, $\varphi = c$, which reduces the apparent tax penalty on equity.

2. It may be true for the average investor that $(1-\tau)(1-\varphi) < (1-\psi)$, but debt and equity could coexist as long as there are *some* investors for whom $(1-\tau)(1-\varphi) \geq (1-\psi)$. This would give us the type of sorting equilibrium discussed in Lecture 9. A sorting equilibrium that balances corporate and individual taxes so that both debt and equity exist is known as a Miller equilibrium, in reference to Miller (*Journal of Finance*, 1977).

3. The *effective* corporate tax rate may be lower than the statutory rate, because of the asymmetric treatment of losses. If additional interest payments simply increase a company's losses, they won't be immediately deductible and give a lower tax advantage.

4. Borrowing increases the probability of default. The possibility of default can be accommodated through a higher interest rate on the bond. But there are also costs to the firm as a whole (i.e., to bondholders plus shareholders) when bankruptcy occurs. Thus, if bondholders are compensated for the increased probability of bankruptcy, shareholders may be worse off, even when the tax advantage is taken into account.

5. Borrowing can increase moral hazard on the part of corporate managers acting in the interest of shareholders. Once a firm has borrowed, it has an incentive to increase the variance of its investment projects, even if this reduces expected returns, because bondholders bear some of the losses in bad states, while in good states the bondholders' returns are fixed by the promised interest rate. If bondholders anticipate this behavior, they will demand a higher promised interest rate. Firms will still choose the riskier projects, bondholders will end up with their normal rate of return, on average, and the losses from the firm's suboptimal investment choices will fall on the shareholders.

Points 4 and 5 refer to cases in which managers act in the interests of shareholders, aligned against bondholders. But managers may have interests distinct from either group, and this could lead to too little borrowing from the shareholders' perspective. For example, managers may be more risk averse than shareholders, because it is easier for shareholders to diversify risk by holding other assets than it is for managers to diversify their human capital risk tied to the firm's outcomes. Thus, managers might borrow less than the amount that would maximize shareholder value. A related argument, associated with Jensen (*AER*, 1986) and others, is that higher borrowing forces managers to work harder and eschew low-value "pet" projects in order to avoid bankruptcy. While in the interest of shareholders, it is not the choice that managers will make, which suggests that shareholder welfare will be increased by a more competitive corporate control market, which forces managers to borrow more or be displaced by others who will. Note that what is optimal from the shareholders' perspective may not be for society as a whole. For example, if the tax system is distorted toward too much borrowing, it might make shareholders worse off, but society better off, if managers limit borrowing due to their own self-interest.

Even if corporations borrow less than one might predict, it is sensitive to changes in the tax benefit from borrowing. Ohrn's paper considers the impact of a provision, the Domestic Production Activities Deduction (introduced in 2004 and in force until the 2017 tax reform), that effectively lowered the corporate tax rate for qualifying companies with domestic manufacturing activities. Treating the variation in the availability of the DPAD across industries as a natural experiment, Ohrn finds, using public financial statement data from Compustat, that the full provision reduced debt-assets ratios by 5.3 percent, a sizable effect given that the effective tax rate reduction was 3.15 percentage points (from the 35 percent baseline corporate tax rate).