

*Annual Review of Economics*  
**Corporate Taxation**

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corporate taxation, tax incidence, multinational companies, economic crises

### Abstract

This article reviews economic research on business taxation, with a focus on corporate income taxation. We discuss what this research can contribute to current debates about corporate tax policy and where existing research is incomplete or inconclusive, so that clarification is needed. The issues we discuss include the incidence of the corporate income tax, its effect on investment and economic growth, the problem of international tax avoidance, and the role of corporate taxes in economic crises, including the current debate about taxes on windfall profits.

## 1. INTRODUCTION

In modern tax systems, firms play a pivotal role for tax collection. The taxes paid by firms include not only taxes on corporate profits but also personal income taxes, payroll taxes, sales taxes, taxes on business property, and value added taxes as well as excise taxes. However, public debates about business taxation mainly focus on the corporate income tax. Corporations are widely seen as powerful actors with a significant impact on the economy, owned and controlled by rich people. Therefore, many people think that taxes on corporate profits are important to achieve a fair distribution of the tax burden. In recent years, a key issue in the debate was the claim that multinational companies (MNCs) do not pay their fair share of taxes because they can avoid being taxed by shifting profits to tax havens. This has led to calls for international tax coordination with the objective to fight tax avoidance.<sup>1</sup>

Corporate taxes are also used as an instrument to stimulate investment and job creation. During the economic crisis caused by the COVID-19 pandemic, tax relief was granted to firms affected by lockdowns, and investment incentives like accelerated depreciation were introduced to stimulate economic recovery. At the same time, extra levies have been proposed to tax away windfall profits made by companies benefitting from crises, like Internet companies experiencing sales increases during lockdowns or energy companies benefitting from the currently high prices for oil and natural gas.

This article reviews economic research on corporate income taxation, with a focus on what this research can contribute to current debates on corporate tax policy. We start with a brief discussion of why corporate profits are taxed, and we explain the basic functions of corporate income taxes and their implications for tax design in Section 2. Section 3 describes the development of tax rates and tax revenues over time and discusses how these developments can be explained. Section 4 discusses how the corporate income tax burden can be measured and compared across firms, sectors, or countries. Section 5 focuses on who bears the economic burden of corporate income taxes. The impact of corporate taxes on key aspects of corporate behavior, in particular corporate investment, is discussed in Section 6. In Section 7 we turn to the taxation of MNCs and international profit shifting, which plays a key role in current debates about fairness in taxation and international tax coordination. Section 8 focuses on the role of corporate taxes in economic crises. In this section, we also discuss the idea of introducing extra taxes on firms that benefit from economic crises, commonly referred to as excess profit taxes or windfall profit taxes. Section 9 concludes.

## 2. WHY DO WE TAX CORPORATE PROFITS AND WHAT DOES THIS IMPLY FOR CORPORATE TAX DESIGN?

Only people can bear the burden of taxation, and corporations are just legal entities. So why do we tax corporate income? In the literature, different reasons are proposed. First, the corporate tax can be considered as a backstop for personal income taxation. In principle, the income of a corporation could be treated as income of the shareholders for the purposes of taxation and be reported in personal income tax returns. However, this is difficult to put into practice, especially for publicly listed companies whose ownership changes frequently every day. Taxing at the level of the corporation is easier.<sup>2</sup>

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<sup>1</sup> A prominent example is the OECD's project against Base Erosion and Profit Shifting (BEPS). A more detailed discussion of BEPS is provided below.

<sup>2</sup> An alternative would be to tax corporate profits only when they are distributed to the shareholders. However, this would give rise to lock-in effects. One widely discussed example with a similar effect is the hoarding of

Second, the corporate income tax is considered as a levy firms pay for public services provided by governments. If these services cannot be financed via fees charged to individual users, the corporate income tax may finance them, even if the link between taxes paid by each firm and its benefit from the public service is loose.

Third, corporate taxes can be seen as an instrument to tax economic rents or excess profits like, for instance, monopoly profits or profits from resource extraction. Here, the reason to tax corporations instead of individuals is that rent taxes are less distortionary than other taxes.

Fourth, corporate taxes are often seen as an instrument to tax rich people, especially when other tax instruments to target the rich like wealth taxes are not available. In this context, the corporate income tax is assumed to increase the progressivity of the tax system, since corporate income is concentrated at the top of the income distribution (e.g., Piketty & Saez 2007, Piketty et al. 2018, Saez & Zucman 2020). To what extent this is convincing will be discussed further in Section 5 of this review.

All these justifications have their pros and cons, but they are useful as points of reference when it comes to debating reforms of the corporate tax system. For instance, if the corporate tax is seen primarily as a backstop to the personal income tax, corporate tax design needs to take into account taxes on dividends and interest income levied at the level of shareholders and creditors. In contrast, if the corporate tax is intended to be a tax on rents, the tax base should ideally allow for deduction of all costs, including the cost of equity. In most existing corporate tax systems the cost of debt is deductible but the cost of equity is not. The debate about why we tax corporate income also has implications for international taxation and for the question of whether the right to tax corporate income should be given to the countries where MNCs (or their shareholders) reside or have their headquarters, or to the countries where firms produce and sell their goods (i.e., where they perform economic activities). For instance, if the corporate tax is seen as a compensation for productive public services, taxes should be raised where firms produce and benefit from these services, not where their headquarters are.<sup>3</sup> This is related to the idea of taxing firms where they create value, promoted by the OECD in its policy proposals against profit shifting and base erosion and in its initiatives to address the tax challenges arising from digitalization (OECD 2020).

### 3. RECENT DEVELOPMENTS OF CORPORATE INCOME TAX RATES AND REVENUES

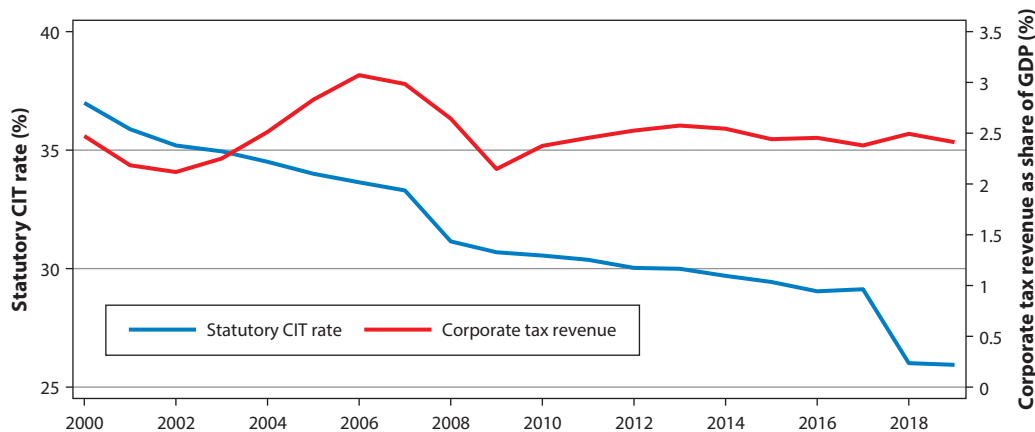
What is the role of corporate income taxes for overall tax revenue? In 2019, the average share of corporate income taxes in the overall tax revenue in the OECD was 9.6%. The two most important revenue sources are the personal income tax, with a share of 23.5%, and general consumption taxes like the value added tax and the sales tax (with a share of 21%). Thus, the corporate income tax is a significant, but clearly not the most important, source of tax revenue. How has corporate tax revenue developed over time, and what are the factors explaining this development? The most striking aspect of corporate tax revenue trends is illustrated in **Figure 1**, which compares the development of statutory corporate tax rates and revenues (measured as the share of the GDP) for the period 2000–2019. In both cases, the data show the GDP-weighted OECD average.

While corporate tax rates have declined, tax revenues have remained remarkably stable. In 2000, the average corporate income tax rate in the OECD was equal to 37%. By 2018, it had fallen by one fourth, to just over 25%. The share of corporate income taxes in GDP, in contrast,

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cash abroad by US MNCs to avoid repatriation taxes. In 2005, the US government offered a repatriation tax holiday, rewarding tax avoidance in the form of postponing repatriation (see Dharmapala 2018).

<sup>3</sup>These fundamental design issues are discussed extensively by Auerbach et al. (2008).



**Figure 1**

Development of corporate income tax rates and revenues in OECD countries. The figure shows the development of the GDP-weighted average statutory corporate income tax rate (*left axis*) and corporate tax revenue over GDP (*right axis*) for 35 OECD countries. PPP-converted real GDP figures are used as weights. Abbreviations: CIT, corporate income tax; PPP, purchasing power parity. Data from OECD Corporate Tax Statistics (<https://www.oecd.org/tax/beps/corporate-tax-statistics-database.htm>).

remained stable at a value close to 2.5%. In the literature, this observation is referred to as the tax rate–revenue puzzle in corporate income taxation (Nicodème et al. 2018).

How can these trends be explained, and how can the stability of corporate tax revenue be reconciled with the decline in tax rates? In the literature, a number of studies have analyzed different aspects of the tax rate–revenue puzzle.<sup>4</sup>

The reduction in corporate tax rates is usually interpreted as a result of international tax competition, which intensifies as mobility of capital increases (Devereux et al. 2002, 2008).<sup>5</sup> Other explanations refer to political economy effects (Swank & Steinmo 2002) including yardstick competition, imitation, political narratives, and changes in the way the efficiency effects of taxation are perceived in the tax policy debate. For instance, starting with the US tax reform of 1986, the idea gained influence that lower tax rates combined with broader tax bases reduce the efficiency costs of taxation. Auerbach & Slemrod (1997) argue that the reform has had international “intellectual spillovers. . . which contributed to a world-wide pattern of tax reforms” (Auerbach & Slemrod 1997, p. 589).

Why have the cuts in headline corporate tax rates not been followed by a decline in tax revenue? If the statutory tax rate falls but revenue remains stable, either the headline tax rate considered is not relevant because profits are partly taxed at special rates, or the tax base has expanded. While there is evidence suggesting that a significant share of corporate profits is taxed at preferential rates—for instance, in patent box regimes (Evers et al. 2015)—this is not enough to explain the stability of corporate tax revenue. Thus, more importantly, the tax base has expanded. This expansion can be attributed to several factors.

First, changes in the legal definition of the tax base play a role. Over the past two decades, many countries have adopted corporate tax reforms combining tax rate cuts with a broadening of the

<sup>4</sup>Readers are referred to Fuest et al. (2022b) and the literature cited there. Some of those studies are discussed below.

<sup>5</sup>Note that, from a theory perspective, growing mobility does not necessarily lead to declining tax rates. For instance, in the presence of agglomeration effects, declining mobility costs may lead to a hump-shaped development of tax rates over time (see Baldwin & Krugman 2004). The reason is that governments can tax agglomeration rents. This may dominate tax policy trade-offs at intermediate degrees of mobility.

legal definition of the tax base. This includes cuts in depreciation allowances or restrictions of loss offset provisions (Auerbach 2007, Devereux 2007, Loretz 2008, Becker & Fuest 2011, Nicodème et al. 2018). For instance, Auerbach (2007) argues that changes in loss offset provisions are key to understanding the development of US corporate tax revenue.

Second, the share of corporate profits before taxes in overall income has increased. There are various explanations for this trend. First, in many countries, the corporate sector has expanded, reducing the share of income declared in the noncorporate sector in the sphere of the personal income tax (Piotrowska & Vanborren 2008). This trend may be a result of, for instance, an incorporation of firms or a reduction of debt financing of incorporated firms (Gordon & Slemrod 1998, Fuest & Weichenrieder 2002, De Mooij & Nicodème 2008). Falling corporate tax rates relative to personal income tax rates are a factor reinforcing this trend.

Third, sometimes particular sectors experience booms that go along with unusually high profits. One example is the expansion of the financial sector in the United Kingdom in the 1990s. Devereux et al. (2004) argue that the growth in corporate tax revenue in the United Kingdom observed at the same time is driven by financial sector profits. However, they also point out that this boom may not be sustainable.

Fourth, the growing tax base may reflect a rising share of profits in the overall income. This is linked to the debate about the decline of the labor share in many developed economies (Dao et al. 2017). Autor et al. (2020) associate this shift with the emergence of superstar firms like Apple or Google. Other studies emphasize the role of market power (De Loecker et al. 2020).

In a recent paper, Fuest et al. (2022b) use firm-level data to examine the tax rate–revenue puzzle with a focus on how the structure of corporate profits has changed. Their data cover firms from 33 OECD countries during the period 1996–2016. The study decomposes the change in the corporate tax base into an increase in the share of EBITDA (earnings before interest, taxes, depreciation, and amortization) in value added, growing financial profits caused by falling interest rates (not falling debt ratios), and a decline in depreciation allowances. Each of these factors has contributed roughly one third of the observed tax base expansion. The data used are accounting data, not tax data. The reduction in depreciation cannot be explained by falling capital intensity; the authors argue that reforms in accounting standards explain the decline, suggesting that depreciation rules for accounting and for taxation have moved in the same direction. Since the data sets in this study are large but ultimately not representative for the countries covered, the study does not allow us to determine to what extent changes in the size of the corporate sector relative to the economy as a whole also play a role.

Overall, the available evidence suggests that tax base broadening measures like more restrictive loss offset and depreciation allowances; a growing share of the incorporated sector in the economy, possibly incentivized by lower corporate tax rates; and a growing profit share and falling interest rates have all contributed to the stability of corporate income tax revenue. Some of these factors imply that the stability of corporate tax revenue comes at the cost of lower personal income tax revenue. To shed further light on corporate tax revenue developments and inform tax policy decisions, it would be desirable to link administrative tax data to accounting data for future research, so that changes in the tax base at the micro level can be measured in combination with changes at the macro level like shifts in the share of the incorporated sector in overall income.

Regarding the debate about whether or not firms pay their fair share in taxation, the key conclusion emerging from reviewing the evidence about the tax rate–revenue puzzle is that the stability of corporate tax revenue does not mean that the tax contribution of corporations has not fallen over time. Rather, their share in overall income has increased, and at constant tax rates the share of corporate tax revenue in GDP would have increased, other things equal.

## 4. MEASURING THE CORPORATE INCOME TAX BURDEN

Comparisons of tax burdens across people, companies, sectors, economic activities, or countries play an important role in tax policy debates. Measuring the tax burden appropriately is also of key importance for empirical tax research.

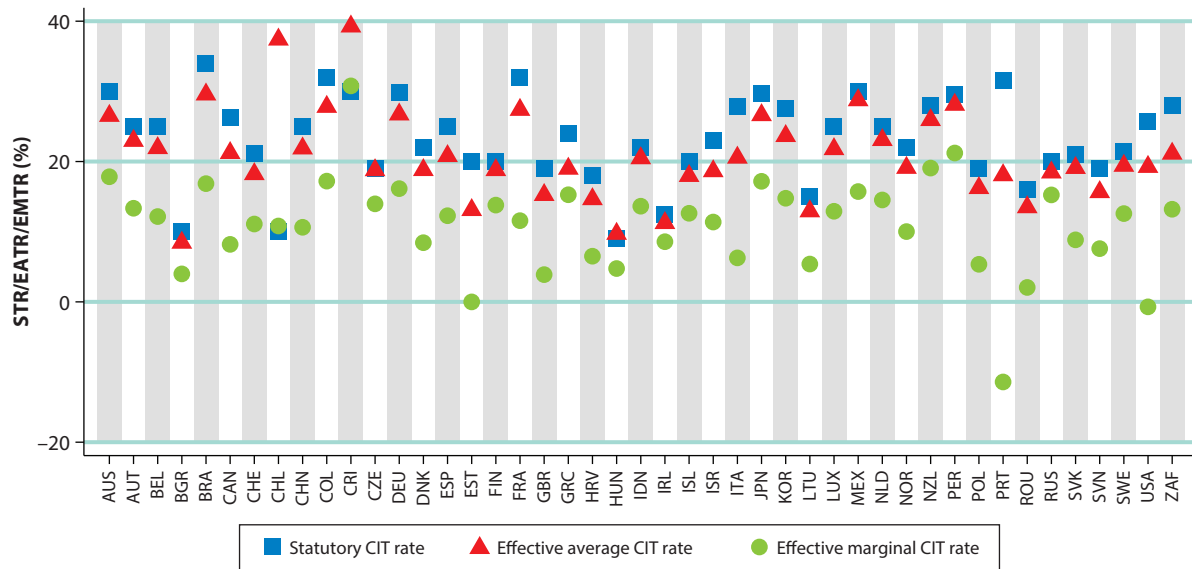
Measuring the corporate tax burden is difficult because the tax a company is required to pay depends on the combination of the tax rate and the rules for determining the tax base. In international comparisons, for instance, the tax rate may be a poor indicator of the tax burden if the tax bases differ. Within countries, one and the same tax system may imply different tax burdens for companies if they differ in dimensions that matter for the tax they are supposed to pay. For instance, a thin capitalization rule that limits the deductibility of interest payments may raise the tax a highly indebted firm has to pay but may be irrelevant for a company operating with more equity. Unsurprisingly, whether a measure of the corporate tax burden is appropriate depends on the question asked.

Public debates about whether companies pay their fair share of taxes often focus on backward-looking measures of taxation, which typically relate taxes paid to some indicator of economic profit like accounting profits. The trouble is that the interpretation of these backward-looking “effective” tax rates is tricky. For instance, an MNC may use transfer pricing or debt financing to make sure that profits reported in a high-tax country are small, so that even a small tax payment generates a high effective tax rate. This can be taken into account by comparing profits reported by MNCs in different countries, as is further explained in Section 7. However, these properties of tax systems are difficult to incorporate into summary measures of the tax burden typically used in international comparisons. Another complex issue is whether measures of the corporate tax burden should be restricted to the firm level or include dividend and capital gain taxes paid at the shareholder level, after profits are distributed.

In economic research on the effects of taxation on economic decisions made by firms regarding investment or financing, the appropriate measure should be derived from economic theory and be geared toward the economic decision under consideration. How taxes affect these decisions will usually depend on how the future tax burden faced by a company or its shareholders changes as a result of the choice made. Therefore, empirical studies of tax effects normally use forward-looking indicators of the tax burden. These include measures like the effective marginal tax burden, introduced by King & Fullerton (1983) and used in empirical studies about how taxes influence investment. This indicator considers a marginal increase of the capital stock of a firm and allows decomposition of the capital cost into a tax component and a nontax component. Taxation may drive a wedge between the nontax cost of capital and the tax-inclusive cost paid by the firm. The size of the marginal effective tax burden depends on tax rates and bases but also on nontax factors—in particular, how the project is financed and what type of asset is acquired or which type of economic activity is undertaken.

The source of financing is important, for instance, because tax systems treat debt and equity financing differently. The type of asset is key because tax systems usually include different depreciation rules for different assets. Governments incentivize certain types of investment using accelerated depreciation or tax credits, in particular R&D investment. Sometimes the tax rate depends on the type of economic activity as well. For instance, some governments levy reduced tax rates on income from intangible assets like patents to incentivize their location in their country.

A different measure is relevant if the decision under consideration is about choosing a location for a discrete investment project. In this case, an indicator of the average effective tax burden in the two locations is needed. The effective average tax rate indicator most frequently used in empirical research was developed by Devereux & Griffith (2003). Its value depends not only on the assumed source of financing and the type of asset but also on the profitability of the investment. As



**Figure 2**

Statutory rates, effective average rates, and effective marginal corporate income tax (CIT) rates for different countries in 2020. The figure shows statutory corporate income tax rates (STR), effective average corporate income tax rates (EATR), and effective marginal corporate income tax rates (EMTR) for 45 countries in 2020. List of country abbreviations available at <https://www.iban.com/country-codes>. Data from OECD Corporate Tax Statistics (<https://www.oecd.org/tax/beps/corporate-tax-statistics-database.htm>).

profitability increases, the effective average tax burden converges toward the statutory tax rate because properties of the tax base like depreciation allowances lose significance. If the research focuses on the choice of the financial structure or certain types of tax planning including international profit shifting, the statutory tax rate may be relevant, possibly complemented by thin capitalization rules.

**Figure 2** shows statutory corporate tax rates together with forward-looking effective average tax rates and effective marginal tax rates for 45 countries. Effective tax rates are computed using the method proposed by Devereux & Griffith (2003) mentioned above.<sup>6</sup> It focuses on a hypothetical investment project with a given pretax return and compares the investment's after-tax present value to the net present value in the absence of taxes. The after-tax present value of the investment is computed taking into account different tax provisions, such as tax credits, allowances, and accelerated depreciation. Moreover, it is assumed that the hypothetical investment is financed by a mixture of corporate equity, retained earnings, and debt. The effective average tax rate measures the tax burden imposed on a hypothetical discrete investment project with positive profitability, while the effective marginal tax rate measures the tax burden for a marginal investment project.

**Figure 2** illustrates that there are notable discrepancies between statutory corporate tax rates and measures of the effective corporate income tax burden. For the sample among the countries considered here, the correlation between statutory tax rates and effective average rates is 0.62. The correlation between statutory tax rates and effective marginal tax rates is only 0.07.

However, due to the differential tax treatment of different types of investment, income, firms, and funding sources, many tax systems would actually be best described by a set of tax burden

<sup>6</sup>The precise method is described by Hanappi (2018).

indicators rather than a single tax rate. In fact, due to the large number of special tax provisions and arrangements many jurisdictions have, effective corporate income tax rates may even be asset and firm specific.

The multitude of corporate tax provisions represents both a challenge and an opportunity for empirical tax research. The challenge arises because statutory tax rates—which are the most widely used measure of the corporate tax burden—may be only a poor proxy for the relevant corporate tax burden. Hence, using statutory tax rates in empirical analyses can introduce a measurement error into the empirical model and, ultimately, lead to inefficient or even biased estimates. An opportunity arises because changes in corporate tax provisions typically affect the effective tax burden of different firms differently. This allows researchers to apply a quasi-experimental research design.

## **5. WHO BEARS THE BURDEN OF CORPORATE TAXES?**

### **5.1. Theoretical Analysis and General Equilibrium Estimates**

A fundamental insight offered by taxation theory is that the obligation to pay a tax is not the same as having to bear the economic burden of the tax. The reason is that prices are flexible and may adjust in response to a tax change. Arguably, nowhere is this fact more evident than in the case of the corporate income tax. While the tax is paid by the corporation, which is just a legal entity, its economic burden can only be borne by people. The latter is true for all taxes. In principle, the corporate income tax burden could be passed on to different groups of people: to shareholders through a reduction in after-tax profits and dividend payments, to workers through wage cuts, to consumers through higher retail prices, and to landowners through lower rents. However, most existing studies on the incidence of corporate income tax focus on its effect on factor prices and, thus, on the division of the tax burden between capital and labor.

In fact, whether the tax is mainly borne by capital owners or workers is one of the most debated questions relating to corporate income taxes. The answer to this question is important because it has implications for the progressivity of the corporate income tax and, consequently, its distributional consequences. If the tax was fully borne by shareholders, it would most likely be a progressive tax, since the wealthy usually hold a large share of their assets in the form of shares while people with medium or low incomes usually hold few shares, if any. However, if firms pass the tax burden on to workers, the corporate income tax may not be more progressive than a labor income tax.

The most influential theoretical analysis of the incidence of the corporate income tax was conducted by Harberger (1962). He develops a model of a closed economy with two sectors, a corporate and a noncorporate sector, and two factors of production, capital and labor. The supply of capital is fixed. In this model, the corporate income tax is levied on the return to corporate capital. In this framework, and for reasonable values of the key model parameters, the burden of the corporate income tax will fall (almost) entirely on the owners of capital.

Until today, there has been a widespread view that the burden of corporate income tax is mainly borne by the rich, so that the tax is seen to increase the progressivity of the tax system. For instance, the US Congressional Budget Office (CBO), whose task it is to estimate the fiscal and distributional consequences of proposed legislation, assumes that 75% of the corporate income tax burden falls on capital owners and 25% on workers (CBO 2021, p. 43). Within those two groups, the CBO assumes that the corporate income tax burden is proportional to the amount of income from capital and labor, respectively. Estimates of the progressivity of the US tax system based on distributional national accounts even tend to assume that the entire burden of the corporate income tax is borne by capital owners (e.g., Piketty & Saez 2007, Piketty et al. 2018, Saez & Zucman 2020). Since corporate income is very much concentrated at the top of the income



distribution, changes in corporate income tax rates are believed to have a notable impact on how progressive the entire US tax system is; that is, the higher (lower) the corporate income tax rate, the more (less) progressive the tax system is believed to be. However, the current state of research suggests that this view may be incorrect.

Since its publication, Harberger's model has been modified and extended in several ways. There are three critical assumptions in the model. First, the capital stock in the economy is fixed. Second, the economy is closed. Third, labor markets are perfectly competitive.

In Harberger's closed economy, the only way for corporate capital to escape the corporate tax is to move to the noncorporate sector. However, the capital relocation inevitably decreases its return in the noncorporate sector until the return to noncorporate capital is equal to the after-tax return of corporate capital. As a result, capital owners in both sectors jointly bear the entire tax burden.

Things look different, though, if the economy is open, so that capital can escape domestic taxation by moving abroad. In the extreme case of a perfectly elastic supply of capital to the economy, the entire tax burden falls on immobile factors like land or labor, assuming that labor is immobile internationally. In the case of large economies whose capital demand has some impact on rates of return abroad, the size of the pass-through depends on various factors, including the degree of international capital mobility, factor and product substitution elasticities, and the size of the domestic economy. Reviewing several open-economy general equilibrium models, Gravelle (2013) concludes that for the United States, a reasonable estimate would be that 60% of the corporate income tax burden is borne by capital and 40% by labor. It should be noted, though, that the division of the tax burden between capital and labor tends to be very sensitive to the realizations of key model parameters, which is why general equilibrium estimates for the United States may not carry over to other economies.

Recent research also highlights the relevance of labor market frictions for the incidence of corporate income taxes. In particular, existing studies focus on the importance of rent sharing between workers and firm owners (e.g., Arulampalam et al. 2012, Fuest et al. 2018, Gale & Thorpe 2022) resulting from labor market frictions like collective bargaining or costly job search. In general, if higher corporate taxes reduce the surplus that can be shared between workers and firms, part of the tax burden falls on workers even if one abstracts from the fact that higher corporate taxes may reduce investment and labor productivity in the medium to long term.

## 5.2. Empirical Evidence

Empirical studies analyzing the incidence of corporate taxes can be broadly divided into three groups (Fuest 2015). The first group exploits differences in corporate tax levels across countries. The second group uses regional variation in corporate taxation within a country. The third group focuses on differences across industries or firms.

Studies using cross-country variation in corporate taxation include those by Hasset & Mathur (2006), Arulampalam et al. (2012), and Clausing (2013). Hasset & Mathur (2006) analyze the association between statutory tax rates and wages earned in manufacturing based on a sample covering 72 countries and the years from 1981 to 2002. According to their estimates, an increase in the statutory tax rate by 1 percent is associated with a decrease in wages of the same size. However, as highlighted by Fuest (2015), the estimate of the incidence falling on labor implied by this elasticity is implausibly large: A 1 dollar increase in the corporate income tax burden would reduce wages by 22 dollars. Clausing (2013) uses data on average wage levels in OECD countries for the period from 1981 to 2009. The estimates of her vector autoregressive model indicate that there is no statistically significant robust association between wages and corporate taxation.

In general, estimating the incidence of the corporate income tax based on observational data is challenging, as it requires identification of the causal relationship between factor prices and tax

rates. To do so, one needs exogenous variation in tax rates across space and/or time. Moreover, for the identification of causal effects, it is important that the association between the level of taxes and factor prices is not confounded by differences in the definition of the tax base, other tax provisions such as deductions, allowances, and depreciation rules, and economic conditions. These requirements are difficult to meet in cross-country studies, since there are hardly two countries in the world applying a common definition of the corporate tax base and whose corporate tax codes include similar provisions. In addition, national economies and their tax and other economic policies are exposed to different shocks. Due to this, estimates based on within-country variation in corporate tax levels are typically considered more credible than estimates based on cross-country variation.

Fuest et al. (2018) use variation in local business tax rates across German municipalities and over time to estimate the share of the corporate tax burden falling on labor. In Germany, corporate income is taxed at both the federal and the municipal level. However, the definition of the corporate tax base as well as other tax provisions affecting the corporate tax burden are determined at the federal level and are thus uniform across municipalities, so that changes in local business tax rates reflect changes in effective tax rates. During their sample period from 1993 to 2012, there were about 18,000 changes in local business tax rates at the municipal level in Germany. The empirical analysis is based on a linked employer–employee data set. The data include characteristics of workers and the firms where they are employed. This allows the authors to test the relevance of different channels through which the corporate income tax burden may be passed on to labor and to assess whether different types of workers are affected differently by corporate tax rate changes. According to the authors' estimates, collecting 1 additional euro through corporate taxes reduces wages by roughly 66 cents. Note that the overall economic burden caused by the tax includes not only the revenue raised but also the excess burden, that is, the cost of economic distortions caused by the tax. Referring to estimates that find the marginal excess burden of the tax system to be 30% of the revenue raised, the authors conclude that workers on average bear approximately half of the overall corporate tax burden.

However, this average number masks a considerable degree of heterogeneity among workers. Specifically, the tax-induced wage decrease is larger for low-skilled workers, women, and young workers. In addition, Fuest et al. (2018) find that the wage effects of tax hikes are larger for firms with collective bargaining arrangements at the firm level, which is in line with the predictions of theoretical wage bargaining models.

Arulampalam et al. (2012) exploit data and variation in corporate taxation at the firm level for nine European countries. The empirical approach they use allows the authors to isolate the effect a corporate tax hike has on wages through rent sharing between firm owners and workers. Their estimates suggest that a 1 euro increase in corporate tax revenue reduces firms' wage bill through the rent-sharing channel by 50 cents. Liu & Altschuler (2013) use industry-level data to measure the incidence of the corporate tax on wages in the United States. They employ a measure of the effective corporate tax rate that reflects that different tax provisions apply to different asset types and that the endowment with these asset types varies across industries. Their main result is that an increase in the corporate tax burden by 1 dollar reduces wages by 60 cents on average.

Although most studies recognize that a part of the corporate income tax burden may also be shifted to groups other than capital owners and labor, especially consumers and landowners, most estimates of the incidence typically do not take this into account. To the best of our knowledge, the only exceptions are provided by Suárez Serrato & Zidar (2016) and Baker et al. (2020). Suárez Serrato & Zidar (2016) estimate the incidence of US state-level corporate taxes by combining a spatial equilibrium model with an econometric analysis, exploiting regional variation in corporate tax rates and apportionment formulas. Besides capital and labor, they also estimate to what extent

landowners suffer from corporate taxation. Their findings suggest that firm owners bear 40% of the incidence of the corporate income tax, workers 30–35%, and landowners 25–30%. Baker et al. (2020) study the effect of corporate tax changes on retail prices using combined scanner, barcode, and firm data from the United States. Their findings suggest that 31% of the corporate income tax is borne by shareholders, 38% by workers, and 31% by consumers.

### 5.3. Tax Incidence and Tax Policy

The widespread view that the corporate tax burden is mainly borne by capital owners and, thus, that the economic incidence of the tax largely corresponds to its statutory incidence is at odds with the findings of empirical studies of corporate tax incidence. Since the relative importance of capital income is particularly large in the top brackets of the income distribution, the corporate income tax may be considerably less progressive than common wisdom suggests. In fact, using back-of-the-envelope calculation, Fuest et al. (2018) show that their incidence estimate implies that the progressivity of the US and German tax systems is 25–40% lower compared to a scenario where the full tax burden is borne by capital. At the same time, this also implies that corporate income tax cuts decrease the progressivity of tax systems to a lesser extent than estimates based on distributional national accounts commonly suggest (e.g., Piketty & Saez 2007, Saez & Zucman 2020).

It should be noted, however, that exploiting tax variation at the state or local level may come at the cost of external validity regarding the effects of national taxes. Whether the findings of these studies are valid for national corporate taxes, where the causal effects of tax changes are harder to identify, is an open question. Arguably, both capital and workers are more mobile across jurisdictions within a country than internationally. So even if existing studies mostly identify rent-sharing effects rather than consequences of mobility, more research is needed regarding in particular the incidence of national corporate income taxes.

Future research should aim at shedding light on the differences regarding the impact of national and subnational corporate taxes on wages and other relevant variables. More research is also needed to clarify to what extent the burden of corporate taxes is passed on to factors of production other than labor—in particular, land and different types of capital as well as suppliers and customers.

## 6. EFFECTS OF CORPORATE TAXATION ON INVESTMENT, INNOVATION, AND GROWTH

Since corporate taxes increase the cost of capital, standard models of corporate investment predict that higher taxes reduce investment.<sup>7</sup> However, early attempts to estimate the relationship between corporate taxation and investment often failed to detect significant results (see Cummins et al. 1994, 1996 for a discussion). This changed when more comprehensive data sets became available and more sophisticated identification techniques were applied. The majority of more recent econometric analyses find results that are consistent with economic theory: the higher the corporate tax burden, the lower the level of investment.

As highlighted above, the effective level of corporate taxation is influenced by many features of the corporate income tax code, including depreciation rules, tax credits and allowances, and the definition of the tax base. In light of this, the existing empirical literature has exploited very

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<sup>7</sup>Among the earliest contributions are those by Jorgenson (1963), Hall & Jorgenson (1967), and Summers et al. (1981) (see Hassett & Hubbard 2002 for a review). Of course, overall capital costs will only increase if less than the full burden of taxation is borne by suppliers of capital. This is plausible if savings are not entirely inelastic or if capital is internationally mobile and can escape taxation by moving abroad.

different types of corporate tax reforms to analyze the effects of corporate taxation on investment.<sup>8</sup> In particular, researchers have studied the consequences of statutory corporate tax rate changes (e.g., Harju et al. 2022), changes in the effective corporate tax burden (e.g., Bond & Xing 2015, Steinmüller et al. 2019), tax deductions and allowances (e.g., Ohrn 2018), and accelerated depreciation rules (e.g., House & Shapiro 2008, Zwick & Mahon 2017, Maffini et al. 2019, Ohrn 2019). To facilitate comparisons across studies, the estimated effects of corporate tax reforms on investment are often translated into an elasticity of corporate investment with respect to changes in the user cost of capital. Reviewing several existing empirical studies, Hassett & Hubbard (2002) conclude that the consensus estimate lies between  $-0.5$  and  $-1$ , implying that a tax-induced decrease in capital costs of 1% increases corporate investment by 0.5% to 1%. Focusing on more recent studies, Zwick & Mahon (2017) report an average elasticity of  $-0.69$ .

The empirical literature also finds that firms' investment responses to corporate tax reforms vary considerably. Financial frictions appear to be one particularly important source of heterogeneity. Zwick & Mahon (2017) estimate how the investments of US firms react to an accelerated depreciation rule. Their findings suggest that firms that have a low level of liquid assets and that did not pay dividends in the years preceding the introduction of the rule show a much stronger reaction than other firms. The authors interpret this finding as evidence that changes in liquidity are an important channel through which corporate taxation affects firm investment.

From a policy perspective, an important question is what tax instrument allows boosting investment at lowest fiscal costs. From a theoretical perspective, as an instrument to stimulate investment, a tax rate cut has the disadvantage that it also provides relief to returns from past investment. Introducing accelerated investment or tax credits focuses on new investment. In empirical research, the investment effects of different tax measures are typically analyzed in isolation, and different studies focusing on different tax measures use different samples and empirical models, complicating a comparison of findings. Future research should thus focus on this question. To the best of our knowledge, the only study providing such a comparison is the one by Ohrn (2018), who evaluates both the investment effects of the US Domestic Production Activities Deduction—a tax provision that reduces the effective corporate tax burden by allowing firms to deduct a proportion of their domestic manufacturing income from their tax base—and a bonus depreciation provision against their fiscal costs. His findings suggest that both instruments create roughly the same amount of additional investment per dollar of forgone tax revenue.

Corporate taxes affect not only general investment decisions but also R&D investment and innovation activity. From a policy perspective this is particularly important, because R&D spending and innovation are widely seen to be key drivers of economic growth. Higher tax burdens tend to reduce innovative activity. Akcigit et al. (2021) study the link between personal and corporate income tax burdens and innovation across US states since the 1920s and find a strong negative impact of higher taxes on the location and the quantity of innovation, but not on its quality. Lichter et al. (2021) use tax variation at the local level in Germany to analyze the impact of taxes on R&D. The study is based on geocoded survey panel data which approximately cover the universe of R&D-active plants in Germany. The authors exploit around 7,300 changes in the local business tax rate over the period 1987–2013 for identification, and they find a user cost elasticity of  $-1.25$ .

While higher taxes thus lead to less innovation and R&D spending, governments also use special tax instruments to stimulate R&D, in particular R&D tax credits. A large part of the literature evaluating these policies focuses on the question of whether R&D tax credits are effective in stimulating private R&D spending. A recent example of this literature is the study by Guceri & Liu

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<sup>8</sup>A closely related literature focuses on the effects of corporate taxes on foreign direct investment. We provide a brief discussion of that literature in Section 7.

(2019), who study the impact of a newly introduced R&D tax credit for small and medium-sized firms and find a user cost elasticity of  $-1.6\%$ , which implies that 1 dollar of tax money spent on R&D tax credits leads to 1 dollar of additional private R&D spending. In a recent survey of the literature, Hall (2020) concludes that the consensus estimate is slightly smaller, with a user cost elasticity of  $-1$ . The author also reviews findings regarding the knowledge spillovers of private R&D and argues that the estimates would justify larger R&D tax credits than those we observe in most countries.

Whether the positive effects corporate tax cuts appear to have on investment and innovation are also reflected in higher rates of economic growth at the macro level is disputed. In an influential paper, a group of OECD economists (Arnold et al. 2011) argues that, among all taxes, the corporate income tax has the greatest negative effect on economic growth. They conclude that restructuring the tax system by cutting corporate taxes and raising more revenue through consumption taxes or taxes on land and real estate would lead to more economic growth. A striking feature of the empirical analysis in their paper is that the authors control for investment in their regressions, which implies that the growth-enhancing effect of changes in the tax structure they find cannot be due to the impact of taxes on investment. This shuts down the mechanism most people would expect to drive the growth effects. A possible explanation is that changes in the tax structure often go along with other policy reforms that may enhance growth. Later research has shown that the findings by Arnold et al. (2011) are not entirely robust (Xing 2012).

Gechert & Heimberger (2022) conduct a meta-analysis based on estimates from 42 empirical studies. While the average growth effect of a corporate tax hike reported in papers published in peer-reviewed journals is negative and of relevant magnitude, things change once unpublished working papers and other types of publications are included in the meta-analysis. In that case, the inverse relation between various measures of the corporate tax burden and economic growth remains, but the estimates become rather small and their significance varies across specifications. The authors suggest that the smaller estimates and their reduced significance indicate a publication bias. It should be noted, though, that some of the unpublished studies they include in their meta-analysis are prepared by institutions with a political agenda and lack a compelling identification approach.

The literature discussed so far focuses solely on the effects of a jurisdiction's corporate tax policy on economic activity within that jurisdiction, but not on its potential spillovers and repercussions on other jurisdictions. The importance of such repercussions is highlighted by Chirinko & Wilson (2008) and Wilson (2009), who study the within-state and cross-border effects of investment tax credits and R&D tax credits, respectively, based on panel data from US states. Both authors come to the conclusion that the implementation of the respective tax incentives is a zero-sum game: The increase in investment and R&D in the state adopting the tax incentive is associated with a reduction in the respective activity in other states.

Overall, as in the case of studies on corporate tax incidence, it is not clear whether the findings about the investment effects of changes in local and state level taxes also hold for national corporate taxes. At the same time, the available evidence does suggest that corporate income taxes significantly affect corporate investment, R&D spending, and entrepreneurial activity. Even if the effects of corporate tax changes on economic growth are not easy to identify, these findings suggest that raising more revenue from corporate taxes does come at the cost of reducing economic growth, so that corporate tax policy needs to weigh benefits and costs carefully.

## 7. THE TAXATION OF MULTINATIONAL COMPANIES

In an increasingly globalized world, MNCs are becoming more and more important. The largest MNCs generate revenues that significantly exceed the economic output of many industrialized

countries. For example, Amazon's global sales of around 330 billion euros (386 billion dollars) in 2020 were greater than the GDP of Greece (183 billion euros), Portugal (226 billion euros), or Finland (257 billion euros). The growing importance of MNCs is both a result and an important driver of (economic) globalization.

The existing systems of corporate taxation are still largely organized at the national level. Therefore, the growing importance of MNCs poses considerable challenges. In recent years, several cases have become public in which MNCs have extensively used opportunities to avoid taxes by reorganizing their global activities and shifting profits to low-tax countries. Such opportunities often emerge because of inconsistencies between national tax legislations and loopholes in double taxation agreements. The growing global economic importance of intangible assets, such as patents, trademarks, and software codes, plays an important role in this context. In addition, digital business models often enable firms to operate in countries without maintaining a physical presence there, to which corporate income taxation is usually linked. These factors make it easy for MNCs to shift part of their activities across countries and reduce their tax burden or avoid taxation altogether.

### 7.1. International Profit Shifting by Multinational Companies

One issue that has attracted great attention in recent years and that ranks particularly high on the agenda of international tax policy is the shifting of MNCs' profits to tax havens.<sup>9</sup> To address this problem, the OECD has launched various initiatives, including the Base Erosion and Profit Shifting (BEPS) project and the introduction of a global minimum tax on corporate profits of large MNCs (see Section 7.3).

While there is a considerable number of empirical studies documenting that MNCs do indeed use opportunities to avoid taxes through international profit shifting, the magnitude of this profit shifting is disputed. In a survey of the literature, Riedel (2018) shows that existing estimates of the share of profits MNCs shift to low-tax countries range from 5% to 30%. Potential reasons for these discrepancies are a lack of appropriate data, especially data showing economic activities in low-tax countries and tax havens; the use of different methodological approaches to identify profit shifting empirically; and the application of different concepts regarding when profits are considered to be shifted (see Fuest et al. 2022a for a discussion).

To assess the tax sensitivity of MNCs' profits, many studies estimate a multivariate regression model of the following form (see Dharmapala 2014):

$$\log(y_{ict}) = \beta_1 \tau_{ct} + \beta_2 K_{ict} + \beta_3 L_{ict} + \gamma' X_{ict} + \delta' Z_{ct} + \mu_i + \pi_t + \varepsilon_{ict}.$$

Index  $i$  indicates the MNC, index  $c$  the residence country, and index  $t$  the year to which the observation refers. In some cases, authors use macro data aggregated at the country level to estimate the equation above, so that index  $i$  must be dropped. The dependent variable is the log of pretax profit. The main explanatory variable in the regression model is the residence country's corporate tax rate  $\tau_{ct}$ . The tax rate's regression coefficient  $\beta_1$  measures by how many percent pretax profits change if the tax rate increases by 1 percentage point (i.e., the tax semielasticity). Occasionally, instead of the tax rate in the country of domicile, the difference between the tax rate in the country of domicile and the average of the tax rates in all other countries where the MNC has subsidiaries is used as an explanatory variable. However, this does not fundamentally change the interpretation of the regression coefficient  $\beta_1$ .

<sup>9</sup>On the role of tax havens for MNCs, readers may consult Hines & Rice (1994) and Hines (2010).

By adding further explanatory variables to the regression model, the tax semielasticity can be determined under the condition that other factors affecting the global distribution of an MNC's pretax profit are held constant. In this context,  $K_{ict}$  measures the capital and  $L_{ict}$  the labor input. Taken together, these two variables can be interpreted as indicating the extent of real economic activity in the residence country.  $X_{ict}$  and  $Z_{ct}$  are vectors containing variables that describe the MNC and residence country in more detail.  $\mu_i$  is an MNC-fixed effect and  $\pi_t$  is a time-fixed effect.

Based on the regression model, the pretax profit reported by MNC  $i$  in country  $c$  can be decomposed into two components. One component measures the part of profit that can be explained by the realizations of the control variables. The size of this component is thus determined by the level of real economic activity—measured by capital and labor input—and by characteristics of the MNC and of the country of residence that are independent of the level of corporate taxation (this applies above all to differences in productivity levels and market size). This component is often referred to as real profit. The second component comprises the shifted profit. This component is independent of the realizations of the control variables and can be explained solely by differences in corporate tax rates between MNCs' residence countries, which is why it can be interpreted as the result of tax planning.

Beer et al. (2020) and Heckemeyer & Overesch (2017) identify a total of 37 and 27 studies, respectively, which estimate the tax semielasticity of multinationals' profits using the equation above or a modified version of it. Based on meta-analyses, they determine an average tax semielasticity of profits of  $-1\%$  and  $-0.8\%$ , respectively. This implies that, on average, a country suffers a loss in its profit tax base of  $1\%$  and  $0.8\%$ , respectively, when it increases the profit tax rate by 1 percentage point.

However, Beer et al. (2020) and Heckemeyer & Overesch (2017) also show that the magnitude of the estimated tax semielasticity of profits of MNCs can depend strongly on the specification of the regression model as well as the definition of the individual variables. In recent years, there has also been criticism of the assumption that the tax semielasticity is constant across all countries. This assumption is problematic because the importance of tax havens suggests that the lower the tax rate in a country, the larger the tax semielasticity in terms of amount (Dowd et al. 2017). In other words, if a low-tax country raises its tax rate, this results in a (relatively) larger profit outflow than if a high-tax country raises its tax rate. Recent empirical studies have accounted for this fact by using quadratic and/or cubic specifications (Dowd et al. 2017, Bratta et al. 2021), logarithmizing the tax rate variable (Garcia-Bernardo et al. 2021), and estimating restricted cubic spline functions (Fuest et al. 2022a). These studies come to the conclusion that the lower the corporate tax level in a country, the larger the tax semielasticity. How large exactly, however, depends strongly on the functional form chosen. Dowd et al. (2017) find a minimum tax semielasticity of  $-4$  based on a quadratic specification; Fuest et al. (2022a) find a minimum tax elasticity of  $-13$  based on a restricted cubic spline specification.

In principle, once the tax semielasticity has been estimated, it can be used to calculate the national tax base loss due to tax-motivated profit shifting. To do this, it is necessary to determine how the profits of MNCs would be distributed globally if there were no tax-motivated profit shifting. This counterfactual global profit distribution is usually determined using a simple simulation in which the tax rates of all countries in the world are set at a uniform level. However, of the 37 studies cited by Beer et al. (2020), only a small fraction also estimates the extent of profit shifting. One reason for this could be that the data used in many studies only incompletely represent the activities of MNCs. Twenty of the 37 studies cited by Beer et al. (2020) use publicly available balance sheet information provided by Bureau van Dijk for their estimate. However, these data

do not capture the activities of all subsidiaries of MNCs. Moreover, the data do not include any information at all on activities in many tax haven countries (Tørsløv et al. 2018).

One source of data not suffering from this limitation are country-by-country (CbC) reports. CbC reporting was introduced in 2016 in the context of the OECD's BEPS initiative. CbC reports must be prepared by MNCs with global revenues of at least 750 million euros, provided the MNC has a tax presence in one of 134 countries participating in the so-called Inclusive Framework on BEPS. Unlike balance sheet data from Bureau van Dijk, CbC reports provide complete coverage of the global activities of MNCs, including their activities in tax havens. Unfortunately, only some countries make these data publicly available, and only at a high level of aggregation. However, in recent years, some researchers were granted access to CbC micro data through national tax authorities. For instance, Fuest et al. (2022a) use information from CbC reports filed by more than 3,600 MNCs with a tax presence in Germany and estimate that around 16% of those MNCs' global profits are shifted to low-tax countries. The associated loss in corporate income tax revenue amounts to 15% of the taxes those MNCs pay. This estimate is larger than previous estimates of the global amount of profit shifting based on Bureau van Dijk data, which lie in a range between 4% (OECD 2015) and 10% (Johansson et al. 2017).

In a recent paper, Tørsløv et al. (2018) take a different approach to estimate the amount of corporate profit shifting. The authors combine national accounts data with information from the OECD's foreign affiliates statistics and balance of payments data. According to the authors' estimates, 36% of MNCs' foreign profits are shifted to tax havens each year. This estimate is considerably larger than other estimates based on firm-level data. One possible explanation for this difference relates to the assumed counterfactual distribution of profits. The counterfactual indicates how MNCs' profits would be distributed globally if there was no profit shifting. In firm-level approaches, the counterfactual typically is a world in which differences with regard to the level of corporate taxation do not matter for the global distribution of MNCs' profits. Instead, the profit distribution is determined by the global distribution of indicators of real economic activity—above all, capital and labor. In Tørsløv et al.'s (2018) work, the counterfactual is derived based on the assumption that the profit-to-payroll ratio of foreign MNCs' tax haven subsidiaries is the same as that of firms whose headquarters are located in tax havens, which includes both MNCs incorporated in tax havens and non-MNCs. This is problematic if MNCs are generally more profitable than smaller firms operating in one country only.

## 7.2. Investment Response of Multinational Companies to Corporate Taxation

Empirical estimates of the extent of profit shifting by MNCs either include indicators of real economic activity, such as capital and labor, as control variables to their empirical models or use profitability measures relating profits to real economic activity, such as profit-to-payroll or the return to assets, to derive a counterfactual distribution. This implies that these profit shifting estimates are calculated taking the global distribution of indicators of real economic activity as given. Thus, they do not indicate whether a unilateral increase in a country's level of corporate taxation leads to a relocation of real economic activity.

There is ample evidence showing that reducing corporate taxes increases the level of investment of MNCs in the country cutting the tax (e.g., Becker et al. 2012), which is not surprising. A more surprising finding is that corporate tax cuts in one country may give rise to positive cross-border spillovers in the sense that they also increase the level of MNCs' investments abroad (Becker & Riedel 2012). Along the same lines, limiting MNCs' opportunities to shift profits to low-tax countries may reduce the level of investment in high-tax countries (Suárez Serrato 2018). These findings seem to be at odds with predictions of the standard tax competition literature,



where a unilateral tax cut in one country is expected to reduce the activities of MNCs in other countries. A common explanation for these findings is that access to low-tax countries allows MNCs to reduce the effective tax they have to pay in high-tax countries, due to the opportunity to shift profits abroad. Consequently, shutting down tax havens may bring not only benefits, in the form of increasing domestic corporate tax revenues, but also costs, in the form of lower domestic investment, fewer jobs, and, ultimately, lower growth.<sup>10</sup>

### 7.3. Fighting Multinational Profit Shifting and Tax Avoidance

Profit shifting by MNCs has drawn the interest not only of economic researchers; it is also a topic that ranks high on the agenda of international politics. In order to curb multinational profit shifting and corporate tax avoidance, the OECD and G20 countries launched the BEPS initiative in 2013. The BEPS project comprises a set of instruments and minimum standards, organized in 15 actions, aiming at improving the coherence of national tax rules, closing loopholes in double taxation agreements, increasing tax transparency, and putting an end to the harmful tax practices of MNCs. Each country interested in joining the BEPS project can do so through the Inclusive Framework on BEPS. As of February 2023, 142 countries are members of the Inclusive Framework on BEPS; membership requires countries to introduce the BEPS instruments and minimum standards into national legislation.

While the 15 BEPS actions were an important step toward increased international tax coordination, ultimately, they still left considerable scope for MNCs to shift profits and lower their tax burden. Due to that, the OECD and G20 countries took one step further and proposed a two-pillar strategy to combat profit shifting activities and reduce corporate tax competition. In the context of Pillar 1, market countries—that is, those countries where MNCs sell their products and, thus, generate their revenues—are granted the right to tax part of the profit of MNCs, irrespective of whether an MNC has a physical presence in that country or not. This represents a breach of the existing nexus linking the right to tax corporate profits to the presence of a subsidiary or permanent establishment in a country. One rationale behind Pillar 1 is that MNCs' revenues are less internationally mobile than the inputs they use to manufacture their products and provide their services, especially if those inputs are intangible. Another reason for linking the right to tax corporate profits to MNCs' sales is that in our modern digital world, customers are often involved in the process of value creation—for instance, by providing data and information used by firms to provide their services or by creating content. Against this background, the OECD and G20 argue that Pillar 1 would ensure a greater overlap between the place where value is created and the place where MNCs' profits are taxed. Pillar 2 comprises a global effective minimum tax of 15%. If the ratio between an MNC's tax payments in a country and its profits reported there is below that rate, then the MNC's headquarters country has the right to levy an additional tax on those profits until an effective tax rate of 15% is reached. Both Pillar 1 and Pillar 2 target only very large MNCs. Pillar 1 is planned to apply to MNCs with global consolidated revenues of at least 20 billion euros, Pillar 2 to MNCs with revenues of at least 750 million euros. The member countries of the Inclusive Framework agreed on the adoption of Pillar 1 and 2 in July 2021. The implementation was planned for 2023 but then postponed to 2024.

Having 142 countries agreeing to a common and coordinated reform of the international tax system is without doubt a milestone in the history of international taxation. However, it is way

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<sup>10</sup>Note that the opportunity to shift profits also appears to have implications for the incidence of corporate taxes. In their study of the wage effects of the German local business tax, Fuest et al. (2018) find that firms with establishments in multiple jurisdictions pass a smaller fraction of a corporate tax hike on to their employees in the form of lower wages.

too early to say that this step has overcome the problem of corporate tax avoidance by MNCs; rather, it is the beginning of what is likely to be a lengthy and tedious process of reorganizing the international tax system. How far this process will lead is not yet foreseeable. Probably the biggest obstacle ahead is that the countries involved must agree on a common definition of the corporate tax base. A common definition of the corporate tax base is necessary to determine an MNC's effective tax rate and, thus, the amount of the add-on tax an MNC's headquarters country can collect in case the MNC's effective tax rate is below 15%. At the moment, many countries compete for MNCs' profits by offering generous allowances and deduction possibilities, all of which diminish the corporate tax base. There is the danger that the common definition of the corporate tax base the Inclusive Framework member countries will agree on will include similar provisions. This would reduce the effectiveness of a global effective minimum tax. Another danger is that the introduction of a global minimum tax will simply lead to tax competition being replaced by subsidy competition.

#### **7.4. Taxing Where Value Is Created and Taxing Corporate Profits in Market Jurisdictions**

While the OECD's BEPS measures as well as Pillars 1 and 2 of the OECD proposals address particular issues related to tax avoidance, partly in an ad hoc manner, there is an ongoing debate about more general principles for the taxation of MNCs. The reform initiatives developed by the OECD have been accompanied by the political mantra that corporate profits should be taxed "where value is created" (see, e.g., Hey 2018). How useful this guidance for international tax rules can be is controversial. Places where business ideas are generated, where risks are taken, and where products or services are developed, produced, or sold to consumers can all be seen as locations where value is created. In fact, the main purpose of this formula seems to be negative: to deny taxing rights to places that are seen to not contribute to value creation, in particular tax havens where little real economic activity takes place.

In terms of fundamental principles, one novelty introduced by the OECD initiative is to give taxing rights to market jurisdictions through the Pillar 1 proposal. This is related to the concept of destination-based corporate income tax, in particular the Destination-Based Cash Flow Tax (DBCFT) proposed by Auerbach & Devereux (2013, 2018) and further developed by Devereux et al. (2021). However, while Pillar 1 tries to combine traditional, primarily source-based corporate tax rules with the participation of market countries in the tax revenue, the DBCFT would imply a fundamental change in the corporate tax system, shifting taxing rights entirely to the countries where companies sell their goods. The key economic argument in favor of DBCFT is that consumption is less internationally mobile than production plants, headquarters, or immaterial assets that determine the distribution of taxing rights in the current tax system.

### **8. CORPORATE TAXES, ECONOMIC FLUCTUATIONS, AND ECONOMIC CRISES**

In economic crises, taxes play an important role for the stabilization and stimulation of the economy. In economic downturns, governments often cut corporate taxes to support firms or stimulate investment and job creation. The literature on the role of taxes in economic slumps distinguishes between the role of taxes as automatic stabilizers and their role as tools for active stabilization.

#### **8.1. Corporate Taxes as Automatic Stabilizers**

What is the contribution of corporate taxes to automatic stabilization? For instance, an income tax with a rate of 30% can work as an automatic stabilizer because it means that a negative gross

income shock of 100 dollars is reduced to a net income shock of 70 dollars. Whether this leads to a stabilization of demand depends on the link between after-tax income and spending. Usually, a change in net income will trigger an immediate change of spending if and only if the household or the company experiencing the shock is liquidity constrained, so that a transitory shock on disposable income cannot be smoothed through borrowing or reduction of savings (Auerbach & Feenberg 2000).

Devereux & Fuest (2009) apply this reasoning to corporate taxes, using data from the United Kingdom. In the case of corporate taxes, a second important factor, next to the link between tax payments and current spending, is whether firms are in a tax loss position. If they are in a tax loss position, they usually do not get full tax relief. Some countries allow firms to set current losses against past profits (loss carryback), but this loss carryback is usually restricted. Many countries allow no carryback at all. In most countries tax losses may be carried forward, but this implies that a shock to current income is not cushioned by taxes at all. Devereux & Fuest (2009) use the following indicator to measure the automatic stabilization effect of corporate taxes:  $s = (x-y)/e$ , where  $x$  is the reduction in the firm's investment spending in the absence of taxes,  $y$  is the reduction in the presence of the tax, and  $e$  is the gross income shock. If all firms were credit constrained and all firms had a positive taxable profit,  $s$  would be equal to the statutory corporate tax rate. Devereux & Fuest (2009) use UK firm survey data to estimate  $s$  and find a value for  $s$  of just 1%. The reason is that most credit-constrained firms are more likely to be in a tax loss position. If there was perfect loss offset,  $s$  would be 8.5%.

An important limitation of the analysis is that, due to data restrictions, Devereux & Fuest (2009) assume that all loss-making firms are also credit constrained, which implies that investment spending is only stabilized in cases where the number of credit-constrained firms exceeds the number of loss-making firms. This approach underestimates the stabilization effect. Buettner & Fuest (2010) use data from Germany, where data on credit constraints and on tax losses are linked. They estimate that  $s$  is equal to 8%. In recessions,  $s$  is slightly higher than in booms, reflecting that the (size-weighted) number of credit-constrained firms in the data increases more in recessions than does the number of firms with tax losses.

Clearly, more work is needed for a better understanding of the automatic stabilization effects of corporate taxes. This work should also take into account that companies usually submit their tax returns with a significant delay, so that current tax payments do not necessarily reflect current losses or profits. More empirical work is needed to investigate how the current tax payments of firms, which directly affect their liquidity, are linked to the current cash flows and how this translates into investment spending.

## 8.2. Corporate Tax, Active Stabilization Policies, and the Role of Uncertainty

Many governments do not restrict themselves to letting automatic stabilizers work. They use corporate tax instruments actively to stabilize or even stimulate investment during economic downturns. However, stimulating investment during economic downturns is far from easy. Gale et al. (2001) argue that the key challenge is to create incentives for new investment rather than creating windfall profits for previous investment. In fact, one would also want to avoid tax relief for investment that would have taken place anyway and target additional investment instead. However, tax incentives for incremental investment are difficult to design.

These considerations suggest that stimulus packages should focus on accelerated depreciation or tax credits for new investment rather than on tax rate cuts. These measures should be temporary, so that firms have incentives to bring forward investment spending. Tax credits may be preferable to accelerated depreciation because the latter is less attractive for firms that are currently in a loss position. In contrast, corporate tax rate cuts, especially if they are temporary, may be

counterproductive. They may have a positive effect on the liquidity of profitable firms, but the lower tax rates reduce the value of depreciation allowances, inducing firms to postpone investment spending. In addition, corporate tax rate cuts create windfall profits for previous investment, suggesting the “bang for the buck” is less favorable than in the case of tax credits for new investment.

A more fundamental question is whether the sensitivity of corporate investment with regard to tax incentives differs in booms and busts. In this context, an important issue is that uncertainty about the future may rise in severe economic downturns. Option models of investment (Dixit & Pindyck 1994, Hubbard 1994) emphasize that, if investment is at least partly irreversible, which is true for most investment projects, rising uncertainty will induce firms to postpone investment because the option value of waiting rises. Firms will only invest if the value of the new project exceeds a certain threshold, and this threshold rises in times of high uncertainty. If it is true that severe economic crises go along with high uncertainty, this uncertainty may be a factor depressing investment. Bloom et al. (2007) investigate how the responsiveness of firms to demand shocks (not necessarily tax incentives) changes at different levels of uncertainty, using a model calibrated to UK data. Their analysis finds that responsiveness declines, which means that firms will both invest and disinvest more cautiously in periods when uncertainty is particularly high. Bloom et al. (2007, p. 391) conclude that “the responsiveness of firms to any policy stimulus may be much weaker in periods of high uncertainty, such as after the 1973 oil crisis and September 11, 2001.” In a more recent paper, Bloom et al. (2018) use a dynamic stochastic equilibrium model to study the impact of uncertainty; they show that the impact of a wage subsidy on hiring is smaller when uncertainty is high.

These results suggest that using corporate tax incentives to stimulate investment in economic crises may be ineffective if economic crises are characterized by high uncertainty, which is well documented (Bloom et al. 2018). If investment as well as disinvestment is lumpy in economic crises, providing tax incentives mostly generates windfall gains but does little to stimulate the economy. Yet, the available evidence about this point is inconclusive. In a recent paper that analyzes the investment response to local corporate tax changes of a large sample of firms in Germany, Link et al. (2022) find that the investment response is twice as large in recessions compared to normal times. This is difficult to reconcile with the results found by Bloom et al. (2007, 2018). More research is needed to explore how the sensitivity of corporate investment to tax changes is related to the business cycle and the prevailing degree of economic uncertainty.

### 8.3. Profiteering and Excess Profit Taxes

Economic crises usually put the economy as a whole under severe pressure, and most companies as well as private households see their incomes decline. However, there are exceptions. For instance, during wars, the defense industry flourishes, for obvious reasons. In the energy crises of the 1970s and 1980s, profits of oil companies soared. When the COVID-19 pandemic broke out, face masks were in short supply, so that prices exploded, allowing companies that were able to supply masks first to charge high prices. The pandemic also led to a shift of economic activity to the Internet, so that the business of Internet providers boomed. Finally, as soon as vaccines were available, they were sold in vast quantities, boosting the profits of firms like BioNTech, Pfizer, Moderna, and AstraZeneca. The current increase in energy prices, which was accelerated by the war in Ukraine, has again allowed oil companies to shine. In the second quarter of 2022, US President Joe Biden publicly complained that “Exxon made more money than God” and argued the company should invest more and pay more taxes (Biden, cited in Rapier 2022).

If some firms make high profits in times of general crisis, politicians tend to propose extra taxes on these profits. For instance, as a reaction to rising energy prices, the Italian government

introduced a special tax on firms belonging to the energy sector. The tax base is the difference between value added in the period from October 1, 2021 to March 31, 2022 and value added in the same months one year earlier. Since the wage bill is unlikely to have changed much, the tax is effectively a levy on the increase in profits.<sup>11</sup> Countries discussing similar taxes include Spain (Chee & Abnett 2022) and the United States, where the Democratic senator Sheldon Whitehouse and representative Ro Khanna proposed legislation that would tax the revenues of oil producing firms above the average price of the years 2015–2019 (66 dollars per barrel) at a rate of 50% (Blackmon 2022).

There are various historical examples of excess or windfall profit taxes. During the two world wars, many countries including the United States introduced extra profit taxes, in particular on the defense industry. But special levies to tax windfall profits were not used only in wars. In 1980, after years of rising oil prices, US President Jimmy Carter signed into law the so-called windfall profit tax for oil companies. Its tax base was not profit but the difference between the market price for oil and a legally defined base price of oil sold by domestic oil producers, but its objective was to tax the growing profits of oil firms.

What does economic research have to say about excess profit taxes of this type? Since a tax on pure windfall profits does not give rise to distortions, an excess profit tax seems attractive. This also applies to other types of high profits, like monopoly profits. The trouble is that high profits do not always reflect windfalls or economic rents. For instance, it is difficult to separate cases of windfall profits from situations in which high profits simply reflect a return needed for a risky investment that took place in earlier periods. If the profits of vaccine producers like BioNTech were punished with an unanticipated extra tax, similar taxes would be expected in the future, and risky investments to develop vaccines for the next health crisis would be much less attractive, in particular if loss offset in case of failure is only granted at the normal tax rate or not at all.

One objection against this critique could point to the fact that high corporate tax rates may have a risk consolidation or insurance effect, as emphasized in the seminal contribution by Domar & Musgrave (1944). They concluded that, through this insurance effect, high taxes may even encourage risky investment. However, if capital markets work properly, risky corporate investment will be diversified, and insurance through taxes and the government will not be needed (Bulow & Summers 1984, Konrad 1991).<sup>12</sup>

There is empirical evidence supporting the view that excess profit taxes have adverse effects. This even applies to seemingly clear cases of windfall profits. According to Rao (2018), the US windfall profit tax on oil producers significantly reduced oil production: A reduction of the profit margin by 10% reduced production by 3–4%. Another issue with excess profit taxes introduced ad hoc and targeting particular sectors is that they are difficult to predict and may increase tax uncertainty, further reducing investment incentives.<sup>13</sup> In addition, the discriminatory nature of this tax instrument raises political economy issues because it is vulnerable to lobbying for special interests.

One way of taxing supernormal profits without creating more uncertainty would be to introduce a progressive corporate tax system permanently, where tax progression refers not to higher marginal rates for larger profits, as in the case of the personal income tax, but to tax rates that rise

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<sup>11</sup>In March 2022 the European Commission recommended the introduction of excess profit taxes in all member states to finance relief measures for poor households (see Eur. Comm. 2022).

<sup>12</sup>For a more detailed survey of research about the impact of corporate taxes on innovation, readers are referred to Adv. Board Ger. Fed. Minist. Finance (2022).

<sup>13</sup>In fact, the implications of uncertainty regarding taxes are complex; under certain circumstances, tax uncertainty may paradoxically increase economic activity through an efficiency enhancing screening effect, as argued by Hines & Keen (2018). Yet this does not imply that tax uncertainty is generally welfare enhancing.

as profitability rises. One area in which profits above a certain profitability threshold are treated differently is international taxation. Pillar 1 of the OECD's proposal for reforming the taxation of MNCs defines profits above a level of 10% of a firm's revenue as "residual profits." However, rather than being taxed at a higher rate, these residual profits are treated differently insofar as the right to tax these profits is shifted to another country.

However, the idea of making corporate tax systems progressive is not without problems. Apart from the negative incentives to innovate and take risks, a progressive corporate tax is particularly vulnerable to tax avoidance. For instance, higher taxes for firms with high profitability create an incentive for these firms to merge with low-profitability firms. The fact that existing tax systems treat profits and losses asymmetrically—a form of tax progression in profitability—has similar effects. The takeover of firms with loss carryforwards but no sustainable business model by profitable firms is a widely used technique to avoid taxes. Most countries have introduced anti-tax avoidance rules that restrict this transfer of tax losses, but these restrictions are disputed and increase the complexity and uncertainty of the tax law.<sup>14</sup>

A more systematic approach to taxing profits in the form of economic rents would be to transform existing corporate tax systems into cash flow taxes, whereby all expenses are immediately deductible. However, this would imply a narrower tax base and require higher tax rates even to keep the revenue constant. This is not what proponents of excess profit taxes have in mind. Also, such a move would make tax systems more vulnerable to profit shifting. In addition, the perception is widespread that investment projects with consistently high returns are also often highly mobile. Taxing these returns at high rates in one country may lead to their relocation to a low-tax country.

## 9. CONCLUSIONS

This article reviews recent research on corporate income taxation, with an emphasis on the relevance of this research for current topics in the corporate tax policy debate. Corporations are legal entities, but the burden of taxes can only be borne by people. The view is widespread that the owners of corporations bear the burden of the tax, and that these people are usually wealthy. While not all shareholders are wealthy, partly because the pension plans of many people with medium incomes include investments in shares, it is correct that the ownership of corporations is biased toward people with high incomes. However, a growing body of empirical research shows that a significant part of the corporate tax burden is shifted to employees. Combined with the evidence regarding the negative impact of corporate taxes on innovation and investment, this suggests that the efficiency/equity trade-off for corporate taxes is not very attractive.

A related issue is that the impact of corporate tax policies on welfare depends on how these taxes affect various economic variables, including investment, employment, wages, land rents, and tax revenues. As discussed by Becker et al. (2012), from a policy perspective, different types of investment, which may be attracted or lost as a result of corporate tax changes, may have very different welfare implications. The welfare effects depend on how much tax revenue they generate or how many well-paid jobs they create for people who would not be able to get similar jobs elsewhere in the economy. More work is needed to investigate these welfare effects beyond mere estimates of how tax changes affect individual variables like the quantity of investment or the level of wages.

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<sup>14</sup>For the situation in the United States, readers are referred to Knight & Knight (2021). From an economic perspective, the option to transfer tax losses across firms has the advantage of reducing distortions caused by the asymmetric treatment of profits and losses. That this asymmetry prevents firms from taking risks is demonstrated, for instance, by Langenmayr & Lester (2018).

Some firms, in particular large multinationals with business models relying on intangible assets, seem to succeed in avoiding a large part of the corporate income tax they would pay if their profits were not shifted to low-tax countries. If taxpayers have the impression that owners and managers of these firms can avoid paying their fair share of tax, this may undermine tax morale in the rest of the economy. This is why policy initiatives like the recent OECD project to crowd back profit shifting are important. It will be equally important to improve data availability for the study of profit shifting, so that the impact of the policy measures taken can be evaluated properly.

Corporate taxation has played a key role in dealing with recent crises. It has been used as an instrument to stimulate economic activity and at the same time to help firms survive periods of lockdown; understanding the impact of these policies and clarifying to what extent firms respond to stimulus measures in periods of economic distress and uncertainty are important tasks for future research.

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The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

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