

CHAPTER 24

Taxation of Business Income



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 - How does the corporate tax affect incentives for investment and business location?
 - How does the corporate tax affect a firm's financial decisions such as debt levels and dividend payments?
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A major component of the Tax Cuts and Jobs Act of 2017 (discussed at the beginning of [chapter 23](#)) was the largest overhaul of the U.S. corporate tax system in 30 years. The motivation for this change echoed widely throughout the business community: the U.S. corporate tax system was crippling our international competitiveness. The corporate tax rate of 35% was higher than the unweighted global average of 24%, and the United States had the highest statutory corporate tax rates among OECD nations. Some European countries had cut corporate taxes to as low as 9% as part of a worldwide tax slashing trend.¹

In the view of President Trump and his supporters, the relatively high U.S. corporate tax rate significantly hamstrung U.S. businesses. Senator Orrin Hatch (R-UT) spoke as an advocate for businesses in a 2012 statement: “Every industrialized country around the globe understands that tax rates can determine whether or not businesses succeed or fail. And America’s job creators know that to remain competitive abroad and create jobs here at home, we’ll have to radically reform our nation’s tax code.”²

Moreover, the existing “worldwide” tax system used in the United States meant that multinational companies were taxed on their earnings abroad as well as at home in the states—but only when those earnings were brought back into the country. This led companies to hold enormous stockpiles of cash outside the United States—cash that many argued could be brought back into the country to create jobs. Estimates placed the amount of corporate cash in foreign banks at around \$2.6 trillion. In 2017, Apple alone had \$252.3 billion in unrepatriated profits.³ Gary Cohn, President Trump’s chief economic advisor from 2017 to 2018 explained that under the old system companies “often [had] to pay extra taxes for bringing profits back to the US, which is why they [kept] the money offshore rather than reinvesting it back here.” Cohn reasoned that changing the corporate tax structure would allow those companies to bring their foreign cash back to the United States.⁴

Others disagreed with this assessment. To start, they pointed out that while the U.S. *statutory tax rate* on corporations was 35%, the *effective tax rate* on corporations’ profits from new investments was much lower—averaging about 24%, compared to 21% among other G-7 nations. In fact, U.S. companies paid less of their worldwide profits in taxes than other G-7 nations (28% in the United States compared with 29% in other nations in 2017).⁵ That is, due to various loopholes that were larger in the United States than in other nations, our corporations didn’t actually face a much heavier tax burden. Moreover, they highlighted that it was unlikely foreign cash would lead to more jobs in the United States. “There is still a lot of thinking on the right that if big corporations are happy, they’re going to take the money they’re saving and reinvest it in American workers,” said Republican Senator Marco Rubio. “In fact they bought back shares, a few gave out bonuses; there’s no evidence whatsoever that the money’s been massively poured back into the American worker.”⁶

In the end, the first set of arguments prevailed, and the Trump tax changes radically reduced corporate taxation along a number of dimensions. First, the corporate tax rate was reduced from 34 to 21%. Second, the United States joined much of the rest

of the world in moving to a territorial tax system, whereby firms are taxed only on profits earned in the United States. As part of the transition, there is a one time, mandatory, repatriation tax for U.S. companies with foreign subsidiaries. The tax is 15.5% for cash and 8% for other assets, placed on not already taxed earnings and profits from 1989 through the present. The tax may be paid over an eight-year period.⁷ Third, those who work in unincorporated businesses who pay taxes under the individual tax system, rather than the corporate system, were given large tax breaks to partially match those received by their corporate counterparts. A variety of other changes, like increased deductibility of business investments and a limit on the deductibility of debt financing, were included as well.

The end result was a bill that was projected to reduce corporate tax revenues by \$644.1 billion over the next decade. Corporate taxes, which in 1960 accounted for almost 25% of federal revenues, are projected to average 7% of federal revenues until 2030.⁸

In this chapter, we evaluate these arguments over the corporate tax and these recent major changes. We begin by discussing the nature of corporations and the arguments for having a corporate tax. We introduce the structure of the corporate tax in the United States and consider the difficulties in defining corporate expenses. We also discuss how to apply the principles of [Chapter 19](#) to assess the ultimate incidence of corporate taxation. We will model the complicated impacts of corporate taxation on a firm's investment decisions. Then, we turn to the difficult issues raised by taxing corporations that earn their income in many different nations. Finally, we discuss the combined impact of corporate and individual taxation on a firm's decisions about how to finance its business ventures.

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24.1 What Are Corporations, and Why Do We Tax Them?

In analyzing corporate taxation, it is important to note that not all goods and services are produced by the corporate sector in the United States. There is also a large and robust noncorporate sector consisting of self-employed individuals, partnerships, and other organizational forms that do not seek the protections of incorporation. The noncorporate sector accounts for the vast majority of firms, but only about one-quarter of sales, in the United States.

Within the corporate sector, most of the production is by firms owned by a large number of **shareholders**, individuals who have purchased ownership stakes in a company. The major advantage of incorporation is that it offers the guarantee of *limited liability*, which means that the owners of a firm cannot be held personally responsible for the obligations of the firm. If a corporation fails, the shareholders are not required by law to use their personal assets (such as their homes and jewelry) to pay the debts of the failed company. The most that shareholders can lose is the amount they have invested in the corporation.

shareholders

Individuals who have purchased ownership stakes in a company.

There are two classifications of corporations: S-corporations and C-corporations (the letters refer to the tax schedule used to file tax returns). The major difference between these classifications is the tax system that applies to the firm. Income from an S-corporation is treated as personal income as it is earned and is subject to the individual income tax; income from C-corporations is subject to the corporate income tax as it is earned and may be subject to the individual income tax again as it is distributed to a corporation's shareholders. Our discussion of corporate taxation will focus on C-corporations, which account for most of the production of the corporate sector.

Ownership Versus Control

Most corporations separate *ownership* of the firm from *control* (or management) of the firm. Some corporations are publicly traded on a stock exchange, so any investor can purchase or sell ownership shares in the company. Other corporations are privately held, so only select individuals are able to have an ownership stake.

In either case, shareholders typically do not make the day-to-day decisions on how to run the corporation. Those decisions are made by *managers*, who are hired by the shareholders to run the company. This separation of ownership from control is certainly necessary for large corporations; the thousands of owners of a large company could never get together to make all the decisions needed to run that company on a day-to-day basis. This separation of ownership from control has the disadvantage, however, of giving rise to what economists call an **agency problem**: a misalignment of the interests of the owners and the managers.

agency problem

A misalignment of the interests of the owners and the managers of a firm.

Consider, for example, the decision of a corporate manager to buy a jet for their corporate travel. Suppose that the manager knows it would be much less expensive to take commercial flights for all of their travel than for the company to own its own jet. Thus, it is in the shareholders' interests for the manager to use commercial flights because that would best serve the profitability of the firm. Yet the manager may prefer the jet for comfort, convenience, and speed, reasons that have nothing to do with the profitability of the company. Moreover, if the manager has control of the accounting process, they can undoubtedly produce calculations to show the firm's owners that a jet is less costly than commercial flights (perhaps by using the most expensive commercial airline prices for comparison rather than the lower prices they would be likely to pay). Thus, the manager may convince the owners to buy a jet, even though it is not in the firm's best interest.

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Why Do We Have a Corporate Tax?

Why do we have a corporate income tax? After all, as we emphasized in [Chapter 19](#), firms are not entities but combinations of factors. So when we tax firms, we ultimately tax the factors of production that make up those firms. Wouldn't it be more straightforward to tax the factors (labor and capital) directly, rather than get revenue from them through the convoluted (and uncertain) mechanism of corporate taxation? There are at least two reasons we might want a separate corporate tax.

Pure Profits Taxation

To the extent that corporations have market power, they will earn *pure profits*, returns that exceed payouts to their factors of production (labor and capital). As established by the important analysis of [Diamond and Mirrlees \(1971\)](#), a pure profits tax is a much better way to raise revenues than is a tax on factors of production. This is because a pure profits tax does not distort the decision making of a producer, while taxes on labor or capital have distortionary effects of the types discussed in [Chapters 21, 22](#), and [23](#) (such as lowering labor supply, savings, or risk taking).

A firm chooses prices and production levels to maximize profits. If the government were to announce tomorrow that it was taking some part of those profits, the optimal choice of price and quantity for the firm would not change; the decision that maximizes pre-tax profits also maximizes after-tax profits: $(1 - \text{tax}) \times \text{profits}$. Pure profits taxes therefore collect revenue without distorting behavior. In addition to being distortion-free, a pure profits tax is very progressive because those receiving the profits from production are likely to be well-off.

While the pure profits tax seems like a good idea, it is not the way the corporate tax works, for two reasons. First, as we see later in the chapter, corporate taxes are not pure profits taxes: firms can minimize their corporate tax burdens by changing their use of inputs. Because corporate taxes cause firms to substitute away from their optimal production pattern, there is a distortion that causes inefficiency.

Second, a pure profits tax should be levied on [economic profits](#), the difference between firm revenues and economic costs. It would involve using the type of cost calculations discussed in [Chapter 8](#), appropriately valuing resources at their opportunity cost (their use in the next best alternative activity). Yet firms pay taxes on [accounting profits](#), the difference between revenues and reported costs.

Reported costs can differ from economic costs both because they use prices rather than opportunity costs and because firms can manipulate their accounting practices to vary the amount they report as costs.

economic profits

The difference between a firm's revenues and its economic opportunity costs of production.

accounting profits

The difference between a firm's revenues and its reported costs of production.

Retained Earnings

Another rationale for corporate taxation is similar to the arguments we discussed for capital gains: if corporations were not taxed on their earnings, then individuals who owned shares in corporations could simply avoid taxes by having the corporations never pay out their earnings. These earnings would accumulate tax-free inside the corporation, leading to a large tax subsidy to corporate earnings relative to other forms of savings (or other economic activity in general). If corporations paid out those earnings many years later, the present discounted value of the tax burden would be quite low.

24.2 The Structure of the Corporate Tax

In this section, we review the basic structure of the corporate tax. This is a very complicated tax, so we present a simplified version of the structure.

The taxes of any corporation are:

$$\text{taxes} = ([\text{revenues} - \text{expenses}] \times \tau) - \text{tax credits}$$

We define each element of this expression in turn.

Revenues

These are the revenues the firm earns by selling goods and services to the market.

Expenses

A firm's expenses consist primarily of three components. The first is the *cash-flow costs of doing business*. These costs comprise any expenditures for services or goods over the past year. Examples include compensation paid to employees, purchases of intermediate inputs to production such as steel or energy, the costs of advertising, rent on buildings, and so on.

The second component is *interest payments*, the payments made to those who lend the firm money. Both cash-flow costs and interest payments are deductible from corporate earnings in the period during which they are incurred; the amount spent each year in these categories is subtracted from that year's earnings in computing the firm's tax burden.

The final expense component is **depreciation** on capital investments, the rate at which capital investments lose their value over time. When a company hires a worker for a year at a given salary, it pays the salary for services rendered during the year and can fully deduct those salary payments from taxation. When the company buys equipment or a new building, however, it is investing in a good that will deliver services for many years. Thus, the tax code does not permit the full costs of the machine to be deducted in the period of purchase. Instead, the tax code allows the corporation to deduct from its taxes **depreciation allowances**, which are tax allowances that are designed to approximate the rate at which the capital

investment loses its value. Corporations take the depreciation allowances each year for a number of years, thus spreading the cost of the asset over a number of years.

depreciation

The rate at which capital investments lose their value over time.

depreciation allowances

The amount of money that firms can deduct from their taxes to account for capital investment depreciation.

The appropriate determination of depreciation allowances is very important for corporate tax policy. How should such longer-lived purchases be treated for tax purposes?

Economic Depreciation

In principle, the tax code should allow firms to deduct economic depreciation, the deterioration in the value of the machine each period, as their expense. Consider a firm that is buying a machine this year for \$100,000. The machine will wear down gradually over time, so each year the machine will be worth \$10,000 less. After ten years, the machine will be worthless, and the firm will have to replace it.

economic depreciation

The true deterioration in the value of capital in each period of time.

The cost to the firm of using this machine for one year is the purchase price (\$100,000) minus its value after one year (\$90,000). Using the machine for one year essentially costs the firm \$10,000 because that is the reduced value of the asset. This amount is the firm's cost of using the machine for the year, so it is the appropriate expense to deduct from earnings. Just as using a year of labor costs that year's wages, using a year of a machine costs the reduction in the value of the machine over that year.

Depreciation in Practice

The problem with implementing economic depreciation in practice is that the true rate of economic depreciation is typically unobserved and varies widely across assets. The economic depreciation of an office building may be quite low because wear and tear on the building is gradual. The economic depreciation of an industrial machine, however, could be much greater because of the wear and tear of the production process.

As a result of these uncertainties, the tax code has adopted a series of **depreciation schedules** for different classes of assets. One approach to depreciation is to take the typical life of an asset—ten years in our example—and divide the amount of depreciation equally into each year of the asset's life. This method is known as *straight-line depreciation*. In our example, this approach would appropriately measure economic depreciation.

depreciation schedules

The timetable by which an asset may be depreciated.

In other cases, depreciation may be more rapid. For those cases, the government may offer *accelerated depreciation* schedules. The government could decide to allow firms to depreciate the cost of the machine over a shorter period of time—say, five years in our example instead of ten. Alternatively, within a given time frame, the government could allow more front-loaded depreciation, with larger depreciation deductions earlier in the life cycle of the asset. In the extreme case, the government can allow corporations to **expense investments** in physical capital and deduct the entire cost of the asset in the year the investment is made.

expensing investments

Deducting the entire cost of the investment from taxes in the year in which the purchase was made.

The key point for modeling the impact of the tax code on investment decisions is that the value of depreciation deductions rises with the speed with which they are allowed. This is because the present discounted value (PDV) of any tax break is higher the sooner you get the break.

Imagine that the firm in our example can borrow at a 10% interest rate, so the firm uses 10% as its discount rate for doing PDV calculations. Consider first economic depreciation (which is the same as straight-line depreciation in this case). The PDV of the set of depreciation allowances is:

$$10,000 + \frac{10,000}{1.1} + \frac{10,000}{(1.1)^2} + \dots + \frac{10,000}{(1.1)^9} = 67,590$$

Now, imagine instead that the firm is allowed accelerated straight-line depreciation, where it can depreciate \$20,000 each year for five years. The PDV of that set of depreciation allowances is:

$$20,000 + \frac{20,000}{1.1} + \frac{20,000}{(1.1)^2} + \frac{20,000}{(1.1)^3} + \frac{20,000}{(1.1)^4} = 83,397$$

By speeding up the rate at which the firm can depreciate its machine, the government has allowed the firm to deduct over \$15,000 more from its taxable income in present value. At the extreme, with expensing, the PDV of the depreciation deduction is \$100,000 because the deduction is all taken in the first period.

APPLICATION

What Is Economic Depreciation? The Case of Personal Computers



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Personal computers are an excellent example of the difficulties in defining economic depreciation. [Doms et al. \(2004\)](#) gathered data on the market value of personal computers and modeled it as a function of the age of the PC. They found that the depreciation period for a PC is very rapid, on the order of only five years. Moreover, the depreciation during this period is *exponential*, not linear. They estimate that each period the value of the PC declines by 50% of its value at the start of the period. So after one year, the typical PC is worth only half its purchase value. After two years, it is worth only 25%; after three years, only 12.5%; and it is essentially worthless by the fifth year. This finding suggests that the depreciation schedules for PCs should be not only short but accelerated even within that brief time frame.

The researchers arrived at another important conclusion: most of the depreciation of PC value is not due to actual wear and tear on the machine but to the *revaluation of the product* as microprocessors improve. A computer doesn't actually function 50% less well after one year in most cases, but it is worth only half as much because new models, at similar prices, are so much better.

Moreover, even the remaining depreciation caused by factors other than revaluation is also not from physical wear and tear. Instead, it is caused by software advances that are beyond the capability of older machines. This part of the depreciation becomes rapid after just a couple of years of PC life. Thus, economic depreciation is a subtle concept that goes far beyond physical depreciation of the actual machine. Tax policy makers face a daunting task in setting depreciation schedules appropriately across the wide variety of physical assets employed by firms in the United States. ■

Corporate Tax Rate

Corporations are taxed on their net earnings (earnings minus expenses) at a flat rate of 21% (the previous corporate tax system had a progressive rate for the smallest firms, but most paid the 35% top rate).¹¹

Tax Credits

The final component for computing corporate tax burdens is tax credits that offset the corporate tax burden. The most famous of these is the [investment tax credit \(ITC\)](#). The ITC allows firms to deduct a percentage of their annual qualified investment expenditures from the amount they owe in taxes. The ITC had been a

periodic feature of the U.S. corporate tax code but has not been in effect since 1986 (when firms could receive a credit amounting to 6 to 10% of their investment expenditures, depending on asset life). But other tax credits remain prominent in the tax code; as [Kocieniewski \(2011\)](#) reports, the video game manufacturer Electronic Arts was able to take sufficient advantage of existing tax credits (and other tax loopholes) to pay almost no taxes on its \$1.2 billion of profits.

investment tax credit (ITC)

A credit that allows firms to deduct a percentage of their annual qualified investment expenditures from the taxes they owe.

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24.3 The Incidence of the Corporate Tax

The tools of general equilibrium tax incidence from [Chapter 19](#) can be employed to assess the incidence of the corporate tax. Consider first the effect of the corporate tax on the goods market. A tax on producers will be shifted to consumers if demand for a good is at all inelastic. In turn, elasticity of demand for a good is determined by how easy it is for consumers to reduce their purchases or shift them to goods produced by the noncorporate sector or by foreign producers. Because the corporate sector produces the majority of goods and services in the economy, demand is not likely to be perfectly elastic. Thus, at least some of the corporate tax is reflected in higher prices for consumers. In the long run, as consumers are more able to adjust their purchases, demand will become more elastic and consumers will bear less of the tax.¹²

To the extent that corporations bear some of this tax, we must then assess how the tax is distributed across labor and capital. Because the corporate sector employs such a large share of workers in the United States, it seems likely that the supply of labor to that sector is not perfectly elastic. Therefore, when corporations pay taxes, at least some of the costs may be shifted to workers in the form of lower wages.

In the short run, the capital supply to the corporate sector is fairly inelastic, and capital therefore bears much of the incidence of corporate taxation. In the long run, however, capital is more mobile because investors can turn to the noncorporate sector or to opportunities in other countries' economies. Indeed, capital is more mobile than labor in the long run because workers are unlikely to move abroad in response to lower wages.

Corporate income taxation also has important general equilibrium effects on the noncorporate sector as well, through spillovers. As capital moves from the corporate to the noncorporate sector in the long run, it raises the supply of noncorporate capital, lowering the rate of return in the noncorporate sector until the after-tax return in the corporate sector equals the return in the noncorporate sector. Capital in the noncorporate sector therefore bears some of the incidence of a tax on corporate capital in the form of lower returns.

Thus, the burden of the corporate tax is shared by consumers, workers, corporate investors, and noncorporate investors in some proportion. A series of recent papers, reviewed in the Empirical Evidence box, suggests that there is a large effect of

corporate taxation on wages. While the incidence is spread widely, [Nallareddy et al. \(2019\)](#) show that on net corporate tax cuts do increase inequality.

EMPIRICAL EVIDENCE

Corporate Taxation and Wages

A central question for tax policy is who bears the ultimate incidence of corporate taxation. This is hard to assess directly from looking at corporate tax payments and wages, with biases in either direction. On the one hand, firms that are doing quite well will pay high taxes—and may share the benefits of their success with workers through higher wages. On the other hand, firms may increase profits, and therefore corporate taxes, by cutting wages. So to carefully assess the impact of corporate taxes on wages we need to turn to the type of quasi-experimental approach described in [Chapter 3](#).

This has been a challenging problem to address from the U.S. perspective. U.S. corporate taxes vary at the state level, but in a highly complicated way that depends on the distribution of firm activity across states. As a result, it is challenging to simply take quasi-experimental methods to the data. Existing work has addressed this problem by imposing more “structural” assumptions on the data that allow corporate tax incidence to be indirectly derived from state tax changes. Using this approach, [Suarez Serrato and Zidar \(2016\)](#) estimate that 35% of corporate taxes are shifted to wages, 25% is shifted to land owners (through general equilibrium effects), and 40% is borne by corporate owners.

There is much more variation in international corporate taxation that allows researchers to assess its incidence. A recent paper by Fuest et al. (2018) illustrates this for Germany, a setting with three important empirical advantages. First, the overall structure of the corporate tax system is set at the national level, but the tax rate is set at the local level, making it possible to assess the impact of the rate alone and not be confounded by other changes to corporate taxes that might be correlated with rate changes. Second, there are a large number of municipalities that are frequently changing tax rates (they studied more than 3,500 municipalities that had almost 7,000 tax changes). The reliability of any quasi-experimental estimate generally rises with the number of experiments that can be incorporated into the analysis, since it reduces the odds that there is an omitted factor that is correlated with the policy change in a systematic way across all of the locations. Finally, Germany has very rich administrative data on wages from an employer–employee matched data set that allowed the researchers to carefully study how wages respond at firms as the local corporate tax rate changes.

The authors set up a careful difference-in-difference framework to evaluate these local tax changes. In addition, they carefully addressed potential concerns about “policy endogeneity.” That is, even with many localities, a natural concern is that localities raise or lower taxes in response to local economic conditions, which could lead to noncomparability between areas that do and do not change taxes. For example, areas that are raising taxes may have lower wages anyway because taxes are increased in down economies. The authors addressed this concern in two ways. First, they showed that there were no pre-existing trends: that is, before the actual tax change, wages were moving in very similar ways in places that eventually did and did not change their taxes. Second, they showed that these changes were not associated with broader changes in economic conditions. Under the policy endogeneity story of changes responding to local economies, we should see wages systematically falling or rising in places about to change taxes, and we should see those changes in taxes associated with changing economic conditions. The fact that neither was true lends confidence to the notion that these tax changes were not being driven by local economic conditions.

The authors used this large set of tax changes to precisely estimate that about 50% of the incidence of corporate tax changes were on wages, somewhat higher (but in a similar range to) the U.S. estimate. Moreover, they estimated that the wages most affected were those of low-skilled and young workers. Taken together, these results suggest that the corporate tax may not be nearly as progressive as assumed by CBO and others.

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This has been a challenging problem to address from the U.S. perspective. U.S. corporate taxes vary at the state level, but in a highly complicated way that depends on the distribution of firm activity across states. As a result, it is challenging to simply take quasi-experimental methods to the data. Existing work has addressed this problem by imposing more “structural” assumptions on the data that allow corporate tax incidence to be indirectly derived from state tax changes. Using this approach, [Suarez Serrato and Zidar \(2016\)](#) estimate that 35% of corporate taxes are shifted to wages, 25% is shifted to land owners (through general equilibrium effects), and 40% is borne by corporate owners.

There is much more variation in international corporate taxation that allows researchers to assess its incidence. A recent paper by Fuest et al. (2018) illustrates this for Germany, a setting with three important empirical advantages. First, the overall structure of the corporate tax system is set at the national level, but the tax rate is set at the local level, making it possible to assess the impact of the rate alone and not be confounded by other changes to corporate taxes that might be correlated with rate changes. Second, there are a large number of municipalities that are frequently changing tax rates (they studied more than 3,500 municipalities that had almost 7,000 tax changes). The reliability of any quasi-experimental estimate generally rises with the number of experiments that can be incorporated into the analysis, since it reduces the odds that there is an omitted factor that is correlated with the policy change in a systematic way across all of the locations. Finally, Germany has very rich administrative data on wages from an employer–employee matched data set that allowed the researchers to carefully study how wages respond at firms as the local corporate tax rate changes.

The authors set up a careful difference-in-difference framework to evaluate these local tax changes. In addition, they carefully addressed potential concerns about “policy endogeneity.” That is, even with many localities, a natural concern is that localities raise or lower taxes in response to local economic conditions, which could lead to noncomparability between areas that do and do not change taxes. For example, areas that are raising taxes may have lower wages anyway because taxes are increased in down economies. The authors addressed this concern in two ways. First, they showed that there were no pre-existing trends: that is, before the actual tax change, wages were moving in very similar ways in places that eventually did and did not change their taxes. Second, they showed that these changes were not associated with broader changes in economic conditions. Under the policy endogeneity story of changes responding to local economies, we should see wages systematically falling or rising in places about to change taxes, and we should see those changes in taxes associated with changing economic conditions. The fact that neither was true lends confidence to the notion that these tax changes were not being driven by local economic conditions.

The authors used this large set of tax changes to precisely estimate that about 50% of the incidence of corporate tax changes were on wages, somewhat higher (but in a similar range to) the U.S. estimate. Moreover, they estimated that the wages most affected were those of low-skilled and young workers. Taken together, these results suggest that the corporate tax may not be nearly as progressive as assumed by CBO and others.

24.4 The Consequences of the Corporate Tax for Investment

We now turn to discussing the efficiency consequences of the corporate tax. In particular, there is significant concern that the corporate tax may reduce the amount of investment undertaken by firms.

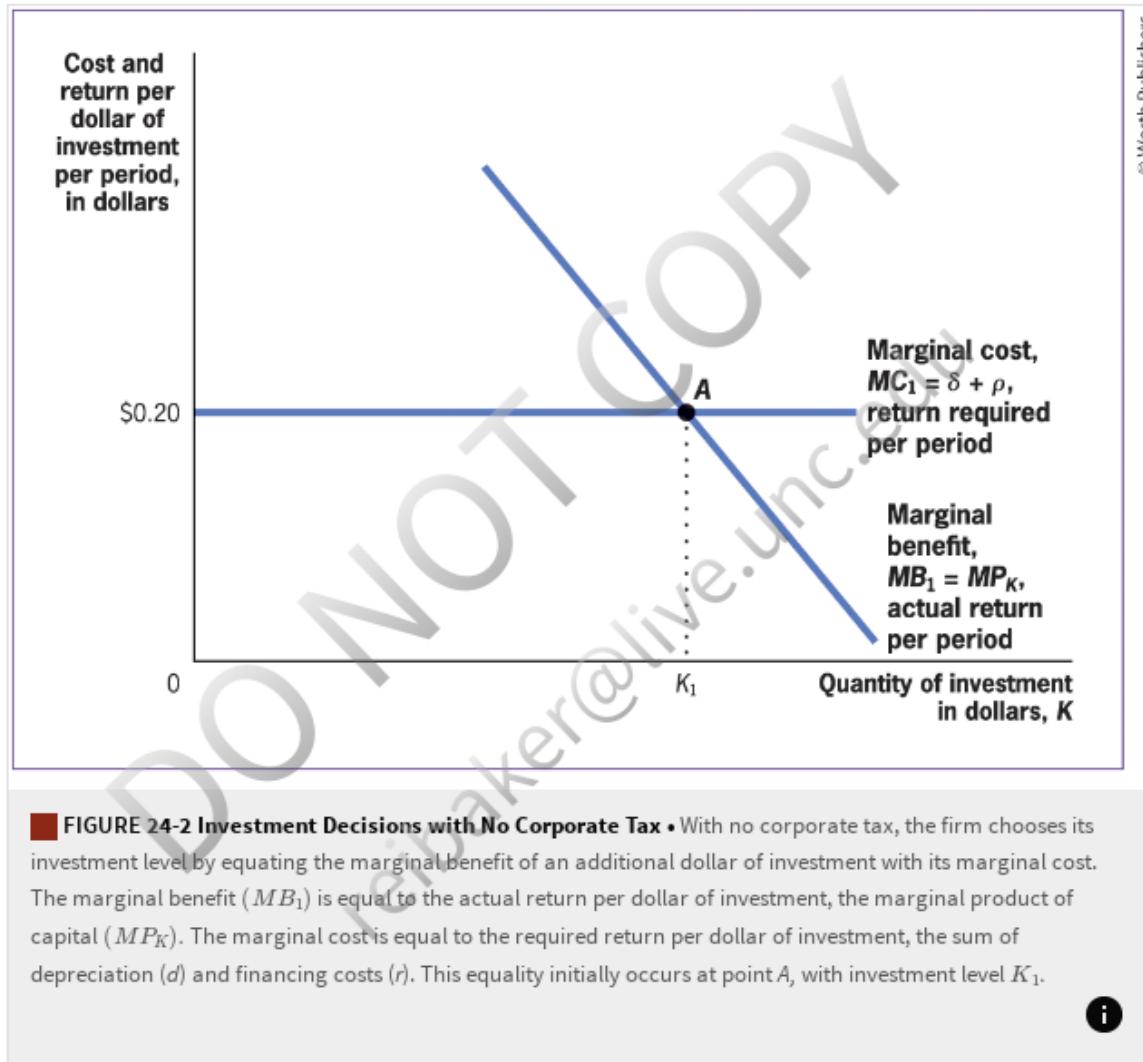
Theoretical Analysis of Corporate Tax and Investment Decisions

To understand the effect of corporate taxation on investment decisions, we begin by modeling the investment decision in a world of no corporate taxes. The investment decision is determined by firms setting the marginal benefits and costs of investment equal on a per-period basis; the firm estimates the return it will get from its investment in each period (the benefit), compares that to the cost of the investment in each period, and invests only if the benefits are larger than the costs.

Suppose that each dollar of investment in a machine produces MP_K cents of additional output in each period (the marginal product of the machine), which is the benefit of investment. In each period, the machine depreciates in value by a linear amount per dollar (such as \$0.10 for each dollar of machinery investment). This depreciation is not, however, the total cost of the machine to the firm in one period; the firm also has to finance the machine's purchase. As we discussed earlier, a firm can finance its investments in several ways. Suppose this firm finances its investment by selling equity shares in the firm. In return, it has to make dividend payments each period of ρ per dollar borrowed. In this case, the total cost of the machine in each period is +dividend = $\delta + \rho$. If the depreciation rate is 10%, and the firm pays out 10% of the value of the investment in dividends (the dividend yield) each period, then the per-period cost of investing \$1 in a machine is $\delta + \rho = \$0.10 + \$0.10 = \$0.20$.

We can analyze the implications of corporate taxation for firm investment decisions graphically. [Figure 24-2](#) shows how the marginal cost and marginal benefit curves for investment determine the amount of investment made (K). The marginal benefit curve measures the actual return to each dollar of investment in each period, MP_K . Marginal benefit falls as investment increases due to the assumption of diminishing marginal product; there is a lower return to each additional dollar of investment because there is a lower marginal product of each additional dollar of capital. The

marginal cost curve measures the required return to each additional dollar of investment each period, or how much the investment must yield in each period to cover its costs (of depreciation and financing). The marginal cost is constant at $\delta + \rho = \$0.20$, as shown by the MC_1 curve.



Firms invest until the marginal dollar of investment results in equal costs and benefits, which occurs at point A, with a level of investment K_1 . Firms invest until the next dollar of investment yields just enough return (\$0.20) to cover their costs in each period. If a firm invests less than this amount (to the left of K_1), the marginal return from an additional dollar of investment is above its marginal cost of \$0.20, so the firm should invest more; if the firm invests more than this amount (to the right of K_1), the marginal return from that dollar of investment is below its marginal cost of \$0.20, so the investment should not be undertaken.

The Effects of a Corporate Tax on Corporate Investment

What happens if we introduce taxes into this story? Imagine first that the corporate tax is simply a tax at a rate τ on cash earnings minus labor costs (there are no tax deductions of any type for investment spending). The cash earnings per dollar spent on the machine per period is MP_K , so once this tax is imposed, the earnings per dollar spent on the machine drop to $MP_K \times (1 - \tau)$ (because the new tax must be paid on each dollar of earnings). This reduction in actual return causes the marginal benefit curve to shift down to MB_2 , as shown in [Figure 24-3](#): the taxation of corporate earnings has reduced the marginal benefit of investing. The costs per dollar of investment remain at $\delta + \rho$, so the marginal cost curve remains at its initial level. The new optimal investment choice is at point B , and investment falls to K_2 .

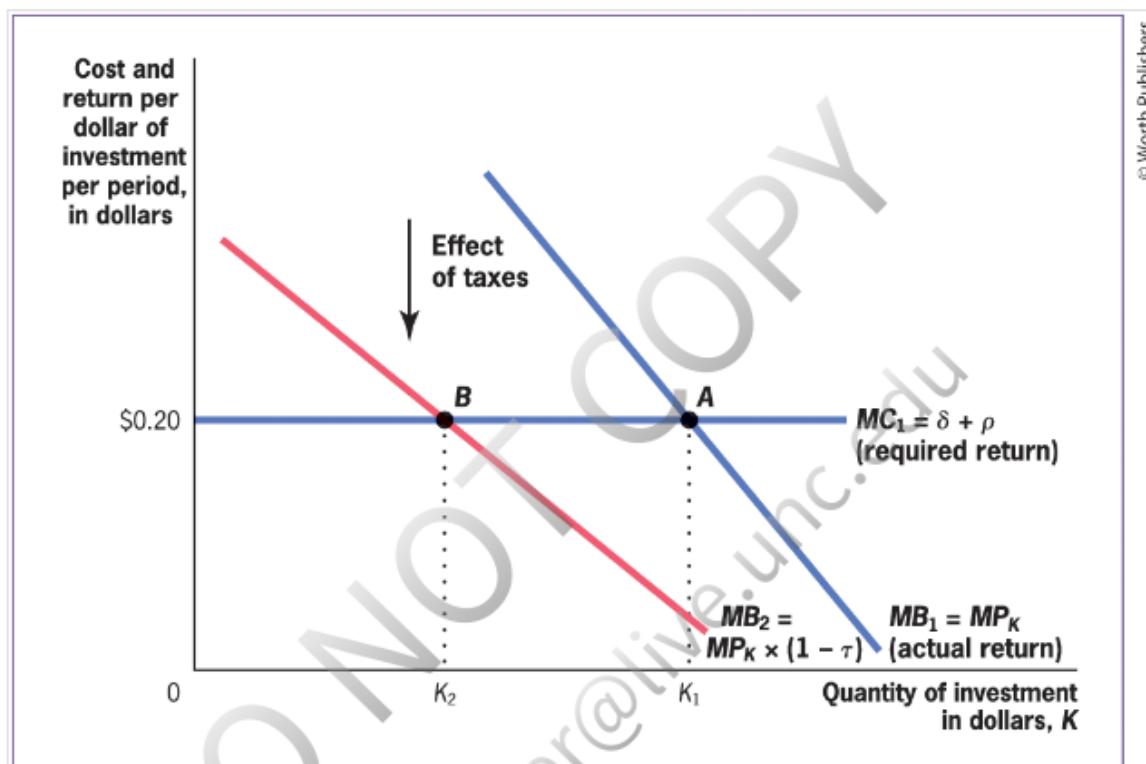


FIGURE 24-3 Investment Decision with a Tax on Corporate Income • Taxing corporate profits lowers the benefits of investment to $MP_K \times (1 - \tau)$, so that the marginal benefit curve shifts to MB_2 . The firm lowers its investment, moving to point B , and a lower level of investment, K_2 .



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Policy Implications of the Impact of the Corporate Tax on Investment

The mathematics of the previous section show the varied impacts that corporate tax structures can have on firm investment decisions. For any given corporate tax rate, the tax system can be designed to offer very different incentives for investment. A tax system that simply taxed corporate income, with no deductions for depreciation or investment tax credit, would clearly reduce investment levels by lowering the marginal benefit (after-tax return) of each dollar of investment. Allowing depreciation, particularly if it is accelerated, investment tax credits can mitigate or even reverse the negative effect of taxes on investment by lowering the required return to an investment. When a company buys a machine, it receives the embedded tax advantages of having purchased that machine. The faster depreciation is and the larger the investment tax credit is, the larger those tax advantages are. As a result, the effective marginal tax rate for corporations has varied widely during the recent past, from a high of 51% in 1980 to a low of 12.5% between 2010 and 2013.¹⁴

The 2017 tax reform further changes the effective tax rate in important ways. First is the reduction in the corporate tax rate from 35 to 21%. At the same time, the law expands expensing of certain investments (such as tangible equipment), which will increase the present discounted value of tax breaks for some investment, and removes expensing for other investments (such as research and development), which will lower the value of tax breaks for other investments. The law also made significant changes to the deductibility of corporate interest (discussed below) and the deduction of net operating losses (where the amount that can be deducted is limited, but it can be deducted for more years). This caused the average effective corporate tax to fall from 17.2% in 2017 to 8.8% in 2018.¹⁵

EMPIRICAL EVIDENCE

Accelerated Depreciation and Investment

One of the most important questions in all of tax policy is the extent to which corporate taxes impact corporate investment decisions. Investment by corporations is a backbone of economic growth. And the model just described shows the complicated and potentially significant ways that tax policy can drive those investment decisions.

There is a large literature investigating the impact of corporate taxes on corporate investment decisions. The conclusion of recent studies is that the investment decision is fairly sensitive to tax incentives, with an elasticity of investment with respect to the effective tax rate on the order of -0.5: as taxes lower the cost of investment by 10%, there is 5% more investment. But a recent study by

[Zwick and Mahon \(2017\)](#) suggests that certain types of corporate tax incentives can have a much larger effect.

Their paper focuses on the response of firm investment decisions to two episodes of “bonus depreciation.” This was a policy put in place to encourage investment during recessions by accelerating the rate at which firms could depreciate their investments. As noted above, faster depreciation (a higher value of α) lowers the cost of investing and should therefore increase investment activity. This bonus depreciation was imposed nationally, however, and was clearly related to economic conditions, raising the challenge of how to separate its impacts from other factors that might drive investment behavior.

To address this challenge, the authors compared firms that were in the same industry—but whose investments were in different categories. Some firms mostly invested in capital equipment with a short life, so that further acceleration of their depreciation deductions didn’t much lower the cost of investing; other firms that invested in long-lasting capital equipment saw a much larger reduction in their investment costs. As a result, firms in the same industry had much larger changes in investment costs depending on their ex ante mix of investments. They found that firms that had their investment costs lowered the most were the ones most likely to raise investment in the wake of the bonus depreciation.

The authors confirmed their empirical strategy in two ways. First, they showed that these pairs of firms had very similar investment patterns before the tax change, and that the differences between treatment and control firms only emerged after the policy changed. Second, they confirmed their findings by looking at the response of investment to “kinks” in the tax depreciation schedule that occurred even in non-tax reform years. These kinks emerged because of a provision of the tax code that allows small firms to fully expense their investment up to some limit; they found that investment spiked exactly at this investment limit.

A particularly innovative aspect of this study is that the authors moved beyond the average effects of the tax incentive to consider heterogeneity across firm types. Doing so yielded two key findings. First, the effect of tax incentives was much larger on smaller and more “cash constrained” firms, for whom the tax break may have been providing valuable needed cash flow toward investing. Second, the effects of tax incentives only showed up for firms that could use the tax breaks in the tax year—as opposed to firms already paying no tax, who had to “carry forward” the tax breaks to be used in a future year.

Putting this all together, the study found an elasticity of investment with respect to the tax price of -1.7 , which is much larger than indicated in the existing literature. The authors speculated that their findings resulted from including a much larger sample of small firms than previous studies did, and from focusing on a mechanism that yielded immediate rather than delayed tax benefits. This suggests that not all tax changes are created equally, but that well-targeted tax changes can have large effects on investment.

24.5 Treatment of International Corporate Income

Corporations around the world are functioning in an increasingly integrated world product market. As a result, there may be a number of reasons firms in the United States would want to produce in other nations, such as lower labor costs, lower transportation costs when selling the product in those nations, or a better ability to customize products to local tastes. Firms that operate in multiple countries are called **multinational firms**, and the production arms of the corporation in other nations are called the firm's **subsidiaries**.

multinational firms

Firms that operate in multiple countries.

subsidiaries

The production arms of a corporation that are located in other nations.

Production costs or sales advantages are not the only reason firms produce goods abroad. The corporate tax structure in the United States and in other nations may also play a role by encouraging international production as a means of avoiding U.S. taxation. Some of the largest U.S. companies see their tax burdens dramatically reduced through international diversification. General Electric, for example, earned worldwide profits of \$14.2 billion in 2010, of which \$5.1 billion came from the United States. But when tax time came, rather than paying taxes, GM claimed a tax refund of \$3.2 billion!¹⁶ In this section, we discuss the treatment of international income in the U.S. corporate tax structure.¹⁷

How to Tax International Income

There are two basic approaches to taxing corporations that earn income abroad.¹⁸ The first is a **territorial system**, whereby corporations earning income abroad pay tax only to the government of the country in which the income is earned. The second is a **global system**, whereby corporations are taxed by their home countries on their income regardless of where it is earned. Under the recent tax reform, America joined most of the world in moving from a global to a territorial system.

territorial tax system

A tax system in which corporations earning income abroad pay tax only to the government of the country in which the income is earned.

global tax system

A tax system in which corporations are taxed by their home countries on their income regardless of where it is earned.

The Transfer-Pricing Problem

The fundamental problem facing tax authorities in taxing foreign income is that when a good is produced using inputs from many nations, it is difficult to appropriately attribute the profits earned on that good to any particular nation. In particular, companies will have an incentive to report profits as being earned in nations with low corporate tax rates, and report expenses as being incurred to offset earnings in nations with high corporate tax rates. A company can accomplish this goal by manipulating its **transfer prices**, the amount that any of the company's subsidiaries reimburse any other of the same company's subsidiaries for goods transferred between the two.

transfer prices

The amount that one subsidiary of a corporation reimburses another subsidiary of the same corporation for goods transferred between the two.

Imagine that France levies a 40% tax on corporate profits, compared to the 21% corporate tax rate in the United States. An American computer company has a French subsidiary that manufactures microchips at a cost of \$100 each. The American company transfers those microchips to the United States, where it spends another \$500 on the rest of the computer, then sells the whole package for \$1,000. So the total profit on the transaction is \$400. How does the company decide to allocate that \$400 in profit between the American parent and the French subsidiary?

The American company could say that the entire \$400 profit is due to the microchip and could transfer \$500 to its French subsidiary in exchange for each chip (the cost of \$100 plus profits of \$400). On paper, the French subsidiary would make a \$400 profit (the \$500 transfer from the United States minus the \$100 cost of producing the chip) and would pay \$160 in taxes ($0.40 \times \400) to the French government. The American company records no profit because it sells the computer for \$1,000 and records costs of \$500 to its French subsidiary for the chip and \$500 to its U.S. plant for producing the computer.

At the other extreme, the American company could say that none of the \$400 profit is due to the microchip and transfer only \$100 to its French subsidiary in exchange for each chip. In that case, the French subsidiary makes no profit, while the American company makes \$400 in profit on each computer ($\$1,000 - \$500 - \$100$). The company thus pays only \$84 in taxes (0.21×400), this time to the U.S. government.

The American company can thus lower its taxes by \$76 per computer by transferring only \$100 to the French subsidiary. The transfer-pricing problem arising from this practice is that companies will have the incentive to make profits appear as if they were earned in the low-tax country.

The United States and other OECD countries are aware of this problem, and tax authorities in those nations require that in transactions between a firm and its foreign subsidiaries, transfer prices be recorded as if the exchange had occurred at “arm’s length,” as if two separate, unrelated firms had negotiated the price. In practice, this rule is extremely difficult to enforce and, in many cases, to interpret. There is substantial evidence that corporations manipulate prices and profits across subsidiaries to reduce tax burdens. For example, [Collins et al. \(1998\)](#) found that U.S. multinationals report greater foreign profitability if they face foreign tax rates below those of the United States.

One major example of such a scheme involved GlaxoSmithKline, a drug company based in the United Kingdom that sells the ulcer drug Zantac through subsidiaries in many other nations.¹⁹ Glaxo has a subsidiary in the United States, which is, in this case, the higher tax country, so it could reduce its taxes by shifting expenses to the United States and profits back to the United Kingdom. According to the U.S. Internal Revenue Service, Glaxo did exactly that by overpaying royalties on Zantac to its British parent company, which did the research and development of the drug. These large royalties led to higher tax payments in Britain and lower tax payments in the United States because the U.S. subsidiary could deduct the royalties as a cost of doing business. As a result, in January 2004, the IRS demanded payment of \$5.2 billion from the company—\$2.7 billion in back taxes owed from 1989 to 1996 and \$2.5 billion in interest. The argument over Glaxo’s taxes dragged out in U.S. tax court and was scheduled to go to trial in 2007. However, in September 2006, Glaxo agreed to resolve the dispute with the U.S. government with a settlement of \$3.1 billion covering the years 1989 through 2005.²⁰

APPLICATION

The A(pple) B(urger King) C(aterpillar)s of Avoiding Corporate Taxes on International Income



The past few years have seen a dramatic increase in the attention paid to attempts by corporations to avoid taxes on their earnings abroad. In this Application, we discuss three of the most notable

examples.

On May 21, 2013, the Senate held a hearing on offshore profit shifting and the U.S. tax code regarding Apple Inc. and its attempts to evade taxes. In 2011, Apple made 70% of its total \$34.2 billion pre-tax profits abroad, but the committee estimated that the company only paid a 2.2% tax rate on that profit.²¹ Investigators argued that Apple had avoided reporting at least \$74 billion in profits to IRS between 2009 and 2012.²²

How did Apple accomplish this tax avoidance? It relied on low corporate taxation in Ireland and a creative organizational structure. Apple used the types of transaction pricing approaches we've discussed to shift much of its profits to Ireland, a country where Apple has received a special corporate tax rate in the single digits for many years. Here's how it worked: Apple made \$34 billion in 2011 and reported that its Japanese subsidiaries made only \$150 million, about 0.44%, even though Japan is one of Apple's largest foreign markets. Profits were removed from Japan and sent to Ireland, where Apple reported \$22 billion in income for that year.²³

In recent years, Apple has been able to take its Irish connection even further. Apple Operations International (AOI) is a holding company that owns most of Apple's offshore entities. Yet AOI has no physical presence and has no employees other than two Apple, Inc., employees from Cupertino, California, and one Irish employee of a different Irish subsidiary that AOI owns.²⁴ Because AOI is not managed or controlled in Ireland, Ireland does not recognize its tax residency. And because AOI is not incorporated in the United States, the United States does not recognize its tax residency. Using these loopholes, AOI has not paid any corporate income tax for the last five years,²⁵ despite making up 30% of Apple's total net profits during the same time frame.²⁶ In 2016, the European Commission concluded that Ireland had illegally given special tax rates to Apple's three Irish subsidiaries in exchange for 5,500 new jobs in Cork, Ireland.²⁷

More recently, attention has been focused on the topic of *corporate inversions*. A corporate inversion in the United States is when a U.S.-based company merges with a foreign one, forming a new merged company that is technically located in a foreign country. The U.S. firm becomes a subsidiary of the merged company, although in reality, the foreign firm is usually controlled by the U.S. firm.²⁸ Essentially, the initial American company loses its U.S. corporate status and, therefore, is no longer under the U.S. Tax Code, but instead pays taxes according to the laws of the foreign country it now legally resides in. This way, the initially American company avoids paying significant amounts in tax dollars to the U.S. government. The relocation of the merged company has little to no additional purpose for the American company other than decreasing taxes.²⁹

This approach received attention when one of the United States' largest fast-food chains, Burger King, undertook a corporate inversion with a Canadian firm. Burger King bought out Canadian restaurant chain Tim Hortons for \$11 billion, despite the Canadian company's larger total annual revenue (\$2.5 billion versus Burger King's \$1.1 billion).³⁰ It was estimated that Burger King avoided anywhere between \$400 million and \$1.2 billion in U.S. taxes over the following four years.

Finally, perhaps the simplest approach to tax avoidance of all was taken by the Caterpillar corporation. In 1999, Caterpillar decided that it could sharply reduce the U.S. tax on profits from the sale of parts sent from the United States to customers around the world by simply taking its name off of the invoices and replacing it with the name of a Swiss subsidiary. As [Norris \(2014\)](#) wrote, "So even though the parts might have never come within a thousand miles of Switzerland, the profits accrued to the Swiss subsidiary. And Caterpillar negotiated a deal to tax those profits well below Switzerland's norms," with rates in the range of 4 to 6%. The tax savings? \$300 million per year.

These are not isolated examples. Jason Furman, former chair of the Council of Economic Advisors, noted that the profits reported by American-controlled corporations in some tax haven nations far exceeded the total economic output of the countries in which those corporations were situated. For example, in 2014, U.S.-controlled corporate profits in the British Virgin Islands amounted to 1,009% of the island's GDP, while in the Cayman Islands, the figure was 1,430%. In Luxembourg, U.S. profits were 103% of GDP, and in Ireland, they were 38%. As Furman said, "I feel safe in saying that the fact that in 2010 U.S.-controlled foreign corporation profits represent 1,578% of Bermuda's GDP, probably does not simply reflect business decisions made for purely business reasons."³¹

Global Versus Territorial Taxation

Given the problem of transfer pricing, how should we think about the trade-offs between the global and territorial approaches to taxing international income? It is useful to view this through the lens of the growing U.S. dissatisfaction with global taxation that motivated the recent tax reforms.

Under the global system, U.S. firms paid their U.S. corporate tax obligation wherever their plants or factories were located. Firms could, however, claim any tax payments to foreign governments as a credit against their U.S. taxes. Because of this **foreign tax credit**, firms should have, in principle, paid the same tax rate (the U.S. corporate tax rate) regardless of where they locate their subsidiaries. In practice, however, this was not the case.

foreign tax credit

U.S.-based multinational corporations may claim a credit against their U.S. taxes for any tax payments made to foreign governments when funds are repatriated to the parent.

This is because firms were taxed only on their international income when the income is returned, or **repatriated**, from the foreign subsidiary to the U.S. parent company. As a result, U.S. firms never faced U.S. taxes as long as they retained their foreign earnings at their foreign subsidiaries. For a subsidiary in a nation with low corporate tax rates, relative to the United States, this tax structure provided a strong incentive to defer repatriation of earnings. For example, if the foreign nation had a corporate income tax rate of only 10%, while the rate was 35% in the United States, the firm could defer taxation in the amount of 25% of earnings by not repatriating those earnings from the foreign subsidiary back home to the United States. This deferral was a tax advantage because those remaining U.S. taxes (the 25%) were paid in the future when earnings were eventually repatriated, so the present value of tax payments on foreign income was lower than if taxes were paid when the income was earned. If the money was *never* repatriated, the corporation

avoided paying any U.S. tax on its foreign earnings altogether.³² This is very similar to the tax advantage of taxation of capital gains on realization rather than on accrual: the effective rate is lowered because taxes are paid in the future.

repatriation

The return of income from a foreign country to a corporation's home country.

As a result of this system, even under the global system, firms could avoid much of the U.S. taxation of their foreign profits. Consider the \$74 billion in profits that Apple avoided reporting through their transfer pricing. If this \$74 billion were to return to the United States, it would have been taxed. Not surprisingly, Apple kept its profits overseas. In fact, to avoid bringing this money back to the United States (and having to pay taxes on it), Apple went into debt by borrowing money even though it had these billions in overseas cash.³³

Given this avoidance behavior, many argued that our global system was already effectively a territorial system, in that profits earned abroad were largely avoided through holding cash abroad. Indeed, some argued, this was worse than a territorial system since it induced companies to hold profits abroad, rather than moving them to where they were most productive. Under a territorial system, those profits might return to the United States and create economic activity here.

This logic motivated a “tax holiday” as part of the American Jobs Creation Act of 2004. As indicated by its name, the bill was intended to rejuvenate the economy and create jobs. One of its most important provisions was a one-year reduction of the tax rate on repatriated profits from 35 to 5.25%. The hope was that multinational firms would take advantage of the one-year window by repatriating billions of dollars in profits currently held overseas.

By summer of 2008, U.S. companies had repatriated roughly \$312 billion. However, it was clear that the expected surge in hiring and job creation did not materialize. A 2009 report by the nonpartisan Congressional Research Service looked at 12 participating companies and found that at least 8 had cut jobs by 2006. In one particularly perverse example, Pfizer repatriated \$37 billion—more than double the amount returned by any other company—but cut 10,000 jobs in 2005. According to the report, “Empirical analyses of the stimulative effects of the repatriation provisions … suggest a limited stimulative impact from the provisions. They conclude that much of the repatriated earnings were used for cash-flow purposes and little evidence exists that new investment was spurred.” Discouragingly, the

nonpartisan Joint Committee on Taxation estimates that while the tax holiday produced an initial flood of cash in 2005, some of that money would have been returned to the United States anyway at a much higher tax rate, costing the government \$3.3 billion in lost revenue by 2014. By 2009, the idea of a repatriation holiday was once again debated in Congress, with the estimated cost of a tax holiday coming in at \$30 billion over the next decade.³⁴

The experience of the tax holiday raises the difficult tension in choosing between a global and territorial system. The global system raises more revenues to the extent that at least some profits are repatriated, but it distorts firms to reduce their repatriation rates in order to avoid tax. The experience of the tax holiday suggests that more repatriation won't, however, have much of an impact on economic growth. For this reason, others have suggested a revised global system, where companies are taxed on their income whether or not it is repatriated.³⁵ Foreign tax credits would still apply, as under the previous global system, but now the difference in U.S. tax burden would be levied regardless of where money is held. As the Application shows, the recent tax reform went in a somewhat different direction.

APPLICATION

The 2017 Tax Reform and Corporate Tax Wedges



At the heart of the public finance approach to optimal taxes is the notion of minimizing tax wedges that cause distortions. The corporate tax system imposes a host of such wedges throughout the economy, but two of the most important are the wedge between domestic and foreign economic activity, and the wedge between corporate and noncorporate form.

By lowering the corporate tax rate to 21%, however, the 2017 tax reform opened up a significant wedge between these organizational forms. In order to address this potential problem, the tax reform added a new tax break for “pass through” organizational forms such as partnerships, sole proprietorships, and S-corporations: such organizations get a 20% deduction for their nonwage income. In this way, the gap between organizational forms is reduced—albeit at an enormous revenue cost (\$415 billion over a decade).

But (you guessed it) this change introduced a whole set of new distortions into the system. This is because the line between wage and nonwage income for self-employed individuals is very vague. As a result, by offering this large deduction for nonwage income, but not wage income, the tax reform created a new wedge. As described in [Marr et al. \(2018\)](#), “A group of 13 leading tax experts have highlighted potential tactics of ‘cracking’ and ‘packing’—that is, splitting apart different aspects of a business, or combining different businesses together, in ways that maximize the new tax break. For example, a group of doctors could form a REIT [an investment vehicle for real estate] and purchase their medical practice’s building. The REIT would ‘charge’ the medical practice ‘rent’ to use the building, and the rental income that the doctors essentially paid themselves would become eligible for the pass-through deduction (REIT income is eligible for the deduction). Moreover, the highly paid doctors would have an incentive for their REIT to overcharge the medical practice for rent, effectively shifting income from a form that isn’t eligible for the deduction (their medical practice income) to one that is eligible (their REIT income).”

The problem of chasing tax wedges becomes apparent here. In order to compete internationally, the United States lowers its corporate tax rate. Then, in order to ensure equality among business forms within the United States, the United States lowers the tax rate on noncorporate businesses. In a broad sense, the reform has reset a system with lower rates and equality across nations and corporate forms. But in practice the reform introduced a new set of tax distortions—while lowering corporate tax revenues to a new low. Whether this on net results in improved economic performance in the United States remains to be seen. ■

24.6 The Consequences of the Corporate Tax for Financing

The corporate tax has efficiency implications beyond the decisions of firms on how much to invest. Another potentially important decision that may be influenced by corporate taxation is how to finance that investment. As noted previously, firms have three primary choices for financing investment: they can use retained earnings, they can increase their debt by borrowing, or they can issue equity (ownership shares). Moreover, if a firm chooses the equity route, it has two choices on how to return earnings to investors: it can issue dividends, or it can reinvest the funds and try to increase the value of the stock, leading to capital gains. For now, let's leave aside the less interesting case of financing investment through retained earnings and focus on the impact of taxes on financing investment from new capital.

The Impact of Taxes on Financing

Suppose that a firm needs \$10 for an investment that will yield \$1 in corporate income each year. The firm wants to finance this investment through debt or equity, and in either case return that \$1 to the investor. [Figure 24-5](#) illustrates the impact of taxes on the firm's decision about how to finance that investment (once again ignoring the option, for now, of financing from retained earnings). At the first node, the firm decides to either take on debt or issue equity to finance the \$10 investment. If the firm finances with debt (the top branch), it will pay the \$1 in interest to bondholders. In this case, the firm will pay no taxes on the \$1 in corporate income because interest payments are deductible from firm income for the corporate tax: the \$1 in corporate income is offset by \$1 in interest payments when computing taxes. The bondholder who has loaned money to the firm therefore receives the full \$1 but then has to pay personal taxes on that \$1 at the personal income tax rate on interest, τ_{int} , so the bondholder receives $\$1 \times (1 - \tau_{int})$.

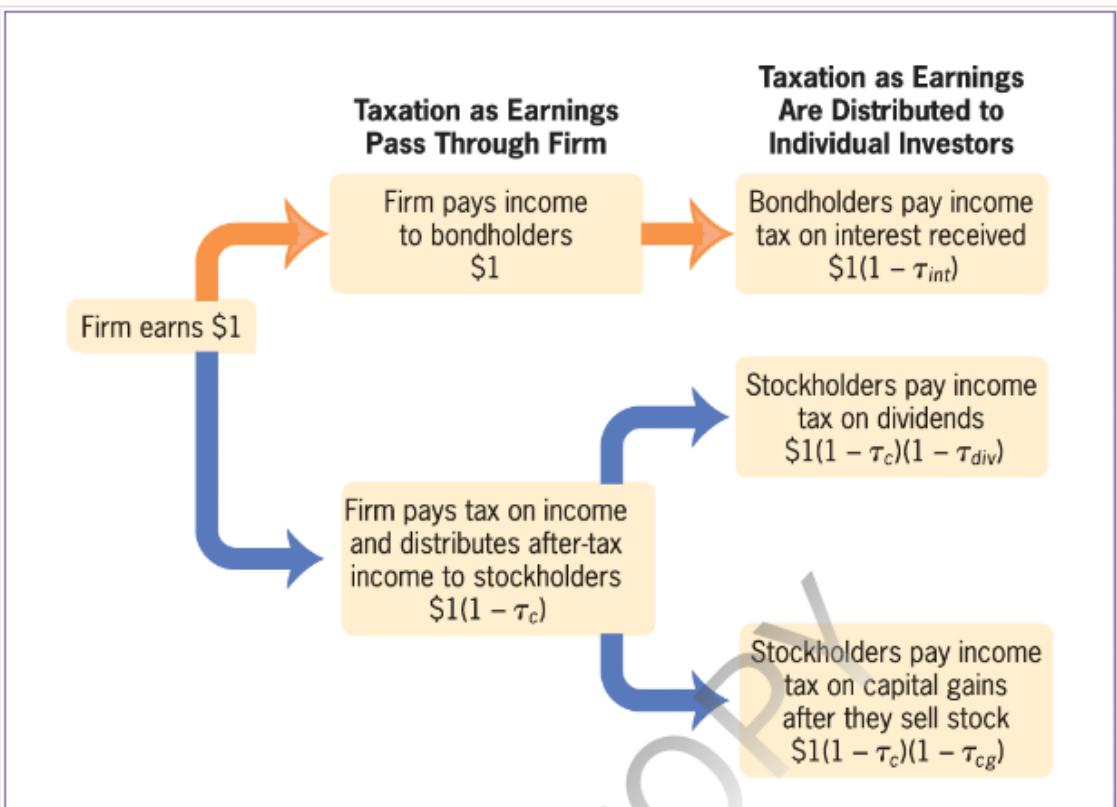


FIGURE 24-5 The Firm's Financing Decision • When the firm wants to finance investment, it can do so either by issuing equity (stocks) or taking on debt (issuing bonds). If the firm takes on debt, then when it earns \$1, it pays that \$1 to bondholders, but it also subtracts the dollar from its taxable income, so that bondholders get the full \$1, on which they pay interest taxes. If the firm issues equity, then when it earns \$1, it pays that \$1 to equity holders in the form of either dividends or capital gains. In either case, the firm has to pay corporate taxes on the dollar, and individuals then pay either dividend or capital gains taxes when they receive the dollar.



Alternatively, the firm can issue equity to finance the investment. In this case, when the firm earns the \$1 from the investment, it will not have the interest payment to provide an offsetting deduction for corporate taxation, so it will have to pay corporate taxes on the \$1. Thus, only $\$1 \times (1 - \tau_c)$, where τ_c is the corporate tax rate, will get passed to shareholders.

If the firm uses equity finance, it has an additional decision: How should it get the money to the shareholders? With debt, there is no choice—the dollar is simply paid as interest. With equity, the firm has the choice of paying a dividend or retaining the earnings and reinvesting them. If it pays the dollar out as a dividend, then the stockholder has to pay dividend taxes on the dollar. Thus, the stockholder ultimately receives $\$1 \times (1 - \tau_c) \times (1 - \tau_{div})$, where τ_{div} is the personal tax rate on dividend income. This feature is often referred to as the *double taxation of dividends*, with dividends taxed by both the corporate and personal tax systems.

If, instead, the firm reinvests the \$1, the stockholder will possibly reap a capital gain when they sell the stock share. Let's assume that each \$1 of reinvestment increases the stock price by \$1. In this case, the stockholder receives

$\$1 \times (1 - \tau_c) \times (1 - \tau_{cg})$, where τ_{cg} is the *effective capital gains tax rate*. The effective capital gains tax rate is lower than the statutory capital gains tax rate for most investors due to the host of benefits to capital gains that we discussed in [Chapter 23](#), including taxation upon realization rather than accrual and step-up of basis at death. The effective capital gains tax rate has also traditionally been far below the dividend tax rate. As of 2004, the statutory rates on capital gains and dividends are equal, at 15%, but the effective capital gains tax rate remains below the dividend tax rate.

As should be clear from [Figure 24-5](#), the corporate tax structure can play a critical role in a firm's decisions on how to finance its investments. Financing through debt saves corporate taxation of earnings but does not allow individuals to take advantage of low capital gains tax rates. Financing by equity, and paying dividends, seems the least tax-efficient route of all. This figure therefore raises two questions about corporate financing.

Why Not All Debt?

A company has two means of financing an investment. If it adds debt, the interest it pays to finance its investment is exempt from corporate taxation. If it adds equity, it pays the corporate tax. So why don't companies simply finance all their investment with debt and thereby avoid corporate taxation?

There are a number of specific answers provided to this question, but they all come down to the key distinction between debt and equity: debt requires fixed payments but equity does not. A firm can choose whether to pay dividends on equity, but it can't choose whether to make its interest payments—it must make them. If the firm doesn't make its interest payments, it defaults on its debts and can be forced into *bankruptcy*. In bankruptcy, all individuals who have invested in a firm can make claims on its remaining assets. Bondholders are the primary claimants; they are first in line to claim whatever assets may remain. Equity holders, in contrast, are only entitled to the resources left over after the bondholders have received their claims.

Imagine that you could choose the grading scheme for this course, and you had two choices. Under one choice, you do a problem set each week, and if you ever fail one problem set, you fail the course. Under another choice, you do a problem set each

week, and it is the average grade across all of your problem sets that determines your final grade. Most of us would choose the latter grading scheme because of its greater flexibility and decreased risk.

Likewise, the extra flexibility of equity can raise its value enough to offset its tax disadvantage. Equity finance can provide a “buffer zone” against the risk of bankruptcy; with equity, if times are bad, the firm can simply not pay a dividend rather than being forced into bankruptcy. Managers, in particular, who often care more about reducing the day-to-day risk of losing their job than about maximizing the return to the distant owners of a company, might prefer equity to debt.

This preference for equity, despite its tax disadvantages, is strengthened by a particular kind of agency problem within the firm: the conflict of interest between debt holders and equity holders. Debt holders are parties who get a fixed return (interest payment) regardless of how well the firm does, as long as the firm doesn't go bankrupt. Equity holders, in contrast, receive a return that is tied to firm performance: the share of earnings that is reinvested in the company grows in value as the company grows in value. In [Figure 24-5](#), we assumed that each dollar reinvested in the firm yielded only a dollar in value. In reality, each dollar of investment earns an uncertain amount. Equity holders suffer when a corporate investment does poorly but benefit when it does well.

For equity holders, however, there is a lower limit to how badly they can lose when the company does poorly: all they can lose is their initial investment if the firm goes bankrupt. On the other hand, there is no upper limit to how well they can do when the company does well. Thus, when equity holders own only a small share of a company, they will want to take excessive risks because they get a higher return but bear relatively little risk; since they own a small part of the company, they don't have that much money to lose. The possibility of excessive risk taking is a problem because equity holders make the decisions about whom to hire and, potentially, which projects to choose.

Consider a firm that currently has equity of \$1 million and debt of \$5 million, as shown in the top panel of [Table 24-1](#), for a total firm value of \$6 million. The firm's interest payment on the debt each period is \$500,000. The firm currently has earnings of \$600,000 per year, so that each year, it can pay the interest it owes its debt holders and pay the remaining \$100,000 of earnings as a dividend to its equity holders.

TABLE 24-1 The Debt Versus Equity Conflict

	Share of Financing	Possible Gain from Investment	Possible Loss from Investment	Expected Return from Investment	Should the Firm Take the Risk?
Equity holders	\$1 million	\$3 million	\$2 million	\$0.5 million	Yes
Debt holders	\$5 million	0	\$10 million	-\$5 million	No
Equity holders	\$5 million	\$3 million	\$10 million	-\$3.5 million	No
Debt holders	\$1 million	0	\$2 million	-\$1 million	No

In the top panel, equity holders control only \$1 million of the firm's finances, and debt holders control \$5 million. The investment under consideration has, from the equity holders' perspective, a potential gain of \$3 million and a potential loss of only \$2 million, so that the expected return is positive, and the investment will be made. However, this is a mistake from the debt holders' perspective because they have no gain and an expected \$5 million loss. When equity holders control \$5 million of the firm's assets, as in the bottom panel, the equity holders will not want to undertake the risky investment.

Suppose that, in addition to this steady flow of earnings, the firm is offered a project that has a 50% chance of yielding \$3 million and a 50% chance of losing \$6 million. If the investment fails, the firm would go bankrupt because it would have to sell its \$6 million in assets (\$5 million of debt and \$1 million of equity) to pay the \$6 million debt from losing. From an overall firm perspective, this is not a good risk to take. The *expected return* on this investment, the odds of winning times the value if the firm wins, plus the odds of losing times the value if the firm loses, is $(0.5 \times \$3 \text{ million}) + (0.5 \times -\$6 \text{ million}) = -\$1.5 \text{ million}$, so the firm is better off not taking the investment because it loses money on average.

Now think about the project from the equity holders' perspective. If this investment hits, they get the entire \$3 million because they gain all the benefits from better firm performance. If the investment misses, and the firm goes bankrupt, they lose the \$1 million they have invested, plus their dividend payment of \$100,000 for each period in the future. At an interest rate of 10%, the present discounted value of this stream of dividend payments is \$1 million, so equity holders lose a total of \$2 million if the firm goes bankrupt.³⁷ From the equity holders' perspective, there is a 50% chance they will lose \$2 million and a 50% chance they will gain \$3 million, for an expected value to the equity holders of \$500,000 ($[0.5 \times -\$2 \text{ million}] + [0.5 \times \$3 \text{ million}] = \$500,000$). So they will vote to take on this project.

What about the debt holders? They get nothing if this gamble hits because the firm already earns enough to pay back its interest payments. But if the gamble misses and the firm goes bankrupt, they not only lose their \$500,000 per year in interest payments, but also their initial \$5 million investment. So from their perspective, this is a gamble with a 50% chance of winning zero (if it hits, they still just get their \$500,000 interest payment) and a 50% chance of losing \$5 million in assets and \$5 million PDV of future interest payments. For bondholders, the expected value of this investment is $-\$5$ million.

In this case, there is a clear conflict of interest between equity holders and debt holders. The equity holders, who own the company and have control over the decision makers if not the decisions, would support taking on this project, while the debt holders would not. This is a problem because the equity share is so small. If the equity share were \$5 million and the debt share were \$1 million, equity holders wouldn't support this project. This is illustrated in the bottom panel of [Table 24-1](#) (assuming that the firm now pays \$500,000 in dividends to equity holders and \$100,000 in interest payments to bondholders). In this situation, the equity holders don't want to risk the new investment because they have too much to lose: the expected return on the investment for them is now $-\$3.5$ million. As before, the debt holders also don't want to make this risky investment because their expected value remains negative. In this case, the interests of the debt and equity holders are now aligned (they both lose money), and the project is not undertaken.

The key insight here is that as the fraction of firm financing that is debt rises, the potential for this conflict of interest grows. This potential grows because as the debt share rises, the debt holders bear a larger and larger share of projects that go bankrupt, while equity holders have a smaller and smaller risk from taking a gamble.

EMPIRICAL EVIDENCE

How Do Corporate Taxes Affect a Firm's Financial Structure?

The preceding discussion suggests that the impact of corporate taxation on firm financial structure—and, in particular, the reliance on debt—is unclear. Of course, this question cannot be addressed by simply comparing whether firms facing higher corporate tax burdens have higher debt levels. Corporate taxes are themselves a function of a variety of firm decisions—including financial structure! A firm with more debt will have lower tax payments, so a regression of debt levels on corporate tax payments will yield a biased estimate.

[Heider and Ljungqvist \(2015\)](#) addressed this problem by using multiple changes in state corporate taxes in the United States. Over the 1990–2011 period, they found 38 instances of states changing their corporate tax rates. They compared the effect of these tax rate changes on firms in those states to the effect on other firms in the same industry in nearby states. In this way, they could use comparable firms to identify how tax changes affect firm financial structure.

It is possible, however, that these state corporate tax changes themselves are responding to the factors that determine firm leverage. For example, a negative economic shock in a state may lead firms to raise corporate tax rates to offset falling corporate profits. At the same time, in recessionary periods, firms may need to borrow more, raising their debt ratios. The authors presented a clever approach to address this concern: they examined firms that are right near the border of states that do and do not change taxes. Such firms face similar economic conditions, but the tax cuts only affect some of the firms and not others.

Using this empirical approach, the authors found that there is a very sizeable effect of state corporate tax rate changes on how firms are financed. Tax increases led to more use of debt: the average state corporate tax increase in their sample of 13% led to a 4.5% increase in debt as a share of firm financing. At the same time, they found that this effect was asymmetric: cuts in corporate taxation didn't lead to reductions in firm leverage. This surprising asymmetry suggests that more is at work than the simple firm optimization of financial structure with respect to taxation.

Now, imagine you work for a bank that is looking to lend its money to a small firm. Would you prefer to lend to a firm with 50% equity and 50% debt or one with 10% equity and 90% debt? By the logic of the example we've just explored, you would prefer to lend to the firm with 50% equity because more of the owners' capital is at risk, so they will make more sensible decisions. You worry that if you lend to the firm with only 10% equity, it will take crazy risks that have negative expected value for you as the debt holder.

As a result of this agency problem, banks (and other lenders) will charge higher interest rates on loans to firms as their share of debt financing rises. These higher interest rates offset the tax advantage of debt, so that firms now face a trade-off: more debt means more tax advantage but potentially higher financing costs because banks fear loans to debt-heavy firms.

The Dividend Paradox

The second major mystery of corporation finance is why firms pay dividends. Having chosen the equity route for financing, if a firm earns \$1, it can pay the dollar out as a dividend, triggering dividend income taxes, or it can reinvest the dollar, raising the value of the stock and allowing the recipient to take advantage of preferential capital gains tax rates when they sell their shares. The fact that effective capital gains tax rates are traditionally so much lower than dividend tax

rates suggests that firms should reinvest rather than pay dividends, as long as they can find productive reinvestments for the firm. Yet about one-fifth of publicly traded firms pay dividends, though the number has been declining in the past couple of decades. Thus, we have another puzzle—why do firms pay dividends when capital gains are taxed so much less?

Empirical evidence supports two different views about why firms pay dividends, as reviewed by [Gordon and Dietz \(2008\)](#). The first is an agency theory: investors are willing to live with the tax inefficiency of dividends to get the money out of the hands of managers who suffer from the agency problem. A study found that if 25 of the largest, long-standing dividend payers in 2002 had never paid those dividends, their cash holdings, currently \$160 billion, would be \$1.8 trillion! The authors suggest that such large cash stockpiles might be a recipe for disaster because of opportunistic managers, leading to inefficient investment or even outright corruption. Equity owners in that situation may therefore be willing to pay the price of dividend inefficiency to reduce the manager's control over firm assets.³⁸

The second is a signaling theory: investors have imperfect information about how well a company is doing, so the managers of the firm pay dividends to signal to investors that the company is doing well. That is, the very fact that managers are willing to “burn money” by paying tax-inefficient dividends must prove that the company has cash to burn! By paying dividends, managers can prove to ill-informed investors that their investment is performing nicely.³⁹

How Should Dividends Be Taxed?

An important ongoing debate in tax policy concerns the appropriate tax treatment of dividend income. As we have seen throughout this chapter, the individual tax rate on dividends is typically higher than the effective tax rate on capital gains. According to the logic of [Figure 24-5](#), a high-dividend tax rate can have three effects on firm financing decisions. First, it can reduce the use of dividends to repay equity holders. As reviewed in the upcoming Application, there is clear evidence that the 2003 reduction in dividend taxation led to an increase in dividend payouts.

Second, high-dividend taxes could push firms to choose debt rather than equity financing. Existing evidence suggests that higher-dividend tax rates cause firms to rely more heavily on debt.⁴⁰

Finally, and perhaps most importantly, higher-dividend taxes could reduce investment. For those investors who receive their return in the form of dividends, the effective tax rate on investment will rise as the tax rate on dividends rises. This increase will lead those investors to require a higher pre-tax rate of return on investments, shifting up the marginal cost curve in [Figures 24-2](#), [24-3](#), and [24-4](#), and lowering investment (because, with diminishing marginal product, firms must lower investment to get a higher actual rate of return on the next dollar of investment). This outcome has caused many to argue that the double taxation of dividends lowers the rate of corporate investment in the United States. Thus, reducing the dividend tax could, in principle, be a strong tool for increasing the nation's level of corporate investment.

This prediction, however, is derived from a model that can't predict why firms would pay dividends in the first place! In fact, both the agency and signaling models predict that higher tax rates on dividends will lead to more investment, not less. This is because in both models, dividends are wasteful, and taxing them more highly reduces their use; regardless of whether dividends solve agency problems or act as a signal, as their cost goes up (through higher taxation), they will be used less for that purpose. When firms pay fewer dividends, they have more retained earnings. Literature in corporate finance has suggested that the availability of retained earnings is an important, and perhaps the most important, determinant of investment financing.⁴¹ Thus, taxing these inefficient dividend payouts will lead to more investment, not less. The best evidence to date, reviewed later, suggests that there is overall little impact of dividend taxes on investment.

APPLICATION

The 2003 Dividend Tax Cut



One of the measures President Bush signed into law on May 28, 2003, under the Jobs and Growth Tax Relief Reconciliation Act, was a reduction in the rate at which dividends are taxed. Previously, dividends were taxed at 38.6%, well above the 20% capital gains rate. The 2003 law, however, reduced both the dividend and capital gains rates to 15%, making dividends significantly more attractive for investors.

Proponents of the dividend tax cut believed it would both stimulate the economy and end what they perceived as the unfair practice of taxing corporate income and then taxing it again when that income was paid out in the form of dividends. Bush himself wanted the complete elimination of dividend taxes, arguing that, "ending the double taxation of dividends [along with his other proposed tax cuts]

... is the best way to make sure this economy grows."⁴² In this view, the tax cut would spur companies to offer more dividends and make investing more attractive to investors by placing more money directly in their hands.

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Such a reform, however, would reduce federal government revenues because all corporate income would be taxed once, not twice, as occurs for equity investment. The tax savings from integration would accrue primarily to the high-income investors who hold the most shares in corporations. Thus, as with many reforms to the corporate income tax, the efficiency gains of integration must be offset against the reductions in the vertical equity of the tax system.

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24.7 Conclusion

Despite the declining importance of the corporate tax as a source of revenue in the United States, it remains an important determinant of the behavior of corporations in the United States. The complicated incentives and disincentives that the corporate tax creates for investment appear to be significant determinants of a firm's investment decisions. And both corporate and personal capital taxation substantially although not completely drive a firm's decisions about how to finance its investments.

The United States faces a difficult set of decisions about how to reform its corporate tax system. Despite repeated calls for ending "abusive corporate tax shelters," there has been little movement to end the types of corporate tax loopholes that cause such activity.⁴⁵ Given the political economy discussion of [Chapter 9](#), this lack of interest should not be surprising: corporate tax breaks have highly concentrated and powerful supporters, with only the diffuse taxpaying public to oppose them.

HIGHLIGHTS

- Corporations are entities that typically feature separation of ownership from control over daily operations.
- The existence of the corporate tax can be motivated either as a pure profits tax or as the only means of ensuring that corporate earnings do not escape taxation.
- The corporate tax is levied on the difference between earnings and expenses. Defining the depreciation expenses associated with investment is a particularly difficult issue.
- The incidence of the corporate tax is unclear, but recent evidence suggests that 35–50% falls on workers.
- The corporate tax system has complicated effects on investment incentives. The effective tax rate depends not only on the statutory corporate rate but also on the treatment of depreciation, the investment tax credit, and the nature of investment financing.
- Existing evidence suggests that corporate investment is fairly responsive to effective tax rates on investment earnings.
- The recent shift from a global to a territorial international tax system has enormous consequences for the treatment of multinationals, lowering the tax burden of international operations but reducing the incentive to hoard assets abroad.
- Despite a strong tax subsidy to debt, through the ability of firms to deduct interest payments from their corporate taxable income, firms are far from fully debt financed, perhaps due to agency problems. And, despite a strong tax disincentive for firms to pay dividends, they continue to pay them, perhaps as a means of removing money from opportunistic managers.

QUESTIONS AND PROBLEMS

1. Beth Jezos is the CEO of a large company. Her compensation is based on current profitability. She's considering undertaking one of two investments available to the company: (a) one that yields profits of \$500 million in each of the next 5 years and none thereafter, and (b) one that yields annual profits of \$300 million over 20 years. She selects the first investment. How could this example illustrate the agency problem?
2. You are a manager of a company that just spent \$80,000 to purchase a piece of equipment that is expected to function for five years. If you can

- borrow money at 5%, what is the PDV of the depreciation allowance under the following circumstances?
- You can expense the investment.
 - You depreciate using straight-line depreciation methods.
 - You depreciate over four years using accelerated straight-line depreciation methods.
 - You depreciate using an augmented accelerated method in which half of the asset value is depreciated immediately and the other half is straight-line depreciated over the remaining three years.
- Suppose that new machines cost \$504, and the marginal benefit from new machines is $MB = 246 - 6K$, where K is the number of machines purchased. The depreciation rate is 15%, and the dividend yield is 10%.
 - What amount of capital will you purchase? Why?
 - What amount of capital would you purchase if there were a 25% tax rate on cash earnings minus labor costs?
 - Suppose that dividend yield is 6%, depreciation is 12%, and the corporate tax rate is 35%. What would be the marginal cost of each dollar of machinery investment in the following situations?
 - Firms are allowed to expense the machine.
 - There is an investment tax credit of 8%.
 - Why has the effective capital gains tax rate tended to be substantially lower than the dividend tax rate in the United States? Given that this disparity exists, why do so many firms pay dividends?
 - Why are equity holders more likely than debt holders to want firms to engage in risky investments?
 - e You conducted a research study and found that corporations that finance their investments with a larger ratio of debt to equity tend to pay higher rates of interest to lenders. Why do you think this practice occurs?
 - The government of Kapitalia changes its tax code to allow for more accelerated depreciation of assets. Would you expect firms to substitute production methods away from capital and toward labor, away from labor and toward capital, or neither? Explain.
 - Consider the psychological effects of dividend signaling. Which would seem a stronger signal of corporate health (or its lack): when a long-standing dividend payer stops paying dividends or when a firm that had not previously paid them begins to do so? Explain.
 - Suppose that all industrialized countries agree to a compact specifying that the corporate income of multinational firms must be paid to the

- country where the parent firm is incorporated. What do you expect would happen to the number of multinational firms? Explain your reasoning.
11. Suppose that the corporate income tax rate is 30%, the personal income tax rate on dividend income and the interest tax rate are both 35%, and the capital gains tax rate is 20%. Compare the after-tax returns on each dollar of corporate earnings under three investment financing strategies: (a) the corporation finances by using debt; (b) the corporation finances by issuing equity but does not pay dividends; and (c) the corporation finances by equity and pays all of its income in dividends.
12. **E** Different states have different corporate tax rates. How could you use this to study the elasticity of corporate investment with respect to corporate tax rates? What would be the problems with this approach?
13. Suppose MedPraxCo Pharmaceutical, a large U.S.-based pharmaceutical company, merged in 2015 with Covlinco, a small medical device company, which is headquartered in Ireland. In 2019, the resulting Ireland-based conglomerate, CovPrax, purchased a small U.S.-based biotech company called Medico, and relocated CovPrax headquarters to South Dakota, where Medico is based. Throughout this 2015–2019 period, 98% of the conglomerate's workforce has remained based in Wyoming. Explain the logic for this series of mergers and acquisitions by MedPraxCo.

ADVANCED PROBLEMS

14. Megacola faces demand of $Q = 2,200 - 20P$. Its costs are constant at \$5 per unit.
- Show that Megacola will not change its behavior if the government introduces a 20% tax on its profits.
 - Does the existence of firms such as Megacola strengthen or weaken the case for a corporate income tax? Explain.
15. Suppose that the corporate tax rate is 25%, there is an investment tax credit of 10%, the depreciation rate is 5%, and dividend yield is 10%. The official depreciation schedule is such that the PDV of depreciation allowances is 40% of the purchase price of a machine.
- Calculate the per-period marginal cost of each dollar that the firm spends on the machine.
 - If the marginal benefit per period is $MB = 40 - 0.6K$, where K is the number of dollars spent on the machine, what is the optimal amount of

- machinery purchased?
- c. How would your answer change if the ITC increased to 20%?
16. The legislature in Tuneria has just passed a new law that will provide a large investment tax credit next year. What pattern of investment would you expect to see over the next two years? What implications would this have for estimates of the elasticity of investment with respect to investment tax credits?
17. Reducing corporate tax rates is often considered as a policy tool to enhance investment. How could the presence of tax loopholes diminish the relationship between corporate tax rates and corporate investment?
18. Facing a shortfall in funding for Social Security and Medicare, Senator Sands argues that the United States should raise the top marginal corporate tax rate back to 35%. Senator Mehta argues that it would be better to raise the revenue by increasing the tax rate on the top individual tax bracket. Which proposal do you think will increase the overall progressivity of the tax system?

The  icon indicates a question that requires students to apply the empirical economics principles discussed in [Chapter 3](#) and the Empirical Evidence boxes.
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