

Example 15.2

Investment Incentives Under the U.S. Corporation Income Tax

Corporations have been taxed separately in all the industrialized market economies. The reasons for this are not entirely clear, but there are two likely explanations. One is the limited liability protection against losses that incorporation affords its stockholders; claims against the corporation to cover losses can be made against the assets of the corporation but not against the personal assets of the stockholders. This protection of owners' assets is absent in partnerships and sole proprietorships, which leads to the view that corporations are distinct entities that can appropriately be taxed. The other is just the importance of corporations in the industrialized economies. In the United States, for example, corporations represent only 19% of all business, but they account for 83% of all business receipts and 66% of all net business income.¹ Consequently, they are an easy source of tax revenue that governments have chosen to exploit. The revenue collected by the U.S. corporation income tax was \$370.2 billion in fiscal year 2007, 15% of all federal tax revenue. Forty-five states also levy corporation income taxes; these states collected \$47.5 billion from their corporation income taxes in FY 2006, just under 7% of total state tax revenue.²

The corporation income tax raises a number of efficiency and equity issues that are of interest to public sector economists:

- *The inefficiencies generated by the tax:* Two potential sources of inefficiency are of particular interest. One is the effect of the tax on the incentives to invest by corporations. This matters because investment is the key to long-run economic

¹ *Statistical Abstract of the United States* (Washington, D.C.: Government Printing Office, 2010), Table 728. The data are for 2006.

² *Budget of the United States Government, Fiscal Year 2009, Supplement* (Washington, D.C.: U.S. Government Printing Office, 2008), Historical Tables, Tables 2.1; and U.S. Census Bureau, State and Local Government Finances, Table 1: State and Local Government Finances by Level of Government and By State: 2005–06, United States Total, www.census.gov/govs/estimate/0600ussl_1.html. Corporate profits, and thus corporate tax revenues, vary substantially with the state of the economy, falling sharply during recessions and rising sharply during recoveries. FY2006 and 2007 are good benchmark years because the economy was essentially at full employment at the time.

growth. The second arises because capital is a highly mobile factor of production. Do corporation income taxes induce firms to reallocate their capital from high-tax to low-tax jurisdictions, such as from high-tax to low-tax states in the U.S. or from high-tax to low-tax nations within the European Union?

- *The incidence of the tax:* Do stockholders bear the burden of the tax, or is the tax passed on in whole or in part to consumers or labor?

Chapters 18 and 19 of the textbook discuss the incidence of the corporation income tax, and Chapter 22 considers the inefficiencies arising from the movement of capital in response to differential tax rates, including the potential for a race to the bottom among jurisdictions in setting the tax rates on corporations. This example focuses on the investment incentives resulting from corporation income tax, using the U.S. tax to illustrate.

The User Cost of Capital

A firm's investment decision is no different, in principle, from its decision regarding any other factor of production. A firm should invest to the point at which the price or cost of capital, P_K , equals the value of capital's marginal product, VMP_K .³ The VMP_K is the additional net revenue the firm receives each year from selling the additional output that the last unit of capital allows the firm to produce. The price or cost of capital is the annualized cost to the firm of the last unit of capital. In a world without taxes, the annualized cost of capital has three components: the price of the plant or equipment, q ; the rate of return, r , that the stockholders can earn on their savings; and the annual depreciation of the capital, δ , as it is used to produce the firm's output. The price of the piece of capital, q , is a one-time payment that cannot be compared directly with the VMP of the capital, which is expressed as an annual increase in net revenues to the firm. The rate of return, r , and the depreciation rate, δ , convert the price into an annualized cost. To see how, consider the following example.

Suppose the price of a machine, q , is \$100,000. Suppose, also, that the firm's stockholders can earn 5% per year on any money that they save. Then the machine has to earn at least $\$100,000 \times .05 = \$5,000$ each year to justify having the stockholders give the managers \$100,000 of their savings to spend on the machine. If the machine does not earn that much, then stockholders should keep the \$100,000 and invest it themselves at 5%. In other words, $r = 5\%$ is the annual opportunity cost to the stockholders for each dollar of investment by the firm. Depreciation is the second factor in determining the annualized cost of the machine. Economic depreciation of capital refers to the decline in the market value each year as it is used in production. Capital depreciates either because it wears out over time and becomes less productive or because it becomes obsolete, superseded by a superior technology. Either way, the capital loses market value each year, which is part of the annual economic cost of using the capital. Suppose the machine

³ We are assuming competitive markets. If the firm has monopoly power in the product market, the marginal revenue product of capital, MRP_K , replaces VMP_K .

depreciates by 20% of its initial value each year. The annual depreciation is $\$100,000 \times .20 = \$20,000$; the machine has to earn at least $\$20,000$ each year to cover the depreciation and help pay for its eventual replacement. Therefore, the machine must earn at least $\$25,000$ each year to cover both the opportunity cost of funds to the stockholders and the depreciation on the machine. $\$25,000 = \$100,000 \times (.05 + .20) = \$100,000 \times .25$. In this example, $\$25,000 = q(r + \delta)$.

The expression $q(r + \delta)$ is the annualized cost of capital to the firm, commonly referred to as the user cost of capital. In a world without taxes, the firm would invest until $q(r + \delta) = \text{VMP}_K$.

A corporation income tax affects both the revenue and cost sides of the equation in a way that, in general, leads firms to make different investment decisions. If so, investment is said to be distorted by the tax. One efficiency goal of a corporation tax, therefore, is to design the tax so that it raises revenues while at the same time maintaining the decision rule that the firm invests such that $q(r + \delta) = \text{VMP}_K$ on the margin. If this marginal condition holds, the tax is said to be non-distorting or neutral with respect to corporate investment.

The U.S. Corporation Income Tax

The U.S. corporation income tax is a highly complex tax that is industry specific in many respects, but understanding a few of its general features is sufficient for the purposes of this example.

Tax rates: The tax employs a complicated series of graduated tax rates on the net income of a corporation. The tax is 15% on the first $\$50,000$ of net income, and then the rates rise, although unevenly, until the net income reaches $\$18.333$ million. From that point on the tax rate is 35%. Since most corporate net income comes from corporations earning far more than $\$18.333$ million each year, we can safely assume that the tax is a flat tax at 35%.

The tax base: The taxable net income is the accounting profit of a corporation, the difference between a corporation's revenues and expenses. The expenses are of three kinds: out-of-pocket expenses for labor and material inputs; deductions for interest paid on corporate debt;⁴ and depreciation allowances.

The way that the IRS has defined the tax base alters corporations' marginal investment decision rule, $q(r + \delta) = \text{VMP}_K$, in a number of ways.

First, the tax reduces the additional net revenues generated from the marginal investment by the amount of the tax. Therefore, VMP_K becomes $\text{VMP}_K(1 - t)$, where $t =$ the 35% tax rate.

Second, the accounting profits remaining after paying the out-of-pocket expenses have three destinations: They are paid out as interest on the corporate debt outstanding, paid out as dividends to the stockholders, or held as retained earnings to finance further investments by the firm. The retained earnings eventually affect the value of the stock, so

⁴ Interest received on savings by corporations is considered to be part of revenues and is taxable.

that the stockholders receive a return on the retained earnings in the form of capital gains (or losses) on their stock. For simplicity, assume that all the accounting profits are paid out as interest or dividends.

Since the interest payments are deductible from taxable income but dividends are not, the rate of return, r , from the point of view of the firm is $r = \theta i(1 - t) + (1 - \theta)\rho$, where: i = the interest rate on the debt; ρ is the rate of return that the stockholders require to keep their funds invested with the firm (the opportunity cost of the stockholders' funds); t = the corporate tax rate; and θ and $(1 - \theta)$ are the proportions of funds used to finance the firm's investment that are raised by issuing bonds and issuing stock.

Third, firms are allowed to deduct from their accounting profits an allowance for the depreciation of their entire capital stock during the year. They do not deduct the true economic depreciation, however, because that is difficult to know for any piece of capital unless the firm sells the capital. Instead, they are allowed to deduct depreciation allowances according to schedules determined by the IRS. The depreciation allowances are complex and somewhat industry specific. Roughly speaking, the IRS divides all capital into a number of separate categories ranging from 3 to 39 years, depending on how long the capital is expected to last. For example, autos and computers are expected to last 5 years, office furniture and fixtures 10 years, and nonresidential real property such as structures 31.5 years if they were put in place before 1993. Firms can then deduct depreciation allowances within each category according to one of three formulas, called straight line, double declining balance, and 150% declining balance depreciation. They can choose the formula that is best for them. If they choose one of the declining balance formulas, they can switch to the straight-line method at any time if it is to their advantage to do so.⁵

For example, if the \$100,000 machine mentioned above is a type of 5-year computer equipment, a firm can deduct \$20,000 of depreciation allowances each year if it chooses the straight-line method (one-fifth of the value each year). If it chooses the double declining balance formula, it deducts 40% of the \$100,000, or \$40,000, in the first year (double the straight line method), then 40% of the remaining \$60,000 in the second year, and so on. It would probably switch to the straight-line method in the fourth year since it could deduct 50% of the remaining balance in the fourth year rather than 40%, and then the other 50% in the final year. The sooner the firm can deduct depreciation allowances the more they are worth to the firm.

Whatever method the firm chooses, let D represent the present value of the depreciation allowances over the life of the \$100,000 machine, expressed as a proportion of the \$100,000 price of the machine.⁶ The depreciation allowances reduce the effective

⁵ The corporation income tax rates can be found at www.smbiz.com/sbrl001.html. A description of the depreciation allowances is available from the IRS at www.irs.gov/publications/p946/ch04.html#d0e5086.

⁶ Refer to the first part of Chapter 20 if you are unfamiliar with the concept of present value. The present value of the depreciation allowances is the sum of the value, in today's dollars, of each year's depreciation allowance for each unit of capital that the firm owns. Since the depreciation allowances are taken after the

price of the machine from \$100,000 to \$100,000(1 – tD), where t = .35, because of the reduction in taxes. In general, the depreciation allowances reduce the effective price of a unit of capital from q to q(1 – tD).⁷

Combining the tax on the additional net income, the interest deduction, and the depreciation allowances, the marginal investment decision rule for the firm becomes

$$(1 - t)VMP_K = q(r + \delta)(1 - tD) = q[(\theta i(1 - t) + \theta \rho) + \delta](1 - tD)$$

Dividing both sides by (1 – t)

$$VMP_K = \frac{q[(\theta(1-t) + (1-\theta)\rho) + \delta](1-tD)}{(1-t)}$$

The right-hand side of the equation is the user cost of capital to the firm under the corporation income tax. Given the actual values that apply to the U.S. tax, the tax raises the cost of capital to the corporations. This tends to reduce corporate investment relative to the no-tax marginal decision rule. In addition, the deduction of depreciation allowances tends to favor short-lived investments such as equipment over long-lived investments such as structures of equal value since more of the depreciation occurs sooner for the short-lived investments. Both effects distort corporations' investment decisions.

Achieving Neutrality

There is a simple and practical way to achieve neutrality under the corporation income tax: Allow firms to expense their investments. This means that firms can deduct the entire value of an investment in the year that it is undertaken. This sets D = 1, since the entire value of the investment is deducted from the tax base in the first year. Also, since the entire investment is deducted, the interest on the debt issued to finance the investment would not be deducted. This is called taxing on a cash flow basis, because the tax base is the revenues of the firm less all its expenses, including the amount of its investments during the year. With expensing of an investment and no interest deductibility, the user cost of capital becomes

$$\frac{q[(\theta i + (1 - \theta)\rho) + \delta](1 - t)}{(1 - t)} = q[(\theta i + (1 - \theta)\rho) + \delta]$$

capital is purchased, the present value of the allowances is less than the price of the capital under the three formulas.

⁷ Laws passed in 2002 and 2003 added a bonus depreciation to new investment in the first year. The 2002 law established a 30% bonus for investments undertaken from 10 September 2001 to 1 January 2005, providing they had effective lives according to IRS guidelines of 20 years or less. The 2003 law increased the bonus to 50% on these investments if undertaken from 1 May 2003 to 1 January 2005. The depreciation formulas then applied to the undepreciated portion of the capital after the bonus was applied.

If the firm uses a combination of debt and equity to finance its investments, then $\theta i + (1 - \theta)\rho$ is the same as r in the no-tax cost of capital, and the corporation income tax is neutral with respect to the investment decision.

Adding Personal Taxes

An additional complication arises because the returns to capital received by households or individuals are also taxed by the federal (and state) personal income tax. Moreover, interest income received by bondholders is taxed at the ordinary tax rates, whereas dividends are taxed at a 15% rate regardless of the income of the taxpayer.⁸ Therefore, if households place θ of their savings in debt and $(1 - \theta)$ of their savings in equity (to match the assumed proportions of debt and equity above used by the firms to finance their investments), the rate of return to their capital is

$$r_H = \theta i(1 - \tau) + (1 - \theta)\rho$$

where: τ = the households' marginal tax rate under the personal income tax, i is the gross-of-tax rate of interest on debt, and ρ is the net-of-tax return on equity required by taxpayers to buy stock in corporations. Suppose the government attempts to make the corporation income tax neutral by allowing firms to expense investment and removing the interest deduction. Then the user cost of capital to the firm becomes

$$r_F = q \left[\theta i + (1 - \theta) \frac{\rho}{(1 - \tau_d)} + \delta \right]$$

where τ_d = the tax rate on dividends, currently 15%.

The firm must provide dividends on each dollar of capital equal to $\frac{\rho}{(1 - \tau_d)}$ so that households can receive a rate of return of ρ on their equity net of the personal income tax. The marginal investment decision remains distorted because of the personal income tax. Moreover the cost of capital to the firm, r_F , exceeds the after-tax rate of return to the households, r_H . Since the firms base their investment decisions on r_F , and the households base their saving decisions on r_H , there is an additional distortion between investment and saving in the capital markets relative to the no-tax world.

Integrating the Corporation and Personal Income Taxes

There is only one simple way to remove these capital market distortions caused by the interaction of the personal and corporation income taxes – replace the personal income tax with a personal expenditures tax or some other form of consumption tax, so that the

⁸ Capital gains are also taxed at a 15% rate, but only when realized. Also, capital gains on assets passed on to heirs at death are not taxed at all. For both reasons, the effective tax rate on capital gains is lower than 15% and therefore lower than the tax rate on dividends. We ignore this additional complication in the discussion of personal taxes, and continue to assume that all returns to equity are in the form of dividends.

receipt of income from capital by households is not taxed. If the corporation income tax is retained, then allow investments to be expensed and remove the interest deductibility, as described above. Under both reforms, $r_F = r_H = \theta i + (1 - \theta)\rho$, and full neutrality obtains in the market for saving and investment.

These reforms may be resisted on equity grounds, however. As discussed in Chapters 14 and 19 in the textbook, replacing the personal income tax with a personal expenditures tax is particularly burdensome to the current elderly generation. Also, allowing firms to expense investment would reduce corporation income tax revenues without an offsetting rate increase. If the burden of the corporation income tax falls primarily on shareholders, as many economists believe, then this would lessen the progressivity of the tax system. Unfortunately, there is no simple and practicable way to achieve neutrality in the market for capital if both the corporation and personal income taxes are retained.