Tax Avoidance and Multinational Firm Behavior

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Abstract: This chapter reviews, and at times extends, the literature on multinational corporate income tax avoidance and its consequences. It is first important to note that multinational corporations pay a substantial amount of taxes, both direct and indirect. Yet, it is also the case that there is evidence 1) of tax avoidance, including cross-jurisdictional income shifting and 2) that the location of 'real' items such as investment, debt, and employment are sensitive to taxation. In addition, in certain cases, tax avoidance necessitates changes to 'real' activity. While there is evidence of income shifting, the literature is not settled on the extent to which it occurs. The chapter briefly touches on the financial accounting and reputational incentives and disincentives for tax avoidance. It ends with a short discussion of the early research following recent tax-regime changes.

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Introduction

This chapter reviews, and at times extends, research that examines tax avoidance by multinational corporations (MNCs) and how taxes and tax-avoidance behavior influence MNCs' investing, financing, accounting, and other practices. The chapter also reviews existing tax-avoidance literature as it relates to purely domestic firms to the extent that comparisons of domestic and multinational firms are informative, or in circumstances where evidence has not been compiled separately for both types of firms.

By operating in multiple jurisdictions with distinct tax policies, MNCs have unique opportunities to reduce their tax obligations by structuring activities strategically across international borders. In addition, countries often compete via tax policy to attract multinational firms. Governments worry that tax-avoidance activities, coupled with tax competition among countries, are eroding their existing tax bases, and they have lamented their inability to impose taxes on multinational firms in the modern business environment. These concerns have become much more acute in recent years with growing coverage of corporate tax-avoidance issues in the popular press, which in turn has heightened political awareness of multinational tax-avoidance issues. The Base Erosion and Profit Shifting initiatives of the Group of 20 (G-20) and the Organisation for Economic Co-operation and Development (OECD), the US Senate investigations into tax avoidance, and European Union reactions to alleged illegal state aid are recent examples. In addition, worldwide and government actions to combat tax avoidance seem to be increasing given the breadth of the recent proposed Global Anti-Base Erosion Proposal (GloBE) by the OECD.[1]

[1] See http://www.oecd.org/tax/beps/ for information about the OECD base-erosion and profit-shifting initiative, https://www.hsgac.senate.gov/subcommittees/investigations/hearings/offshore-profit-shifting-and-the-us-tax-code for information about the US Senate investigations on tax avoidance, and http://europa.eu/rapid/press-release_IP-18-6889_en.htm for an example of the European Union's actions on illegal state aid.

For purposes of this chapter, corporate income tax avoidance (hereafter, "tax avoidance" for simplicity) is defined as anything that reduces cash income taxes paid relative to pretax financial accounting income. This is the same definition adopted in numerous studies that require a firm-specific measure, including Dyreng, Hanlon, Maydew (2008) and Hanlon and Heitzman (2010). Admittedly, not all research uses this definition; but having such a working definition makes an evaluation and summary of tax-avoidance research as it applies to multinational firms more tractable. This definition of tax avoidance involves a broad set of both 1) actions taken by the firm to lower taxes and 2) outcomes of tax laws established by governments. In other words, tax avoidance under this definition captures both aggressive tax avoidance and also statutorily intended avoidance such as accelerated depreciation deductions, research tax credits, or other laws and agreements instituted by governments. However, it is important to recognize that this measure does not capture all tax planning because it will not capture tax planning that reduces both taxes and reported accounting income (known as conforming tax avoidance).

This chapter begins by examining data on how much US MNCs pay in taxes. Despite many articles in the press that highlight specific situations where MNCs paid very little or even no taxes, the fact is that MNCs pay billions of dollars in income taxes. For example, between 2009 and 2018, publicly traded US multinational corporations paid, in aggregate, more than $2.7 trillion in income taxes to governments around the world.[2] These same firms reported an aggregate of about $10.7 trillion in pretax earnings during that same period, suggesting that, in aggregate, about 25 percent of pretax earnings were paid in income taxes around the world during that ten-year period. MNCs also pay (or remit) other taxes and these are discussed near the end of the chapter. These

[2] The $2.7 trillion tax total is calculated by summing the value of income taxes paid (Compustat data item TXPD) on Compustat for all US-incorporated firms with non-missing beginning assets (Compustat data item AT), revenues (Compustat data item SALE) greater than zero, and non-missing pretax income (Compustat data item PI) from 2009 to 2018.

so-called indirect taxes are also substantial.

While some firms significantly reduce their income tax liabilities, the totality of the evidence suggests that multinational firms face significant operational and reputational constraints on tax avoidance, a narrative that is often missing in media portrayals of tax avoidance that focus on a few specific examples. In light of this, the chapter discusses questions and related research about 1) the extent to which firms can avoid taxes, 2) the variation in tax avoidance, 3) characteristics associated with tax avoidance, 4) the pervasiveness of tax avoidance, 5) the costs that deter tax avoidance, and 6) the consequences of tax avoidance.

This chapter reviews and extends the literature that measures and quantifies tax avoidance at the firm level. Similar to prior research, it provides evidence consistent with considerable cross-sectional variation in tax avoidance, with some firms appearing to pay taxes at rates significantly lower than the statutory tax rate, while other firms appear to pay taxes at rates that are higher than the statutory tax rate. Even when effective tax rates are measured over long periods to reduce the influence of unusual years or one-time shocks, the variation in tax avoidance remains high. For example, when measured over a ten-year period, about 17 percent of observations have cash effective tax rates below 20 percent, while 15 percent have a cash effective tax rate higher than 50 percent (during years when the US statutory tax rate was between 34 percent and 35 percent). Consistent with prior research, when firm-specific cash effective tax rates are measured over longer horizons, the distribution tightens.[3]

This chapter then reviews and extends the literature that examines how tax avoidance has changed. Consistent with Dyreng, Hanlon, Maydew, and Thornock (2017), the data presented in this chapter suggests that tax avoidance (as we define it) has increased over the past thirty years.

[3] The effects of changes are discussed in the sample below.

Contrary to the conventional wisdom that multinational firms have more tax-avoidance opportunities than purely domestic firms, and thus benefit from tax-based cost advantages, the evidence suggests that tax avoidance has increased (that is, cash effective tax rates have decreased) at purely domestic firms as much as at multinational firms over the past thirty years. In addition, looking at the level of rates, purely domestic firms have lower cash effective tax rates than multinational firms over the entire thirty-year period. Moreover, following the recent US tax reform, known as the Tax Cuts and Jobs Act (TCJA) of 2017, purely domestic firms experience a much sharper decline in cash effective tax rates than multinational corporations. This is consistent with expectations because all of a purely domestic firm's income is subject to the US tax rate (which the TCJA dropped from 35 percent to 21 percent) and because some international provisions in the TCJA may increase the taxes multinationals pay.

Researchers have devoted substantial resources to understanding the determinants of tax avoidance. This chapter reviews the findings from these studies and concludes that, despite some progress, the field still cannot explain a large portion of the variation in tax avoidance. The unexplained variation arises in part because 1) idiosyncratic business models and idiosyncratic business managers engender idiosyncratic tax-avoidance opportunities and varying proclivities to take those opportunities that are unlikely to be explained by traditional regression techniques, and 2) because tests that include all known tax-avoidance factors simultaneously are difficult to design. A few of the factors associated with tax avoidance beyond traditional firm characteristics (industry and size) have been recently studied including financial accounting incentives, reputation, and the identity of executive-level managers.

Part of the chapter discusses the techniques multinational firms use to avoid taxes, including income shifting. This is difficult because many techniques are highly technical and

context specific. Additionally, the specific structures employed by firms are generally proprietary or not widely known. Where possible, the chapter highlights information that has been revealed publicly in court cases, congressional testimonies, academic literature, and investigative reports in the press. Nevertheless, for much of the discussion the technical details and intricate nuances of these strategies are omitted in favor of describing more generalizable patterns. One of the most common techniques multinational firms use is to shift income from one jurisdiction to another. Because income shifting is impossible to directly observe, researchers use a variety of econometric techniques to generate estimates of the phenomenon. This chapter reviews this literature, and notes, as other studies have, that the economic magnitudes of income shifting estimated in these studies are wide-ranging and at times seem implausibly large when compared with other data.

Finally, the chapter turns to the literature that examines how taxes and tax avoidance affect other decisions such as investment location, corporate capital structure, and employment. For example, the evidence suggests that jurisdictions with low tax rates attract investment, all else constant. Further, firms may choose to shift income to a low-tax jurisdiction, which might only be possible if some real production activities are performed in the low-tax jurisdiction (or at least performed outside of the United States). Prior to the TCJA, the income recognized in the low-tax jurisdiction could have become 'trapped' abroad as the company could not repatriate the earnings to the United States without paying incremental US taxes. Research suggests that companies with trapped foreign earnings engaged in relatively more investment in foreign jurisdictions and relatively more domestic borrowing, creating a situation where tax avoidance, including income shifting, seemed to affect foreign investment, which opened the door for more tax avoidance.

Most of the chapter focuses on US MNCs and primarily discusses research that was conducted between the Tax Reform Act of 1986 and before the TCJA was effective in 2018. At

the end of the chapter, some very recent research about the effects of the TCJA is discussed.

Do Multinational Firms Pay Taxes?

Many US multinational firms pay substantial income taxes, despite many anecdotes in the press to the contrary. In addition, some companies disclose and discuss the amount of taxes they pay. For example, in 2004, Lee Scott, President and CEO of Wal-Mart, wrote in his annual letter to shareholders:

> I also will report that Wal-Mart paid $4 billion in U.S. federal income taxes in fiscal year 2004. To borrow a page from my friend Warren Buffett's annual report letter to the shareholders of Berkshire Hathaway, this means that if 446 other taxpayers paid the same amount as Wal-Mart, no other business or individual in the United States would have had to pay federal taxes last year (based on 2003 US federal tax receipts of $1.782 trillion).

To estimate, in a large sample, how much firms pay, much of this chapter uses information from financial statements. Thus, it is important to understand what financial statements disclose about taxes. The most crucial distinction to make and understand is the difference between income tax expense on the income statement and cash taxes paid.

The income tax expense on a firm's income statement is computed using the accrual method of accounting (like everything else on the income statement). Thus, income tax expense is not equal to cash taxes paid. At a high level, the total income tax expense in a reporting period reflects taxes that have been and will be paid on the accounting earnings reported on that income statement for the same period. In simple terms, the income tax expense is matched with the current-year pre-tax earnings. Or, alternatively stated, tax expense captures future tax costs and benefits incurred in the current period. The accounting income tax expense amount consists of two parts—

current tax expense and deferred tax expense.[4] Each of these expense amounts is disclosed by broad jurisdiction—United States, international, and state (generally). The current tax expense is the portion of the expense that most closely mirrors cash taxes paid. However, it is not equal to cash taxes paid because the current tax expense will include some accruals as well (for example, tax expense recorded for changes in contingent tax liabilities arising to account for possible future taxes from assessments by tax authorities). In the sample of public multinational firms, the correlation between cash taxes paid and total current tax expense is 92 percent.

In contrast to tax expense, cash taxes paid is the amount of cash firms remitted to all governments around the world for income tax payments, net of any refunds received. Cash taxes paid is not disclosed by jurisdiction. Cash taxes paid could be related to this year's income or could include such things as payments made as a result of a tax audit or settlement for a prior tax year. In other words, cash taxes paid is literally just that: the amount of cash paid during the year for income taxes.[5] Because cash taxes paid is not disclosed by jurisdiction, current tax expense is used as a proxy for cash taxes paid when by-jurisdiction amounts are needed.

In Figure 1, Panel A reports the aggregate amount of income taxes paid to all governments by publicly traded US multinational companies each year over the past thirty years in the line labeled Cash Taxes Paid. The figure reports that these companies paid a total of $64 billion in

[4] Deferred tax expense is the expense related to changes in deferred tax assets and liabilities. A discussion of this is beyond the scope of this paper. For more information about the accounting for income taxes, see any intermediate accounting textbook.

[5] Compustat data items for the items discussed are as follows: cash taxes paid (TXPD), total income tax expense (TXT), federal current income tax expense (TXFED), foreign current income tax expense (TXFO) and state current income tax expense. The conventional Compustat year convention is used. For example, a firm with a year ending from June 2018 to May 2019 will be labeled as having a fiscal year in Compustat of 2018. The convention puts calendar-year end 2018 firms as 2018 as well as firms with fiscal years where the majority of months fall in 2018. This will cause some mismatch in timing as firms with a fiscal year-end of, say, October 2018 will be labeled as a 2018 firm year but would have to apply a blended rate for tax purposes and the financial accounting effects would occur in a year labeled 2018 even though the act was passed in 2017. However, for most firms (including calendar year-end firms) the classification lines up. The one exception is that the immediate expensing provisions of the TCJA start in 2017. This is discussed more, to some extent, below.

income taxes to governments around the world in 1988. The amount rises to as much as $332 billion in 2014, and is $259 billion in 2018, the year immediately after the passage of the TCJA.[6] Figure 1 also reports the federal current tax expense each year for the past thirty years in the line labeled Federal Current Tax Expense. In 1988, publicly traded US multinational firms reported $34 billion in federal current tax expense, and in 2018 reported $167 billion in federal current tax expense.[7]

Though the amount of taxes paid is large, it is difficult to interpret without context. In 2014, the most recent data available, the Internal Revenue Service collected just over $336 billion in corporate income taxes, which accounted for about 11 percent of US revenue. In 2014, publicly traded US multinational firms reported $187 billion in current federal tax expense, or about 56 percent of all US federal corporate income taxes (assuming that current tax expense is a reasonable proxy for cash taxes paid in aggregate for such purposes).

In addition to comparing the amount of taxes paid by publicly traded multinational firms with the total amount of corporate tax collected in the United States, it is also informative to examine the amount of taxes paid relative to measures that capture the scale of the economy. In

[6] Taxes paid appears to decline after 2014. Why this occurs is unclear. In examining the data, the number of firms declines by 192 observations. This chapter does not investigate this further or examine the changes in observations year-to-year.

[7] In Figure 1 there is a spike in current federal tax expense in 2017 but no corresponding spike in cash taxes paid. This is an example of where the two can differ. In 2017, with the passage of the TCJA, for financial accounting purposes, companies were required to accrue the tax expense for some provisions in the TCJA, for example, the mandatory deemed repatriation tax (the transition tax) on unrepatriated foreign earnings (Section 965(a) inclusion). However, the tax did not need to be paid in 2017, but could be paid over an eight-year period following the TCJA. This creates a large difference in the two measures. Astute readers may wonder if immediate expensing in the TCJA resulted in a similar difference. In the measures used in Figure 1, the answer is no. The immediate expensing of qualified assets enacted as part of the TCJA had an effective date of September 27, 2017. Immediate expensing would lower cash taxes paid for companies that took advantage of the provision. The provision would also lower current federal tax expense for financial accounting. Thus, there would not be a difference in the two measures we present due to immediate expensing. However, if we were to examine *total* income tax expense (current plus deferred) there would be a difference between cash effective tax rates and the effective tax rate where total income tax expense is in the numerator. This is because bonus depreciation from immediate expensing on the tax return would increase deferred federal tax expense for financial accounting. Thus, immediate expensing would lower cash taxes paid and current federal tax expense similarly (in general), but would not lower total income tax expense (because financial accounting pre-tax income and financial accounting depreciation are not affected by the new tax rule).

Figure 1, Panel B plots cash taxes paid divided by US gross domestic product (GDP) and federal current tax expense divided by US GDP. As the figure shows, worldwide cash taxes paid hovers between 1 percent and 2 percent of GDP. As might be expected, federal current tax expense captures a smaller fraction of GDP, and hovers between about 0.5 percent and 1 percent of GDP.

In sum, the results, juxtaposed against the common narrative that large public multinational corporations pay very little income tax, suggest that the reality of the corporate income tax is nuanced and difficult to convey in a single statistic or simple conclusion. Indeed, many multinational corporations clearly pay substantial income tax, while other companies undeniably pay relatively little income tax. The wide variation in income tax burdens is discussed throughout the rest of the study. In addition, as mentioned earlier, although the study focuses on income taxes, multinational corporations also pay other types of taxes, including property taxes, employment taxes, value-added taxes (VATs), excise taxes, tariffs, and other indirect taxes. These taxes are briefly discussed before the conclusion.

Corporate Tax Planning and Avoidance

Research on corporate tax planning and corporate tax avoidance dates back many decades. In the economics literature, foundational work by Hall and Jorgensen (1967) established that tax policies could affect investment and other corporate decisions. Similarly, Modigliani and Miller (1963) argued that corporate taxes could affect corporate financing policies. Over the ensuing years, researchers have devoted substantial efforts to understanding how tax policies affect investment and financing policies. In effect, the fact that corporate taxes influence so many corporate actions is evidence of tax planning. If firms simply blindly complied with tax laws without any tax planning at all, taxes would have no effect on corporate behavior.

Myron Scholes and Mark Wolfson provided significant structure to the literature on corporate tax planning in the 1980s and published what has become a seminal textbook in 1992. In the wake of the Scholes and Wolfson textbook, research on tax planning and tax avoidance began to grow in the 1990s. Moreover, the rise of corporate tax shelters became more widely documented in the late 1990s, due, in part, to a white paper by the US Treasury (1999) and substantial media coverage (for example, Novack and Saunders, 1998; Frank, 2003). In an influential review of the tax literature, Shackelford and Shevlin (2001) called for research on the determinants of tax aggressiveness, while Weisbach (2002) identified the "undersheltering puzzle" where he asked why tax avoidance (sheltering in his paper) is not more pervasive. Additionally, Slemrod (2004), Chen and Chu (2005), and Crocker and Slemrod (2005) developed the theoretical foundation of corporate tax avoidance within an agency framework. The combination of these factors, and undoubtedly others, has led to a recent explosion of corporate tax research.

What is Corporate Tax Planning?

For purposes of this chapter, the term "tax planning" refers to any alteration of corporate activity relative to a zero-tax world. The chapter assumes the objective of a representative firm is to maximize after-tax returns. For example, tax planning might consist of altering investments, finances, operations, employment, mergers and acquisitions, or any other corporate activities to maximize the after-tax return on those activities, even though the choices might be suboptimal in a zero-tax world. Thus, the definition of tax planning is consistent with Scholes and Wolfson (1992) who argue that "effective tax planning involves considering the role of taxes when implementing the decision rule of maximizing after-tax returns."

As a practical matter, tax planning is impossible to observe directly because the world absent taxes cannot be observed. Corporate tax planning encompasses every type of tax that might

affect a corporation either directly or indirectly. Thus, firms maximize profits after taking into consideration both explicit taxes, which are taxes paid to the government, and implicit taxes, which are taxes that are not paid to a government, but are borne economically because the returns on tax-favored projects might be lower than the returns on non-tax-favored projects. Firms maximize income after taking into consideration not only corporate income taxes, but also property taxes, value-added taxes, and sales taxes, and so forth (to the extent they are borne by the entity). Furthermore, and at least in theory, firms maximize returns by taking into consideration shareholder investment taxes (although the empirical evidence on this is not strong). In other words, effective corporate tax planning requires that firms take into account all parties, all taxes, and all costs (Scholes and Wolfson, 1992).

What is Corporate Income Tax Avoidance?

For purposes of this chapter, corporate income tax avoidance (again, referred to herein as tax avoidance for simplicity) is defined as anything that reduces cash income taxes paid relative to pretax financial accounting income.[8] This definition of tax avoidance is broad enough to capture activities as egregious as tax evasion, where earnings are simply not reported to the taxing authorities, or aggressive forms of avoidance that might be technically legal but push the boundaries of the law. The definition also encompasses benign activities that reduce taxes, such as investments in municipal bonds that generate tax-exempt interest income, and the effects of statutory provisions such as accelerated depreciation, research and development tax credits, or other laws and agreements established by governments. Importantly, the definition of tax avoidance used in this chapter encompasses most common tax planning strategies used by multinational firms, including shifting income to low-tax foreign jurisdictions using strategically

[8] Tax planning and tax avoidance are sometimes used interchangeably in extant literature.

set transfer prices, or intercompany debt, as well as decisions that generate tax savings such as establishing manufacturing, research and development, or sales operations in low-tax foreign jurisdictions.

Although this definition of tax avoidance encompasses a wide range of activities, it misses some forms of tax planning. Because avoidance is defined as taxes paid relative to pre-tax accounting earnings, any actions a firm takes that reduces both taxes and pretax accounting earnings will not fall within the scope of tax avoidance as measured here. For example, interest payments on most forms of third-party debt are tax deductible, and reduce both cash taxes paid and pretax financial accounting earnings.[9] Tax planning that reduces pre-tax financial accounting earnings and cash taxes paid is sometimes referred to as "conforming tax avoidance," while this chapter's definition of tax avoidance might be more precisely referred to as "non-conforming tax avoidance."[10]

Estimating Corporate Tax Avoidance

Following Dyreng, Hanlon, and Maydew (2008), this chapter empirically measures corporate tax avoidance, using the cash effective tax rate, by summing cash income taxes paid over some period (usually one, five, or ten years), and dividing by pretax earnings summed over the same period, as follows:

$$CASH\ ETR = \frac{\sum_t CASH\ TAX\ PAID_t}{\sum_t PRETAX\ INCOME_t}. \quad (1)$$

[9] See Hanlon and Heitzman (2010) for their discussion of interest expense. To be clear, the use of debt to third parties will generally not affect the *(CASH ETR*) measure because the interest expense would often reduce accounting income and provide a deduction for taxable income. Thus, interest expense to third parties often constitutes conforming tax avoidance. However, intercompany debt would likely affect the measure because intercompany interest expense would be eliminated upon consolidation for financial accounting but have the effect of reducing taxable income in a high-tax jurisdiction and increasing taxable income in a low-tax jurisdiction. Thus, cash taxes paid for the worldwide entity would be lower but accounting income would likely not be lowered.

[10] Conforming means accounting and taxable incomes are conformed to be the same with respect to that transaction.

Although data necessary to calculate *CASH ETR* (cash effective tax rate) is available annually for publicly traded US multinational firms, relatively long-run versions of the measure are preferable because they minimize the effect of several problems. First, *CASH ETR* is difficult to interpret when *PRETAX INCOME* (defined as pre-tax financial accounting income) is negative. Increasing the length of the period over which the measure is calculated reduces the fraction of observations with negative *PRETAX INCOME* because fewer firms have cumulative losses over a longer period. Second, because both *CASH TAX PAID* and *PRETAX INCOME* can be volatile for many reasons, summing over a long period allows random fluctuations to wash out, thereby creating a more stable measure. Third, because the numerator is cash-based, but the denominator is accrual-based, summing over a long period allows for many of the accruals in pretax earnings to reverse, creating a better (though still not perfect) match between numerator and denominator.[11] Fourth, using a cash-based number in the numerator removes the effect of tax accruals, which can sometimes significantly alter the tax expense relative to cash taxes paid.

Figure 2 uses data from Compustat between 1988 and 2017 to plot the distribution of *CASH ETR* calculated over various horizons for all publicly traded non-financial, non-utility MNCs and domestic-only corporations (DOCs) with total assets greater than $10 million and pretax income greater than zero.[12] Following Dyreng, Hanlon, and Maydew (2008), if *CASH ETR* is greater than

[11] Note that the measure could be affected by management in attempts to manipulate earnings to achieve certain benchmarks such as analysts' earnings forecasts. Imagine a company "manages income upward" but does not pay tax on that income. The measured tax rate will fall. This should be less of a concern over the long run as some portion of the earnings management will reverse. In addition, this is still considered tax avoidance under this chapter's broad-based definition because the company avoided paying tax on the managed earnings.

[12] The sample attrition from deleting firm-years with negative pretax income varies with the horizon over which the *CASH ETR* is calculated. For one-year *CASH ETR*, 34.7 percent of observations are deleted because of negative pretax income, for five-year *CASH ETR*, about 31.0 percent of observations are deleted because of negative five-year pretax income, for ten-year *CASH ETR*, about 23.6 percent of observations are deleted because of negative ten-year pretax income, and for thirty-year *CASH ETR*, about 8.6 percent of observations are deleted because of negative thirty-year pretax income.

one, it is reset to one, and if it is less than zero, it is reset to zero.[13]

Panel A of Figure 2 provides histograms of one-year *CASH ETR* (that is, where the numerator and denominator are annual measures). Also, the number of observations, the moments of the distribution, and values of various quantiles of the distribution are presented in the first row of Table 1 Panel A for MNCs and Table 1 Panel B for DOCs. The mean of the distribution for MNCs is 0.293, about 5 or 6 percentage points below the statutory tax rate during the sample period of 34 percent or 35 percent. The mean of the distribution for DOCs is 0.261, about 8 or 9 percentage points below the statutory tax rate. As can be seen by looking at Panel A of Figure 2, more firm-years appear in the lower ranges of *CASH ETR* than in the higher ranges. For example, for both MNC and DOC firm-years, 70 percent have *CASH ETR* below the statutory tax rate (that is, 35 percent), but only 30 percent have *CASH ETR* above the statutory tax rate. Moreover, 37 percent of MNC firm-years and 45 percent of DOC firm-years report *CASH ETR* below 20 percent. With both groups, a relatively large number of observations have CASH ETR very near 0 percent, and this is particularly obvious in the sample of DOC firm-years, suggesting many of these observations have zero or negative cash taxes paid, despite earning profits during the year. These observations can often be attributed to unusual or extreme earnings or tax realizations, including losses in prior years that result in large tax loss carryforwards. For example, if a firm records a

[13] In Panel A of Figure 2, about 3.7 percent (4.1 percent) of the multinational (domestic) observations were below zero, and thus reset to zero; about 4.3 percent (3.3 percent) of the multinational (domestic) observations were greater than one, and thus reset to one. In Panel B, about 1.3 percent (1.7 percent) of the multinational (domestic) observations were below zero, and thus reset to zero; about 4.7 percent (4.6 percent) of the multinational (domestic) observations were greater than one, and thus reset to one. In Panel C, about 0.5 percent (0.7 percent) of the multinational (domestic) observations were below zero, and thus reset to zero; about 4.8 percent (5.1 percent) of the multinational (domestic) observations were greater than one, and thus reset to one. In Panel D, none of the observations were below zero; about 3.1 percent (3.0 percent) of the multinational (domestic) observations were greater than one, and thus reset to one. In Panel E, about 2.6 percent (4.5 percent) of the multinational (domestic) observations were below zero, and thus reset to zero; about 2.9 percent (2.9 percent) of the multinational (domestic) observations were greater than one, and thus reset to one. In Panel F, about 4.1 percent (9.5 percent) of the multinational (domestic) observations were below zero, and thus reset to zero; about 4.2 percent (1.9 percent) of the multinational (domestic) observations were greater than one, and thus reset to one.

pretax financial accounting loss in year *t*-1 (and let's assume just for this discussion that firm records a tax loss as well), that observation would be excluded from the sample in year *t*-1 because *CASH ETR* is difficult to interpret when pretax earnings are negative. If the same firm records a profit for financial accounting in year *t*, *CASH ETR* might be very low or even zero because the firm might be able to use the tax loss carryover from year *t*-1 to reduce or eliminate taxes in year *t*, thus reducing the numerator of *CASH ETR* to zero, over a positive denominator of *PRETAX INCOME* (because financial accounting losses are not carried over).

Panel B of Figure 2 presents a histogram of five-year *CASH ETR* (that is, where the numerator and denominator are separately summed from *t*-4 to *t*, then divided), and the associated characteristics of the distribution are reported in the second row each of the two panels of Table 1. As can be seen in Table 1, the mean of the distribution rises several percentage points relative to the one-year *CASH ETR*, for both MNCs and DOCs achieving a value of 0.339 for MNC firm-years and 0.331 for DOC firm-years. Both of these values are lower than the statutory tax rate, but higher than the mean of one-year *CASH ETR*. The distribution of five-year *CASH ETR* remains asymmetric, with more mass in the left side of the distribution, but less asymmetric than one-year *CASH ETR*. In addition, there are fewer extreme observations so that the masses at the ends of the distribution are smaller, a fact that is particularly visible for DOC observations.

Panel C of Figure 2 presents histograms of ten-year *CASH ETR* (that is, where the numerator and denominator are separately summed from *t*-9 to *t*, then divided), and the associated characteristics of the distributions are reported in the third row of the two panels of Table 1. Once again, the mean of the distribution rises a few percentage points relative to one-year *CASH ETR* and five-year *CASH ETR*, with a value of 0.356 for MNC firm-year observations and 0.363 for DOC observations. The distribution also becomes more symmetric and even fewer extreme

observations are reset to zero from below or to one from above so the abnormal masses at the ends of the distribution are smaller. Even though the distribution becomes more symmetric, 16 percent of MNC and 18 percent of DOC observations have cash effective tax rates below 20 percent.

Panel D of Figure 2 contains histograms of thirty-year *CASH ETR* (that is, where the numerator and denominator are separately summed from t = -29 to t, then divided), which covers the entire sample period from 1988 to 2017. The associated characteristics of the distributions are reported in the fourth row of each panel of Table 1. This panel reports data from 559 firms (424 MNCs and 135 DOCs), each with only one observation because the sample comprises 30 years of data. The mean thirty-year *CASH ETR* is 0.351 for multinational (domestic) firms and 0.350 for domestic firms, relatively close to the statutory tax rate of either 34 or 35 percent during the sample period. The standard deviation of this distribution is relatively tight, and the extreme tails continue to shrink. When calculated over a thirty-year period, one MNC and five DOCs had a *CASH ETR* less than 10 percent, and thirty-six MNCs and ten DOCs had a *CASH ETR* less than 20 percent.

Obviously, because data is required for thirty consecutive years when calculating thirty-year *CASH ETR*, only firms with long histories as publicly traded companies appear in the figure. To determine if the shape of the distribution is driven by the calculation of thirty-year *CASH ETR*, or whether it is driven by special characteristics of firms that survive for thirty years, the chapter re-examines one-year *CASH ETR*, but only for firm-years that correspond to the 559 firms with a non-missing thirty-year CASH ETR. The resulting histograms are in Figure 2, Panel E, and the 5th row of Table 1 Panel A and Panel B. Even though all of the observations in this figure are derived from firms that survive the full thirty years, the distributions are asymmetric and have significant extreme values, similar to the distributions plotted in Panel A for all available firm-years. This confirms that in any given year, *CASH ETR* might be unusually low or high because of random

fluctuations in earnings or taxes, unusual corporate events (for example, mergers), changes in tax policies, tax enforcement actions, or other short-lived factors.

Finally, Panel F of Figure 2 presents one-year *CASH ETR* for 2018. Although the distributions appear similar to the distributions presented in Panel A, which covers firm-years between 1988 and 2017, the mean of each of the distributions in Panel F is lower than the corresponding distributions in Panel A. This can be easily seen by comparing the values in the sixth row of Panels A and B of Table 1 with the values on the first rows of Panels A and B of Table 1. The mean of one-year *CASH ETR* is 0.239 for MNCs and 0.158 for DOCs in 2018 compared to 0.293 for MNCs and 0.261 for DOCs from 1998 to 2017. In addition, more firms bunch in the bar close to zero for DOCs—nearly 40 percent of the sample of DOCs are in the bar nearest zero for 2018 versus a roughly 27 percent in from 1988 to 2017. These effects are likely due to the TCJA, which lowered the statutory tax rate from 35 percent to 21 percent and allowed for immediate expensing of qualified assets.

Overall, there are five key observations related to Figure 2. First, the distribution of *CASH ETR* tightens as the time horizon lengthens. Second, even when calculated using a thirty-year horizon, there is still variation in the distribution of *CASH ETR* (though the mean rises to 35 percent). Third, the distribution is asymmetric – fewer firms have *CASH ETR* higher than the statutory tax rate than below the statutory tax rate. Fourth, there are a substantial number of firms that achieve *CASH ETR* lower than 20 percent even over longer-run periods (but again, the percentage of firms that can do this does decline as the horizon lengthens).[14] Fifth, the mean value of *CASH ETR* appears to have dropped significantly in 2018 after the TCJA, especially for domestic only firms, consistent with the corporate statutory tax rate being lowered from 35 percent

[14] Rather than classifying firms in the distribution, other approaches include subtracting the firm's rate from a cross-sectional constant/benchmark of some type, for example, the statutory US tax rate or an industry average.

to 21 percent.

Overall, the data presented in this section using *CASH ETR* provides evidence that some firms pay taxes at rates lower than the US statutory tax rate, over the period 1988-2017, and this is the case for both multinational entities and purely domestic firms. Later, the chapter describes some of the common mechanisms firms use to achieve these relatively low tax rates, with a special focus on strategies employed by multinational firms.

Trends in Tax Avoidance

Over the past thirty-one years, firms have become increasingly multinational, and this trend is readily apparent in the data using any number of measures. One of the simplest measures of multinationality used in the literature is whether a firm reports any foreign earnings or foreign taxes in its annual report (as used above). In Figure 3, Panel A replicates and extends Figure 1 from Dyreng, Hanlon, Maydew, and Thornock (2017), the data reveal that about 34 percent of firm-years in Compustat reported evidence of foreign earnings or foreign taxes in their annual reports in 1988, and that this fraction has steadily grown to about 70 percent in 2018.

Dyreng, Hanlon, Maydew, and Thornock (2017) study profitable firm-years on Compustat, and require other conditioning variables. One possible concern with the trend observed in Figure 3, Panel A, is that that the trend toward multinationality might be biased because perhaps older, surviving firms are more likely to become multinational. To investigate this possibility, in Figure 3, Panel B examines whether rates of multinationality are systematically different for relatively young versus relatively old firms.[15] In 1988, about 14 percent of firms between one and ten years old have multinational operations, while the fraction is about 32 percent of firms between twenty-

[15] The sample for this analysis is all US-incorporated firm-years in Compustat with positive values of total assets and sales.

one and thirty years old. This suggests that older firms are more likely to have multinational operations and this is true in each of the other years examined, 1998, 2008, and 2018. The results reveal that a larger fraction of older firms have multinational operations than younger firms in every decade of the sample studied. However, the figure also shows that firm-years in both age groups, young and old, are more multinational in each successive decade, consistent with globalization trends.

Not only has the fraction of US public corporations that report foreign earnings or foreign taxes grown, but the number of unique countries in which US multinationals report significant operations has also increased. The SEC requires publicly traded US firms to disclose a list of their significant subsidiaries each year.[16] As can be seen in Figure 3, Panel C, among firms that disclose at least one significant foreign subsidiary, the number of distinct countries in which the mean firm has a material foreign subsidiary has grown from 6.78 in 1996 to 11.79 in 2018. Moreover, among this same set of firms, the mean firm had a significant subsidiary in 1.27 tax-haven countries in 1996 compared with 2.52 tax-haven countries in 2018.

Over this same period, foreign countries (and the United States in 2018) have lowered statutory corporate tax rates. Figure 4 shows the average corporate statutory tax rate of OECD countries was 44 percent in 1988, and has declined steadily to 24 percent in 2018. In addition, many countries have enacted tax holidays, granted special negotiated tax rates, or provided tax incentives for specific types of investment (for example, patent box regimes), that have further

[16] The disclosure is Exhibit 21 of Form 10-K. There is some selective disclosure in Exhibit 21, though Dyreng, Hoopes, Langetieg, and Wilde (2019) find that most disclosures are accurate. Moreover, we gather data using text search algorithms that may miss or misclassify subsidiaries (for example, if the company includes the name of the country in the subsidiary name, the subsidiary might be double-counted). In addition, Exhibit 21 requires disclosure of the country of incorporation, but many tax structures rely in differences in incorporation location and the location of management and control (for example, an Irish incorporated subsidiary managed in Bermuda), and Exhibit 21 does not have information on the location of management or control.

reduced the tax burden faced by corporations in many countries.[17]

Considering both increasing multinationality and decreasing corporate tax rates around the globe, a natural question is whether and to what extent has tax avoidance (defined as cash taxes paid divided by pre-tax accounting income) increased among multinational firms. Dyreng, Hanlon, Maydew, and Thornock (2017) provide evidence on this question by examining the trends in corporate tax avoidance for US multinational firms compared with purely domestic firms. Consistent with expectations, the authors find that the cash effective tax rates of US multinational firms declined substantially in the twenty-five years between 1988 and 2012. Surprisingly, however, the authors also find that purely domestic US firms report similar declines in their effective tax rates. Figure 5, Panel A, reproduces and extends Figure 3 from Dyreng, Hanlon, Maydew, and Thornock (2017). The figure provides evidence consistent with 1) the cash effective tax rates of US multinational firms declining, and 2) the cash effective tax rates of purely domestic firms declining at a similar pace, which is somewhat surprising because the US statutory tax rate was effectively constant between 1988 and 2017, rising only once from 34 percent to 35 percent in 1994. The trends of both types of US companies merit further discussion.

First, the evidence in Dyreng, Hanlon, Maydew, and Thornock (2017) suggests that the declining effective tax rates of US multinationals appear to be partially driven by 1) US multinationals becoming more global, more intangibles-based, and reporting more foreign earnings (either via fundamental business purposes or via income shifting) and 2) foreign statutory tax rates declining. Prior to the TCJA, the United States had a worldwide tax system that allowed deferral of US taxes on foreign subsidiary operating earnings until repatriation. Thus, any earnings

[17] Clearly, statutory tax rates do not tell the whole story. Tax rate changes are often accompanied by other changes that affect the tax base or tax enforcement, as discussed in Kawano and Slemrod (2015). Moreover, some countries have imposed new taxes on multinationals to prevent profit shifting (for example the diverted profits tax in Australia and the United Kingdom).

1) recognized in a foreign subsidiary in a country with a relatively low tax rate, and 2) held abroad and not subject to immediate US taxation, lowered the firm's cash effective tax rate. As more operating earnings were reported in foreign jurisdictions (and not repatriated), cash effective tax rates declined.[18]

Second, the fact that domestic firms have declining cash effective tax rates is puzzling, and calls into question the conventional wisdom that multinational firms have a tax-based competitive advantage. Many believe that because purely domestic firms do not have opportunities to earn income in low-tax jurisdictions, and cannot engage in strategic behaviors to recognize earnings in tax havens, their tax-avoidance opportunities are limited. Nevertheless, the data reveal that their cash effective tax rates are lower and have been declining at the same pace as multinational firms.

Several researchers have proposed explanations for these two puzzles. Dyreng, Hanlon, Maydew, and Thornock (2017) speculate that one partial explanation resides in temporary statutory tax changes (and possibly other domestic tax changes) designed to stimulate the economy and encourage investment such as bonus depreciation from 2001 to 2004 and starting again in 2008 (now scheduled through 2026 in the TCJA), and special deductions like the domestic production activities deduction (now expired). Drake, Hamilton, and Lusch (2019) argue that purely domestic firms on average have larger tax loss carryforwards than other firms, and their low effective tax rates can be explained, in part, by the utilization of these tax loss carryforwards. Dyreng, Hanlon, Maydew, and Thornock (2017) discuss tax losses and attempt to control for the effects, but these controls may have been limited due to data constraints. It is also important to

[18] Depending on how a firm accounted for unremitted foreign earnings, the effective tax rate for financial reporting (known in the literature as the GAAP—or Generally Accepted Accounting Principles—effective tax rate) may or may not have been affected. If a firm treated the earnings as temporarily reinvested, then the US tax was accrued for financial reporting purposes and the GAAP effective tax rate was not reduced. However, if the earnings were treated as indefinitely reinvested, then the US tax was not accrued, and the GAAP effective tax rate was reduced.

consider that tax losses are not entirely exogenous.

Thomsen and Watrin (2018) extend Dyreng, Hanlon, Maydew, and Thornock (2017) by comparing the effective tax rates of US multinationals to European multinationals. They find that effective tax rates have declined for both groups of firms, but more for European multinationals than for US multinationals. They find that the downward trends of European multinationals are primarily driven by declines in statutory corporate tax rates around Europe. Dyreng, Hanlon, Maydew, and Thornock (2017) also find that the decline in foreign statutory tax rates (for example, European tax rates) is a partial driver of the declining trend for US multinationals.

To provide further insight, possible effects of industry and size are examined. Figure 5 Panel B presents the data by industry—high tech firms versus firms in other industries.[19] The general trends shown in Panel A generally also apply to firms in both high-tech industries and in other industries, namely, that tax rates are declining, and that domestics generally have lower tax rates than multinationals.[20]

Figure 5 Panel C presents the data by size of firm—large and small firms. Cutoff points were created for each quintile of market value of equity of multinational firms in each year and these cutoff points were used to assign all firms (multinationals and domestics) to five groups. By construction, the multinational firm-years are evenly spread across the five groups. The domestics are skewed to the smaller quintiles. Nevertheless, there are sufficient domestic and multinational observations in each quintile to facilitate analysis. In the subset of the largest firms, domestics and multinationals are fairly similar, with both groups exhibiting declining tax rates. And, for this

[19] High-tech industries are defined as firms with three-digit SIC codes equal to 283, 357, 366, 367, 382, 384, 481, 482, 489, 737 or 873 following Kile and Phillips (2009).

[20] The trends are broadly similar in unreported results if firms are split into those that report research and development expense (a variable commonly used to identify high tech firms) and those that do not report research and development expense.

subset of observations, neither domestic nor multinational firms have consistently lower cash effective tax rates. In contrast, in the smallest quintile, domestics have generally lower effective tax rates than multinationals. This finding appears consistent with Drake, Hamilton, and Lusch (2019), suggesting that small domestic firms possibly have greater loss carryforwards, resulting in their cash effective tax rates being relatively lower in profitable years. However, the data also suggest that large domestics do not achieve those types of benefits – large domestics and large multinationals are more similar to each other than are small domestics and small multinationals.[21] Thus, while the subset of large firms does not reveal that domestic firms have lower cash tax rates than multinationals, the totality of our analysis does not support the conventional narrative that multinationals have vastly lower tax rates or a steeper downward trend in tax avoidance than domestics.

After presenting data on tax avoidance in the cross-section and over time, the chapter now turns to literature on the factors associated with tax avoidance, methods of tax avoidance, and consequences of tax avoidance.

Characteristics and Factors Associated with Tax Avoidance

As noted earlier, the distribution of tax avoidance varies widely.[22] Over the past decade, researchers have published numerous studies attempting to explain this variation, with some progress. Nevertheless, researchers typically report adjusted R-squared statistics between 5 percent and 20 percent, suggesting that the bulk of the variation remains unexplained. For example, even

[21] Additionally, the largest 100 domestic firms in each year were matched to the multinational firm that was closest in size in the same year. The unreported results again suggest that large domestic firms and large multinational firms have similar levels and trends in *CASH ETR*. Again, in unreported results with similar conclusions, this exercise was repeated, but with the matched firm required to come from the same industry (using the Fama French 30 industry classification).

[22] As shown earlier, *CASH ETR* displays significant variation. Other proxies for tax avoidance (for example, GAAP ETR, book-tax differences, permanent book-tax differences) also display significant variation.

with a full set of firm- and manager-fixed effects, Dyreng, Hanlon, and Maydew (2010) report an adjusted R-squared of at most 24 percent when examining one-year *CASH ETR*, while Chen, Chen, Cheng, and Shevlin (2010) in their study of family firms report an adjusted R-squared between 12 percent and 20 percent.

Despite difficulty explaining the variation in *CASH ETR* (and GAAP ETRs) overall, researchers have identified numerous factors that are correlated with *ETRs* (however defined).[23] First, several studies illustrate the effect of executive compensation packages on tax avoidance. Rego and Wilson (2012) report evidence consistent with a positive association between stronger equity risk incentives for the manager (designed to encourage the manager to take on risky projects) and tax avoidance (using various measures, one of which is CASH ETR), consistent with tax-avoidance activities being risky investments. Phillips (2003) finds that compensating business unit managers on an after-tax basis is correlated with lower effective tax rates, and Armstrong, Blouin, and Larcker (2012) report that the tax director's incentive compensation is correlated with GAAP effective tax rates (rather than cash taxes paid), suggesting the importance of reported earnings numbers.

Not only do explicit managerial incentives affect tax avoidance, so do the managers themselves. In other words, compensation packages incent behavior but the managers themselves matter, separate from the firms, firm characteristics, and incentives. Dyreng, Hanlon, and Maydew (2010) find evidence that individual managers affect tax avoidance (that is, a manager fixed effect for tax avoidance), but the authors cannot isolate any particular factor that explains why (for example, age, education, power, and so forth). Subsequent research reports evidence consistent with some attributes of the executives mattering such as prior military service (Law and Mills,

[23] The numerator of a GAAP ETR is tax expense rather than cash taxes paid.

2017), personal tax aggressiveness (Chyz, 2013), religious social norms (Dyreng, Mayew, and Williams, 2012; Boone, Khurana, and Raman, 2013), civic mindedness (Hasan, Hoi, Wu, and Zhang, 2017), social connections (Brown and Drake, 2014), and political preferences (Francis, Hasan, Sun, and Wu, 2016).

Managers are also concerned with financial accounting earnings, and often appear to favor reporting high accounting earnings, even if this means paying more cash tax. For example, Erickson, Hanlon, and Maydew (2004) study firms that were accused by the SEC of overstating financial accounting earnings and were subsequently required to restate their financial results to remove the overstatement. By comparing restated financial results to the original overstated amounts, the authors find that the average firm in their sample paid eleven cents in cash taxes for an additional one dollar of overstated financial accounting earnings.[24] Graham, Hanlon, and Shevlin (2011) survey tax directors and report evidence that 1) top management at public firms often place more weight on GAAP effective tax rates than on cash taxes paid and 2) the impact of repatriating foreign earnings on financial accounting income is an important determinant in the repatriation decision. Blouin, Krull, and Robinson (2012) use archival data and report evidence consistent with Graham, Hanlon, and Shevlin (2011).

The relationship of additional firm characteristics and tax avoidance has also been examined. For example, Badertcher, Katz, and Rego (2013) report evidence consistent with managers of closely held firms being more risk averse, and consequently avoiding less tax. This finding is consistent with Chen, Chen, Cheng, and Shevlin (2010) who interpret their evidence as suggesting that family firms avoid less tax. In addition, McGuire, Wang, and Wilson (2014) study firms with dual-class ownership structures and find that as the wedge between voting rights and

[24] For more on this issue see Shackelford and Shevlin (2001) and their review of the book-tax tradeoff literature, including accounting method choice decisions, disqualification of incentive stock options, and other firm decisions.

cash flow rights increases, tax avoidance declines. However, the results need to be interpreted with care. The measures of tax avoidance employed in many of these studies were not designed to be employed across public and private firms nor perhaps across firms with otherwise different ownership structures. The measures are usually some type of effective tax rate—cash taxes paid or income tax expense dividend by pre-tax accounting earnings. As discussed, cash effective tax rates only capture non-conforming avoidance, meaning tax avoidance that lowers taxes paid but does not lower pre-tax accounting income. It is plausible that private firms and firms with otherwise lower capital-market pressures would be willing to engage in conforming tax avoidance (that is, the type that also lowers pre-tax accounting earnings). Thus, comparing effective tax rates across firms with different ownership structures, and thus, different capital-market pressures cannot be interpreted in the same manner as comparing effective tax rates across a sample of publicly traded firms. Effective tax rates are likely not as good a measure of tax avoidance in private firms (Hanlon and Heitzman, 2010).

Rego (2003) examines economies of scale and multinationality as determinants of GAAP effective tax rates.[25] Using data from 1990 to 1997, Rego (2003) finds that larger firms have higher GAAP effective tax rates, consistent with the political costs argument from Zimmerman (1983). Holding firm size constant, Rego (2003) also reports that firms with higher incomes have lower GAAP effective tax rates, consistent with the marginal benefit of tax avoidance increasing with profitability. Finally, Rego's results are consistent with multinational firms having lower GAAP effective tax rates than purely domestic firms, holding size and income level constant. In addition, Rego's evidence also suggests that multinational firms with more extensive foreign operations

[25] GAAP effective tax rates are calculated as income tax expense per the financial statements divided by pretax income per the financial statements, where the financial statements are computed according to Generally Accepted Accounting Principles (GAAP).

have lower GAAP effective tax rates than multinational firms with less extensive foreign operations, consistent with economies of scale for tax planning.[26]

Markle and Shackelford (2012 and 2013) study multinational companies from around the world, not just the United States. The authors document that Japanese and US multinational corporations have the highest GAAP effective tax rates while multinationals based in tax havens have the lowest. However, they find little difference between the effective tax rates of domestic and multinational firms. They also find that entering a tax haven is associated with subsequent declines in effective tax rates, consistent with Dyreng and Lindsey (2009).

Overall, the studies find that firms with more financial leverage, higher research and development expenses, more property plant and equipment, generally have relatively lower cash effective tax rates. Executives seem to matter though it is not clear what the executive does to lower rates. In terms of multinationality specifically, firms with more foreign earnings (especially in tax havens) are able to achieve relatively low tax rates and this effect is stronger when the firm is also more intangible in nature (for example, more R&D spending). Nevertheless, the overall effect of multinationality on tax avoidance remains somewhat mixed as some studies find that, when compared to domestic firms, multinational firms have lower rates (Rego, 2003), have similar rates (Markle and Shackelford, 2012) or higher rates (Dyreng, Hanlon, Maydew, and Thornock, 2017).[27]

Although researchers have documented that tax avoidance is correlated with a multitude of

[26] Interestingly, Rego motivates her study quoting Leblang's (1998) Tax Notes article which states that multinational corporations "…may have significantly greater opportunities to escape tax with respect to cross-border investments than with respect to strictly domestic investments." (page 181) and by quoting Collins and Shackelford's (1999) Tax Notes article which concludes that "…empirical findings in the area are insufficient and inconclusive and fail to support or undermine Leblang's assertions" (p. 131). Rego (2003) was an important paper in trying to reconcile these views, but the question still seems open today.

[27] We caution that these discrepancies could be driven by different time periods and differences in the research designs of the studies, and in particular driven by the fact that Dyreng, Hanlon, Maydew, and Thornock (2017) examine *CASH ETR*, while Rego (2003) and Markle and Shackelford (2012) examine GAAP effective tax rates.

factors, significant issues remain unresolved. First, it is difficult, if not impossible, to simultaneously study all the factors that have been shown to be correlated with tax avoidance. Thus, researchers have difficulty understanding just how much total variation in the tax-avoidance distribution can be explained. Additionally, researchers struggle to determine with confidence which factors are the primary drivers of the variation in tax avoidance because it is difficult to control for all known determinants of tax avoidance in a single model. Second, researchers commonly face problems of endogeneity, including both simultaneity and omitted correlated variables, and have had difficulty finding satisfying identification strategies. For example, R&D is correlated with tax avoidance, but it unclear if the tax benefits of engaging in R&D per se causes lower *CASH ETR*, or if firms that engage in R&D also have a greater ability and propensity to shift income to low-tax jurisdictions, resulting in lower *CASH ETR*. The reality is that both effects are probably occurring, but it is difficult to identify which matters the most. To date, researchers have not identified a "silver bullet" that explains the cross-sectional variation in tax avoidance. To the extent that tax avoidance arises through actions beyond idiosyncratic personality traits or business models, researchers likely will use advanced econometric techniques and identify clever natural experiments to improve the understanding of the cross-sectional variation in tax avoidance.

How Do Firms Avoid Taxes?

Though many studies identify characteristics of firms and managers that are correlated with corporate tax avoidance, researchers generally stop short of identifying the exact nature of the actions taken that caused fewer taxes to be paid. This is partly because of the myriad options available when considering how to avoid income taxes as well as the lack of required public disclosures about firms' tax situations. Indeed, as discussed, managers' tax planning can range

from using incentives clearly granted by statutory authority (for example, accelerated depreciation deductions, interest deductions, tax exempt municipal bond interest) to illegal tax evasion (for example, not reporting known taxable income), with many possibilities in between. This section identifies some of the known methods managers use to avoid taxes.[28]

Tax avoidance via provisions in the tax code

The tax code explicitly provides some methods of tax avoidance. For example, firms can take accelerated depreciation deductions on many types of capital assets and claim deductions for most types of interest paid. They can receive tax credits for certain research or experimentation, for investments in solar or wind energy, and for investments in low-income housing, among many other tax breaks. Each year, the US Department of Treasury identifies the cost associated with these tax breaks in a report on tax expenditures. In 2015, the government identified 169 different types of corporate tax breaks, with deferral of tax on foreign earnings, research and experimentation credits, domestic production activities deductions, and low-income housing investment credits among the largest.

One of the largest statutory tax deductions is for interest.[29] Firms that use debt financing instead of equity financing can reduce their tax payments. Researchers have long debated just how significantly this tax break affects corporate capital structure and other corporate behaviors. Early researchers hypothesized that firms with non-debt tax shields (for example, depreciation deductions) would employ less leverage, but they often found the opposite because firms with high non-debt tax shields often had high financing needs (large physical capital assets drive both large amounts of depreciation and large needs for capital financing).

[28] See Beer et al. (2018) for a discussion of international corporate tax avoidance methods and estimated magnitudes.

[29] Notably, the government does not include interest expense deductions on the list of corporate tax breaks.

In the 1990s, researchers made progress in estimating firm-specific marginal tax rates (Shevlin, 1990; Graham, 1996) which led to significant progress in documenting a relation between debt and taxes (Graham, 1996; Graham, 2000).[30] However, some questions remain because estimating marginal tax rates is notoriously complicated and fraught with measurement error (for example, Shevlin, 1990; Graham, 1996; Blouin, Core, and Guay, 2010), and because separating the effect of the marginal tax rate from other correlated factors can be difficult. For example, firms with low marginal tax rates are also more likely to experience existing or future losses, and are thus more likely to face higher bankruptcy costs and other frictions that make borrowing difficult. In addition, measuring leverage can be complicated. For example, financial reports do not capture some economic liabilities and other liabilities can be "off-balance sheet" for financial accounting but deductible for tax purposes (see Mills and Newberry, 2005).[31] However, overall, the evidence suggests an association between debt and taxes; but how important taxes are in corporate capital structure (that is, what order effect) is still an open question.

Some companies have also significantly reduced their cash effective tax rates by using stock-based compensation. Until 2004, companies were not required to record a financial accounting expense for stock option compensation, but received tax deductions for the intrinsic value (market price less the strike price) of the compensation at exercise.[32] This created situations where tax liabilities were reduced significantly, but financial accounting income was not affected,

[30] Shevlin (1990) and Graham (1996) focus on deriving firm specific marginal tax rates in contrast to the prior literature at the time. Auerbach (1983) estimated marginal tax rates on the earnings of corporate investments in plant and equipment. In addition, we note that 1) Altshuler and Auerbach (1990) examine and clearly describe the restrictions on the ability of firms to utilize tax losses and credits and 2) Devereux (1989) and Devereux, Keen, and Schiantarelli (1994) model and examine the effects of tax asymmetries on investment. Shevlin (1987, 1990) and Graham's work (starting with the 1996 paper) incorporate the insights and details about loss carryovers and credit utilization from these prior papers in developing the firm-specific marginal tax rates.

[31] See Hanlon and Heitzman (2010) and Graham (2008) for more complete reviews.

[32] This same amount is taxable to the employee as compensation in the same reporting period.

resulting in very low *CASH ETRs* for some firms.[33] Since 2004, firms have been required to record financial accounting expense for share-based compensation in the amount of the "fair value" of the compensation on the grant date, with the financial accounting expense typically being recorded over the vesting period. Even with this expensing, during some years with high stock market appreciation, the deduction for stock compensation can be significantly larger than the financial accounting expenses recorded, such that some firms still report a very low *CASH ETR*. In addition, while the prior accounting standards did not require the book-tax difference for options to be accounted for in income tax expense (instead the excess tax benefits were recorded in equity), current rules require the recording of a temporary difference related to the amount expensed for financial accounting and a permanent difference for any amount in excess of the compensation expense for financial accounting. As a result, income tax expense is now also lowered by any excess (for tax relative to book) deductions for stock options. Such an excess deduction for stock option compensation was likely the major factor that reduced Amazon's federal current tax expense to zero in 2018.[34]

Just because the aforementioned tax breaks are explicitly listed in the tax code, does not mean that they are without controversy. For example, significant grey areas arise when determining what qualifies as an interest payment (and therefore deductible) versus a dividend payment (and therefore not deductible)—for example, in hybrid debt-equity investments. Likewise, there is substantial room for disagreement over what qualifies as a research or experimentation expenditure that might qualify for a tax credit instead of a less-valuable deduction.

[33] But the GAAP ETRs were not affected. See Hanlon and Shevlin (2002) for an explanation of the prior accounting for income taxes when options were not expensed for financial accounting.

[34] See https://www.wsj.com/articles/does-amazon-really-pay-no-taxes-heres-the-complicated-answer-11560504602 for further information about Amazon. The deduction lowered tax payments for many companies in the 1990s during the dot-com bubble but these reductions were not reflected in income tax expense (see Hanlon and Shevlin (2002) and Graham, Lang, and Shackelford (2004)).

With almost every codified tax deduction, there is some scope for companies to reduce taxes by interpreting the law to their benefit. Moreover, some countries (and states) negotiate directly with companies and grant special tax rates or tax holidays. Chow, Hoopes, and Maydew (2018) report that about 9.7 percent of US public multinational firms reported participating in at least one tax holiday. Some special tax deals have recently been scrutinized, for example, the illegal state aid case brought by the European Union against Ireland and Apple.[35]

Tax avoidance via 'tax shelters'

In addition to favorable tax legislation, and the discretion allowed within those rules, companies also cleverly interpret the tax law to reduce tax payments. In the 1990s, some companies engaged in what became known as "corporate tax shelters" with colorful names and acronyms such as COLI (Corporate Owned Life Insurance), LILO (Lease-in, Lease-out) BOSS (Bond and Option Sales Strategy), and so forth. These strategies were technically legal but widely viewed as being contrary to the intent of the law. Often they were sold to clients by law firms, accounting firms, or investment banks. Many researchers and others have described and examined these shelters. (Prior research includes Bankman, 2004; Graham and Tucker, 2006; Hanlon and Slemrod, 2009; Wilson, 2009; and Brown, 2011.) The US Treasury analyzed the shelters in 1999, investigative reporters have written about them (Byrnes and Lavelle, 2003; Novack and Saunders, 1998), and there have been books—for example, Perfectly Legal (Johnson, 2003). While the nuances of these shelters is beyond the scope of this chapter, most of these transactions have been curtailed in recent years through increased penalties for taxpayers and advisors, and through more-thorough reporting to the IRS and to the public in required financial reports.

[35] See https://europa.eu/rapid/press-release_IP-16-2923_en.htm for a press release by the European Commission related to the case, and https://en.wikipedia.org/wiki/EU_illegal_State_aid_case_against_Apple_in_Ireland for a summary of events. See also Apple's 10-K at SEC.gov.

Tax Avoidance via Income Shifting

Income shifting is high on the menu of tax avoidance options available to multinational firms.[36] This method of tax avoidance for MNCs has attracted the most attention, thus this chapter devotes more attention to the method, including a discussion of the various magnitude estimates.

Firms shift income by strategically using intercompany transactions to recognize earnings in low-tax jurisdictions. These intercompany transactions generally involve payments for goods and services, known as transfer prices, or intercompany interest payments on internal debt. Transfer prices and intercompany interest rates are required when doing business as a multinational whenever transactions happen between related entities, but they are also subject to strategic manipulation by companies because the same decision makers control both sides of the transaction.

Current rules require that intercompany transactions take place at an arm's-length price—a price that would have been used if the parties to the transaction were unrelated. In practice, however, the arm's-length price is difficult to enforce because open-market prices are difficult to observe or simply do not exist for many goods, services, and financing transactions. For example, when an internet user in France clicks on an advertisement delivered by Google, it seems reasonable for Google's French subsidiary to pay a royalty for use of the Google search algorithm and other intellectual property; after all, the algorithm was likely developed by engineers located outside France. But, an open market does not exist for search algorithms, and hence an arm's-length royalty rate is unobservable and essentially nonexistent. Without an observable market price, Google necessarily makes assumptions about what the price should be, but those assumptions are influenced by Google's incentives, including the tax incentives. Thus, the theory of requiring an arm's-length price is sound, but perhaps in practice it is a difficult method of

[36] Income shifting has, at times, been important for other cross-jurisdictional tax avoidance, for example across states in the United States. This chapter focuses on cross-country income shifting.

mitigating income shifting.

Recognizing the limitations of arm's-length pricing in controlling tax-motivated income shifting in some cases, countries have erected a wide variety of additional barriers, known as anti-base erosion provisions. These barriers include limitations on interest deductibility, withholding taxes on dividends, royalties, and interest payments, taxes on passive income, and many others (including the base erosion and anti-abuse tax (BEAT) in the United States in the TCJA). These anti-base erosion provisions increase the cost of income shifting, thereby reducing its prevalence.

Because tax rules are generally created at the individual-country level, and different countries seek different objectives with their tax systems, the existing international tax landscape is disjointed and extremely complicated.[37] Some countries tax the earnings of resident companies regardless of where they are earned. Other countries tax only the earnings generated within the home country. Some countries define residence as the location of management while others define it as the location of incorporation. Some countries have wide bilateral treaty networks that enable tax-efficient movement of capital, earnings, and goods and services between the two countries; others do not have large treaty networks.[38] The ultimate outcome of the uncoordinated nature of the international tax landscape is that some companies have opportunities to create complex structures and clever intercompany transactions that cause these tax systems to interact in the company's favor.

Anecdotal evidence of income shifting is pervasive, and a few of those anecdotes are cited below to illustrate several strategies used by some US multinational companies.[39] First, some US

[37] Efforts around the world are currently underway to improve coordination of tax rules among countries, and thus change how global income is allocated and taxed.
[38] Many countries have made substantial changes to their international tax rules during the sample period studied.
[39] There are variations on the structures. For example, the foreign subsidiary may not own the intangible asset but rather license it from the parent company in some cases. For ease of discussion, only the relatively simple case for the transactions is presented.

multinational companies with valuable intangible assets such as patents, copyrights, or trademarks arrange their global organizations such that the intangible asset is owned by a subsidiary in a low-tax country.[40] The transfer of ownership (or some ownership rights) usually requires a taxable payment by the low-tax subsidiary to the high-tax entity at a "fair-market" arm's-length price. Thus, firms have an incentive to transfer ownership of intangible assets early in their life when their market value is low, or when market values are difficult to determine. For example, Uber transferred the rights to many of its intangible assets to foreign subsidiaries in the Netherlands in early 2013, shortly before a new round of venture capital financing increased the value of the company from $330 million to about $3.5 billion.[41] Once the low-tax subsidiary owns or controls the asset, it licenses the right to use it to other subsidiaries of the company located in other countries. Subsidiaries in these other countries (often with higher tax rates) pay royalties, license fees, or other compensation to the low-tax subsidiary each time they use the intangible asset owned by the low-tax subsidiary. As the value of the intangibles grows and they generate more income, these payments from the operating companies to the entity in the low-tax country grow. The payments to the entity in the low-tax country are generally tax deductible in the high-tax countries, thereby lowering, or even eliminating, the taxes owed to high-tax countries by entities in the high-tax countries. For example, Starbucks was accused of shifting income out of the United Kingdom by compelling its UK subsidiary to pay royalties for the Starbucks brand and business processes to its Dutch holding company. The net effect was that Starbucks reported no profits and paid no taxes in the United Kingdom, despite robust UK sales and claims by management to shareholders that UK operations were profitable. Like most of these cases, there are two sides to the story and

[40] In some instances, ownership is not transferred, but licensing rights are granted. In the text that follows, "owned" is used for simplicity, but actual transactions can take many forms.
[41] See https://fortune.com/2015/10/22/uber-tax-shell/ for additional details.

the truth is not clear-cut. Sales and financial accounting profitability do not determine tax liabilities; but rather the tax rules of the jurisdictions determine taxation. Starbucks claimed the tax planning was legal and it did not technically owe UK tax. Some argued that the case was brought on moral, not legal, grounds. Regardless of whether Starbuck's actions were legal or moral, it falls within this chapter's definition of tax avoidance (a reduction of cash taxes paid relative to financial accounting income). Additionally, the case illustrates that when the apparent economics do not align with taxation, journalists and regulators notice. Indeed, reporters and regulators have raised similar accusations against other well-known companies. These accusations seem to be bringing about real change in the perception of tax avoidance and the regulations around the world.[42]

Second, many US multinationals have been accused of using intercompany lending arrangements to strip earnings out of high-tax countries and report it in low-tax jurisdictions. In these arrangements, a subsidiary located in a low-tax country lends to a subsidiary in a high-tax country. The entity in the high-tax country pays interest on the loan, which is tax deductible in the high-tax country. The interest payments are taxable in the country where they are received, but because the lending subsidiary is generally located in a low-tax country, the overall company's tax bill is reduced. A recent example of a US MNC involved in income shifting using intercompany debt is Hess, Inc. Hess's Norwegian subsidiary borrowed from Hess's Dutch subsidiary at an unusually high interest rate. The high interest rate reduced income in Norway and increased income in the Netherlands where it was taxed at a lower rate than it would have been taxed in Norway. In 2017, the Norwegian government determined that the interest rate was not arm's length, and disallowed some of the deductions that the Norwegian subsidiary had claimed.

[42] For more on both sides of the Starbucks issue see Kleinbard (2013) and Worstall (2014) and Lawson (2012).

In some situations, complicated corporate structures are necessary for income shifting. Consider structures such as the Double Irish, or the Double Irish with the Dutch Sandwich that have been implemented by US companies (via Ireland) for the purpose of generating untaxed foreign earnings that is not immediately subjected to US taxation.[43] In general, the structures involve a cost-sharing agreement where the low-tax jurisdiction foreign subsidiary acquires intellectual property (IP) from the US parent company (either through a purchase or a licensing agreement).[44] The foreign subsidiary then shares in the cost to further develop the IP or to develop the market for the sales of the IP in other jurisdictions. As the foreign subsidiary bears risks and costs, it is entitled to the income from the sales of the product, effectively shifting the income (revenue and the shared costs) to the low-tax jurisdiction. This transaction is described in detail in Kleinbard (2011). Often in such strategies, the foreign earnings were ultimately recognized in other haven nations; giving rise to terms like the "Bermuda Black Hole" to describe the final destination of international profits of US multinational firms.

The examples above illustrate how international tax rules can incentivize firms to form complicated chains of ownership and intercompany transactions. Many of the structures require various subsidiaries and a series of intercompany contracts and payments. While many income-shifting anecdotes such have been identified in the popular press and by academic researchers and policy makers, researchers have struggled to systematically study income shifting on a large scale. As a result, the extent to which income shifting occurs (i.e., is it concentrated in a few sensational examples or is it more pervasive across firms) and the overall magnitude of income shifting are

[43] For discussions of these, see Kleinbard (2011) and Drucker (2010) for the Double Irish and Double Irish Dutch Sandwich. The Double Irish is no longer allowed but Ireland has replaced it with the Single Malt. See Coyle (2017) for a description of the Single Malt. The Capital Allowances for Intangible Assets (CAIA) (also known as the Green Jersey) is another strategy used in Ireland (for a description of the CAIA see (Ernst & Young (2017)).

[44] This initial transfer of ownership or control is a taxable transaction, with tax liability based on the purchase price or royalty payment of the transfer.

not yet reliably known.

By its nature, income shifting is not directly observable because the counterfactual, that is, what income would have been absent the income shifting, is not reported (or otherwise observable). As such, researchers must first estimate (using observable data) what earnings would have been had they not been shifted, and then compare this estimated quantity to reported income to infer shifted income. Thus, income shifting research is largely an exercise in estimating what earnings would have been if income were determined by economic factors of production, and testing to see whether the difference between actual earnings and estimated "as-if" earnings varies predictably with tax incentives to shift income.

Importantly, companies expand and operate overseas for many reasons that have nothing to do with taxes (location of customers, labor costs, natural resources, and so forth). At the same time, the evidence suggests tax rates playing a significant role in location decisions and income reporting. In addition to the academic studies discussed below, government reports provide evidence that is consistent with income shifting. For example, the Government Accountability Office (GAO) reported in 2008 that foreign operations of US multinationals in low-tax countries have income shares significantly larger than their share of other measures such as physical assets, compensation, and employment. The relation was the opposite for most of the operations in high-tax foreign locations. Furthermore, the US Treasury, in a study of transfer-pricing rules, examined the relation between controlled foreign corporation profitability and the statutory tax rate of the jurisdiction in which the controlled foreign corporation is located. Using tax filing data, the Treasury found an inverse relation between pre-tax profitability and tax rates. The evidence that some shifting likely occurs is pervasive. However, evidence that firms shift income does not necessarily mean they are doing any illegal tax planning. Many of the estimates, as described above

(and below), measure income relative to what would be expected based on the location of the factors of production. However, the tax laws do not compute taxation based on the factors of production (or formulary apportionment).[45]

There is a large academic literature on income shifting, including some early seminal work, that this chapter cannot fully cover (for example, Altshuler and Grubert, 2001; Altshuler, Grubert, and Newlon, 2001; Grubert, 2003; Harris, 1993). Grubert and Slemrod (1998) and Grubert (2003) were early papers that recognized the importance of intangible assets for income shifting. For example, Grubert (2003) uses Treasury corporate tax return files for 1996 and finds that income derived from R&D-based intangibles account for about half of the income shifted from high-tax to low-tax countries. Grubert (2003) also reports that R&D intensive subsidiaries engage in more intercompany transactions and thus have more opportunities to shift income. This chapter primarily focuses on more-recent studies that attempt to quantify the shifting and also the studies that examine the determinants and the consequences of income shifting.

Estimating Income Shifting Using Macroeconomic Data

In one line of studies, researchers use macroeconomic data to estimate income shifting. One early example is Hines and Rice (1994). They aggregate data at the country level and estimate variations on a model that takes the general form of

$$\log \pi_z = \beta_1 + \beta_2 log L_z + \beta_3 log K_z + \beta_4 log A + \beta_5 \tau_z + v_z, \quad (2)$$

where π_z is the sum of profits of all non-bank subsidiaries of US parent firms in country z, L_z is labor input in country z, K_z is capital input in country z, A is a measure of the productivity of economic activity in country z, and τ_z is the country's tax rate. If reported earnings arise through the application of economic factors of production (that is, capital, labor, and country productivity),

[45] See also Joint Committee on Taxation (2010).

and taxes are not an economic factor of production, then the tax rate should not affect earnings. However, taxes might explain reported earnings if firms use intercompany transactions to report income in jurisdictions different from where it was economically generated. Hines and Rice (1994) conclude that high tax rates reduce reported profits and that firms strategically shift earnings to low-tax countries to reduce their tax.

Other researchers have studied income shifting using macroeconomic data, including most recently Clausing (2020), Wright and Zucman (2018), and Torslov, Wier, and Zucman (2018). Clausing (2020) uses data, from the US Commerce Department's Bureau of Economic Analysis (BEA), on direct investment earnings to infer income shifting. She first provides evidence consistent with direct investment earnings being sensitive to the tax rate on those earnings (higher tax rates are correlated with lower direct investment earnings). She estimates that income shifting by US multinationals reduced tax revenue collections by about $100 billion in 2017. As mentioned, estimating income shifting is important but very difficult work, and there is no consensus in the literature of the economic magnitude of the problem. In recent work, for example, Blouin and Robinson (2019) argue that recent estimates of income shifting and revenue losses using macroeconmic data from the BEA are overstated due to double counting of some earnings.

Moreover, based on a simple back-of-the-envelope calculation, the estimate of $100 billion in Clausing (2020) seems high. Consider that the sum of all foreign profits of publicly traded US multinational firms in 2017 was $513 billion.[46] Thus, if publicly traded US multinational firms paid no tax at all to foreign governments on their earnings in 2017, then an upper bound of lost tax revenue would be 35 percent of $513 billion, or about $180 billion. But, it is also the case that

[46] The sum of $513 billion was calculated by adding all pretax foreign income (Compustat data item PIFO) of US-incorporated firms with positive values of assets at the beginning of the period, positive revenues, and nonmissing values of cash taxes paid, pretax income, pretax foreign income, and foreign current tax expense (Compustat data items TXPD, PI, PIFO, and TXFO, respectively).

those same firms had a foreign current tax expense (which, as discussed above, is a rough proxy for taxes paid) of about $111 billion during that same year. That means, ignoring any foreign tax credit limitations, that about $69 billion in tax revenue was lost ($180 billion minus $111 billion). While it is possible that the discrepancy could be accounted for by private firms shifting income to low-tax foreign jurisdictions, it seems unlikely that the discrepancy could be so large.

Using a different approach, Torslov, Wier, and Zucman (2018) compare the profit-to-wage ratios of foreign firms to the ratios of local firms. They estimate that 40 percent of the foreign profits of multinational firms were shifted to tax havens in 2015. In a related study, Wright and Zucman (2018) argue that 60 percent of the foreign profits of US multinational firms were in tax haven affiliates in 2015. This estimate also seems very high when compared to data derived from publicly available financial reports. Publicly traded US multinational firms recorded pretax foreign income of $416 billion in 2015. Applying the Wright and Zucman (2018) estimate that 60 percent of foreign income (or $250 billion) was recognized in a tax haven (where presumably the tax rate is zero or very low), the remaining 40 percent (or $166 billion) would have been taxed at a rate of 59 percent to account for the approximately $98 billion in foreign current taxes recorded by these firms to foreign governments, a far higher rate than the OECD average statutory tax rate of about 25 percent in 2015. While it is plausible that a few companies recognized very large profits in tax havens, it seems unlikely that 60 percent of the foreign earnings of the typical US multinational firm were recognized in a tax haven. In sum, while the evidence based on macroeconomic data suggests there is income shifting, the extent of the issue and magnitude of the income shifted is very much an open question.

Estimating Income Shifting Using Microeconomic Data

Because there are inherent limitations to research on income shifting using macroeconomic

data, researchers have also employed firm-level data to estimate the magnitude of income shifting and study the factors associated with it.[47] Early work by Collins, Kemsley, and Lang (1998) examines the foreign profits of US multinational firms relative to the same firms' consolidated worldwide profits. During their sample period, some foreign countries had higher statutory corporate tax rates than the US statutory corporate tax rate. The authors report evidence consistent with abnormally high US profits for firms that have relatively high foreign tax rates. The authors interpret the evidence as being consistent with tax-motivated income shifting into the United States. Their estimates imply that for each percentage point difference between the foreign tax rate and the US tax rate, 1 percent of income is shifted for tax purposes. Using essentially the same methodology, Klassen and Laplante (2012) estimate that from 2005 to 2009, US multinational firms shifted $10 billion of income more per year *out* of the United States than from 1998 to 2002.

Huizinga and Leaven (2008) extend Hines and Rice (1994) by applying the Hines and Rice (1994) method to firm-level data (usually from public sources concentrated in Europe) instead of country-level data. In addition, the authors developed a new proxy for the tax incentives to shift income that takes into account all of the statutory tax rates of the firm's subsidiaries simultaneously, and varies for each of the firm's subsidiaries each year (but includes only subsidiaries and tax rates of countries of subsidiaries included in their data). Huizinga and Laeven (2008) primarily study the economic magnitude of income shifting and find that a decrease of the statutory tax rate of 1 percentage point increases reported profits in the country by less than 1

[47] When using macroeconomic data to estimate income shifting, researchers face limits on the conclusions they can draw. For example, macroeconomic data series are often difficult to compare across countries because variation in calculations driven by cultural or political climates, researchers can struggle to make precise estimates of income shifting. Moreover, because the data arises at an aggregated level, researchers using macroeconomic data are unable to determine the characteristics of companies that are associated with income shifting, how many companies shift income, and what organizational or operational consequences might follow the choice to shift income.

percent in many countries, a semi-elasticity that is similar to that reported by Collins, Kemsley, and Lang (1998). Overall, they report an average semi-elasticity of about 1.31, but the estimate varies significantly depending on the empirical specification.

Dharmapala and Riedel (2013) use a different approach to identify income shifting. They first identify exogenous shocks to the income of parent firms and then trace the shocks through to affiliates of the firm. They find evidence that shocks to income at the parent firm are more likely to manifest in higher reported profits in low-tax affiliates than in high-tax affiliates, suggesting tax-motivated income assignment. Davies, Martin, Parenti, and Toubal (2018) examine French firm-level data on export prices to both related affiliates and to unrelated third parties. The authors find evidence that tax avoidance through transfer pricing is large and that the activity is concentrated—most of it is driven by exports of 450 firms to ten tax havens.

Although many recent income-shifting studies use affiliate-level (micro) data, the data have some weaknesses. First, publicly available datasets (for example, data from the Bureau van Dijk Amadeus database (BVD)) generally do not contain detailed affiliate-level data on the financial results of the entire firm. Instead, information about some parts of the firm exist in reasonable levels of detail (for example, European subsidiaries), while information about other parts of the firm is almost non-existent (for example, Asian subsidiaries, tax havens outside of Europe (the Cayman Islands, Bermuda, and so forth)). This compels researchers to make estimates by examining only a fraction of the firm's geographic footprint that is not randomly selected, but possibly is correlated with key variables such as a country's tax status. An example of this problem is highlighted by Torslov, Wier, and Zucman (2019). Torslov, Wier, and Zucman (2018) discuss micro data and its problems to explain their use of macro data. They state that of the more than $50 billion in consolidated profits reported by Apple in 2016, only about $2 billion can be

identified in Apple's subsidiaries using publicly available data sources commonly used to apply the Huizinga and Laeven (2008) model (which is an affiliate-level model). They argue that this discrepancy suggests that estimates calculated using publicly available micro-level data generate unreliable point estimates because the data cover such a small fraction of some firms. We note that while the lack of complete coverage by the BVD database is concerning, some researchers have developed clever techniques to minimize the effect of the incomplete data problem (for example, Dharmapala and Riedel, 2013).

Second, and related to the first, because BVD data (commonly used in firm-level and affiliate-level) income-shifting studies only provide a partial view of the entire firm, researchers cannot easily track the flow of funds. In principle, one advantage to such micro-level data is that it can be used to observe subsidiaries with abnormally low earnings and corresponding subsidiaries with abnormally high earnings, and thereby determine the flow of funds within the firm. Unfortunately, with such sparse data, such estimates are difficult.

Finally, some researchers have used consolidated public filings for US multinational firms, which contain earnings numbers that are disaggregated to show domestic and foreign components (for example, Dyreng and Markle, 2016; Klassen and Laplante, 2012). These data are advantageous because they include all of the firm's earnings, but they come at a major cost. They do not contain detailed information on the specific countries where the earnings were reported. Thus, using these data, researchers are forced to examine only shifting into or out of the United States, but cannot examine shifting from one subsidiary to another within the same family group, nor can they identify which tax haven countries receive the shifted income.

Overall, and with the above data limitations in mind, the estimated magnitude of income shifting using firm-level (or affiliate-level; microeconomic) data is generally smaller than the

estimated magnitude using country-level (macroeconomic data) data (Dharmapala, 2014). Indeed, Heckemeyer and Overesch (2013) systematically evaluated the elasticities estimated in 27 unique empirical studies, most of which used microeconomic data, and found that the consensus elasticity is about 0.8, which is significantly smaller than the elasticities typically found in studies that use macroeconomic data.[48]

Summary of Income Shifting Literature

The weight of the evidence is consistent with firms shifting income away from high-tax countries into low-tax countries. The evidence is consistent with this outcome across studies that employ public and private data, macro and micro data, and with a variety of techniques. Nevertheless, these same studies report widely varying estimates of the magnitude of the phenomenon. Thus, the extent to which income shifting occurs is still debated and is still an open question. More progress will (hopefully) be made as additional data become available, by conducting tests as tax rules change, and as econometric techniques advance.

Tax avoidance via location decisions regarding investment, incorporation, and debt

Multinational firms can also go beyond merely shifting reported income to different locations; they can reduce their tax bill by relocating real activities. Indeed, the two actions are not mutually exclusive. Firms make location decisions based on many factors, taxes being one. Once

[48] The Huizinga and Laeven (2008) approach has been widely adopted in recent years to examine specific questions regarding the association of income shifting and other firm outcomes. As examples, Markle (2016) estimates that multinational firms subjected to territorial tax regimes appear to shift more income than multinational firms subjected to worldwide regimes; Dischinger, Knoll, and Riedel (2014) report evidence suggesting firms are biased toward recognizing profits in the country of their headquarters; and De Simone, Klassen, and Seidman (2018) report some evidence that income shifting is negatively related to investment efficiency. In addition, De Simone (2016) provides evidence that the adoption of International Financial Reporting Standards increases estimated income shifting. The evidence suggests that a mechanism behind this result is that the standards created cross-jurisdictionally comparable financial statements, and therefore allow firms to draw from a larger pool of observations when justifying profit margins to demonstrate compliance with arm's-length standards. See also Bilicka (2019). Bilicka (2019) examines UK administrative data and compares UK subsidiaries of foreign multinationals to domestic-only UK companies. Her evidence is consistent with multinational subsidiaries having a lower ratio of taxable profits to assets in the United Kingdom than domestic-only companies in the United Kingdom.

an investment is made in a low-tax jurisdiction it is likely that opportunities for tax avoidance (for example, income shifting) expand. In addition, if a firm engages in income shifting, sometimes structural changes (for example, local investments) are required to support the income shifting (a type of feedback effect).

The most straightforward action is that firms will locate investment in low-tax jurisdictions. Indeed, the literature finds that a decrease in a country's tax rate leads to an increase in foreign direct investment. DeMooij and Ederween (2003) conducted a meta-analysis and concluded that across the outcomes in the twenty-five studies they analyze, the median value of the tax elasticity is around minus 3.3; a 1 percent reduction in the host-country tax raises foreign direct investment in that country by 3.3 percent.[49]

Studies on the recent "innovation- or patent-box" regimes, which provide lower effective tax rates on income derived from intellectual property, report some evidence that firms change the location of patents and also capital expenditures (see Böhm, Karkinsky, Knoll, and Riedel, 2015; Bradley, Dauchy, and Robinson, 2015; and Bradley, Robinson, and Ruf, 2018, and others) when innovation-box legislation becomes effective, suggesting that lower tax rates attract investment.

Companies can also change their tax residence to a low-tax jurisdiction, an action sometimes known as a tax inversion. The goal of an inversion is generally to escape US taxation on foreign earnings and to strip income out of the United States via deductible payments from the US entity to the new foreign "parent" (for example, interest). There have been waves of inversions,

[49] DeMooij and Ederween (2003) provide an excellent summary of the literature. Hines (1997 and 1999) reviews the US literature and finds that a 1 percent higher tax rate on companies leads to a reduction in inbound investment of around 0.5 percent and 0.6 percent. See also Hassett and Hubbard (2002) a comprehensive review on taxes and investment. For some other important papers see Desai and Hines (1999), Barrios, Huizinga, Laeven, and Nicodeme (2012), Hebous, Ruf, and Weichenrieder (2011), Becker and Riedel (2012), Becker, Fuest, and Riedel (2012). Note, however, that the literature has, at times, had a difficult time documenting that aggregate investment responds to taxes, so much so that Hines and Park (2019) state that "The apparently small power of tax incentives to stimulate aggregate investment spending is one of the puzzles of the empirical investment literature."

in the United States and in other countries as well (specifically the United Kingdom before they became a more tax-favorable jurisdiction). The United States has countered with increasingly strict tax rules that make inversions less beneficial and the TCJA, based on the evidence so far, seems to have stopped inversions out of the United States.

There was a significant inversion wave from the late 1990s through 2001. Inverting firms during this period would often state that part of the reason to invert was to save taxes. For example, Ingersoll-Rand stated that it expected to save $40 million a year and Cooper Industries expected to save $55 million a year in US taxes (Cloyd, Mills, and Weaver, 2003). Another wave of inversions occurred in the mid-2010s. Pfizer tried to invert in 2015 (via merging with Allergan) but the US government implemented rules to stop the transaction. Seida and Wempe (2004) examined inverting firms' effective tax rates and showed that they do indeed decline after inversions. Several studies looked at the market reaction to inversion announcements during the earlier wave (Cloyd, Mills, Weaver, 2003; Desai and Hines, 2002) and found somewhat mixed evidence with Cloyd, Mills, and Weaver (2003) finding no statistical market reaction to inversion announcements, but Desai and Hines (2002) finding a small positive market reaction to inversion announcements.

Finally, firms can also locate financial debt capital in foreign locations to take advantage of tax treatment and tax rules and use debt location to shift income. Newberry and Dhaliwal (2001) provide evidence that US multinationals allocate debt based on jurisdiction-specific tax loss carryforwards and foreign tax credit considerations. Furthermore, Huizinga, Laeven, and Nicodeme (2008), Egger, Keuschnigg, Merlo, and Wamser (2014), and Buettner and Wamser (2013) provide evidence for European firms of tax-motivated income shifting via debt. Fuest, Hebous, and Riedel (2011) examined income shifting via debt in developing countries and provide

evidence that the effects are larger than in developed countries.[50]

Thus, firms can choose to locate their investment, place of incorporation, and debt across the globe in a manner that will save taxes. Setting up such structures often enables income shifting to occur and then sometimes income shifting requires a further commitment for real investment offshore.

Consequences of Tax Avoidance

Beyond simply documenting the existence of tax avoidance (for example, shifting income and changing real behavior to lower taxes), and attempting to estimate the economic magnitude of the phenomenon, researchers have examined many subsequent economic outcomes associated with tax avoidance. The research that has examined some of the significant consequences of tax avoidance by US multinational firms is discussed below.

Consequences: Lost Revenues

The most obvious consequence of tax avoidance is that governments around the world lose revenue. Estimates of just how much are difficult to compute with much reliability because, of course, the revenue that would be raised in a no-tax-avoidance world is unknowable. In addition, tax incentives can potentially raise revenue for governments and even perhaps provide other valuable economic benefits such as increased investment and employment. The value of those benefits would need to be estimated and offset against lost revenue. As discussed above, the magnitude of lost revenue from tax avoidance of any type, including income shifting, is unsettled.[51]

[50] For other studies see Desai, Foley, and Hines (2004) and Buettner, Overesch, Schreiber, and Wamser (2012).

[51] In addition to the academic studies discussed above, we note that as part of the Base Erosion and Profit Shifting Project, the OECD published an estimate of $240 billion for the global annual revenue loss due to income shifting (https://www.oecd.org/tax/beps/). Likewise, the IMF reported that in 2013 more than $400 billion of tax was lost for OECD countries and $200 billion for non-OECD countries (Crivelli de Mooij and Keen, 2016).

Consequences: Pre-TCJA "Trapped Cash" and its Effect on Corporate Capital Structure, Payout Policy, and Investment

As discussed, many tax-avoidance strategies of multinationals included moving operations and investments to low-tax jurisdictions and income shifting to low-tax jurisdictions. As investments were made in low-tax foreign jurisdictions and income was shifted to low-tax foreign jurisdictions, US companies had earnings and cash in those jurisdictions that would be subject to the relatively high US tax rate if repatriated to the United States. As a result (at least in part due to the US tax), US multinationals had large and growing cash balances in foreign entities (Foley Hartzell, Twitman, and Twite, 2007). In other words, the companies had what came to be known as *trapped* cash.[52]

Effect of 'Trapped Cash' on Capital Structure and Payout Policy

Many anecdotes suggest that US firms increased US borrowing because they did not have access to their foreign cash. For example, back in 1993 Apple Computer Inc. (now Apple Inc.) was preparing to issue $500 million in debt and was being questioned about why it needed to issue debt. The company responded that it was considering issuing debt to pay for new research and development facilities. Analysts at the time noted that the situation was unusual because Apple had more than $1 billion in cash on hand and no long-term debt obligations. The investor relations spokesperson for Apple at the time, Bill Slakey, responded that Apple was reluctant to draw on its cash reserves because much of the cash was outside the United States and repatriating it would produce a significant tax bill (Weber, 1993). Potentially even more costly than issuing debt, a few years later Apple considered merging or selling itself to Sun-Microsystems because its "financial condition was worsening." Apple noted that its board contemplated the merger as potentially

[52] Harford, Wang, and Zhang (2017) provide evidence consistent with shareholders valuing foreign cash less than domestic cash because the firm will face repatriation taxes on foreign cash, and because the agency costs of foreign cash appear to be higher than domestic cash.

"…the best way to save the company, which is facing a cash crunch to pay future restructuring charges and an upcoming debt payment." An analyst from Brown Brothers Harriman said that Apple had $1.1 billion in cash, but most of it was in foreign subsidiaries. He stated, "If they were to draw it out it would be subject to taxation. It's liquid, but it's like drawing money from a 401K (retirement plan) or something" (Poletti, 1996).[53] Several academic studies support the idea that many US firms borrowed in the United States to fund US operations and payouts. [54] For example, Graham, Hanlon, and Shevlin (2010), in a survey of tax executives, report that nearly 45 percent of firms stated they borrow money in the United States to avoid the repatriation tax. Beyer, Downes, and Rapley (2017) examine internal capital market inefficiencies (for example, the repatriation tax) and how such inefficiencies affect payout policy and corporate leverage. The authors conclude that domestic cash is a typical determinant of payouts, but that increases in foreign cash are also significantly associated with shareholder payout for investment-grade firms that can borrow. In a related paper, De Simone and Lester (2018) find that firms with large foreign cash balances have relatively high domestic debt.

Effect of 'Trapped Cash' on Investment

Researchers have also examined the effects of tax-avoidance behavior and trapped cash on investment. Faulkender and Petersen (2012) find that financially constrained firms appear to forgo domestic investments because of the frictions repatriation taxes create in internal capital markets. Hanlon, Lester, and Verdi (2015) investigate the merger-and-acquisition activity (and capital expenditures and R&D) of firms with large amounts of trapped cash due to the repatriation tax.

[53] This example is from Graham, Hanlon, and Shevlin (2010). Apple issued an additional $17 billion in debt in 2013 and again had to explain to the market why it was borrowing even though it had so much cash on its balance sheet. The Wall Street Journal (Burne and Cherney, 2013) stated, "Apple has a huge cash stockpile, but much of its money is overseas. Raising cash in the bond market helps Apple avoid the big tax bill that would hit if the company brought its cash back to the U.S., executives said last week."

[54] See also Altshuler and Grubert (2003) about repatriation taxes and financial policy at multinationals.

The authors examine whether the locked-out cash is associated with more foreign acquisitions (in other words, whether the cash is burning a hole in managers' pockets). They find that locked-out cash is associated with a higher likelihood of foreign acquisitions (as well as foreign capital expenditures and R&D spending), but not domestic acquisitions and capital spending. The authors also document a negative association between locked-out cash and the market reaction to a foreign deal, which they interpret as evidence the market views those acquisitions as less value-enhancing. Similarly, Edwards, Kravert, and Wilson (2016) examine the market reaction to foreign acquisitions and report evidence that firms with high levels of trapped cash make less profitable (measured as lower returns and lower return-on-assets after the transaction) acquisitions of foreign targets.

Bird, Edwards, and Shevlin (2017) examine acquisition behavior of foreign acquirers. The authors' evidence suggests foreign acquirers are tax-favored relative to US acquirers when the target company has substantial trapped cash. The hypothesis is that foreign firms can acquire US targets and avoid the US tax on the locked-out cash, whereas US acquirers cannot avoid the tax. The authors' results are consistent with their hypothesis.

Thus, the evidence suggests that, before the TCJA, investment and investment location were affected by tax-avoidance behavior and the resulting trapped cash of US multinational firms.

Consequences: Employment

Some evidence suggests that tax rates affect employment and some recent evidence suggests that tax avoidance affects both employment and the location of employment. Much of this work is conducted using data at the state level in the United States. For example, Giroud and Rauh (2019) use data from the US Census Bureau to examine whether state-level business taxation affects employment and capital. Their research design tests the responses of different

organizational forms to different tax rates. Their data span 1977 to 2011 and they find that increases in the state corporate tax rates are associated with fewer establishments and fewer employees at corporations, but not at businesses not taxed as corporations. Moretti and Wilson (2014) provide evidence that state-level subsidies for biotech employers is associated with significant increases in the number of star biotech scientists in that state. They also estimate that much of the response is due to the relocation of the scientists across state lines.[55]

The effect of tax incentives on labor in an international setting is even more lightly studied, likely due to the paucity of data. One example, however, is Williams (2018) who studies whether tax incentives explain job offshoring. He cites the congressional testimony of attorney Paul Oosterhuis of Skadden, Arps, Slate, Meagher & Flom (2013), who explained that, under the then-current transfer pricing rules, the party that bears the costs and risks in an arm's-length transaction is entitled to the bulk of the return. Hence, moving labor off shore, in some cases, supports the rights to the income in the offshore location (in other words, manufacturing had to follow the income shifting). Oosterhuis, in his testimony, attributed much of the loss of manufacturing (investment and labor) the United States to these tax incentives. Indeed, the outcome of manufacturing following income shifting was implied by the models presented in prior literature (for example, Hines and Rice (1994), Grubert and Slemrod (1998), and Gordon and Hines (2002)). Williams (2018) uses data reported by the Department of Labor's Trade Adjustment Assistance (TAA) program that covers 80,000 offshored jobs during his sample period, 2003 to 2009. Williams finds a negative association between the number of jobs offshored to a country and the corporate tax rate in that country. He finds significant cross-sectional variation in that firms where

[55] However, see Gale, Krupkin, and Rueben (2015) for a counter view that the economic effects of state tax rate changes on labor and capital spending are small and thus, cuts in state income tax rates will not necessarily generate growth.

the jobs are kept within the worldwide firm are much more likely to be responsive to tax rates as compared to instances when the jobs are outsourced to a third party.

Fuest, Peichl, and Siegloch (2018) examine data on corporate taxes imposed by German municipalities—the German local business tax (LBT) — to estimate how much of the corporate taxes falls on workers in the form of lower wages. This setting useful for several reasons, one of which is that the municipality determines the rate of tax but the base is determined at the federal level. In addition, there is substantial variation in rates and almost 18,000 changes (6,802 are used in their study) in tax rates across thousands of municipalities over their 20-year sample period. They conclude that wages decrease significantly after tax increases; indeed, they estimate that workers bear about half of the total tax corporate burden. Other results in their study suggest that wages are more sensitive to tax rates in more profitable firms, but at the same time, the wage effects are almost zero for very large firms, foreign-owned firms, and firms that operate in multiple jurisdictions. One possible explanation is that these firms can engage in more profit shifting to avoid the tax increase and thus there is no response in wages.

More recent evidence on the effects of tax provisions such as the domestic production activities deduction (DPAD) (Lester, 2019; Dobridge, Landefeld, and Mortenson 2019; Ohrn, 2018) is also informative. The DPAD was enacted as part of the American Jobs Creation Act in 2004. It allowed firms to deduct a portion of income related to domestic production when determining their US income tax liability; effectively equivalent to a 3.15 percentage point rate decrease on domestic manufacturing income. The evidence from the studies suggests that the DPAD increased capital expenditures by firms who claimed the deduction and that the increase in investment was greatest when the benefits of the tax provision were fully phased in.[56] In addition,

[56] Ohrn (2018) estimates that a one percentage point reduction in effective tax rates generated by the policy increases

the evidence suggests employment costs did not increase (and indeed decreased) after the tax cut in the DPAD. Thus, the lower tax rate on certain activities is associated with greater investment related to those activities and what seems like a substitution effect of capital for labor in that setting.

Consequences: Transparency and Shareholder Value

Several studies examine the hypothesis that having subsidiaries in tax-haven countries reduces transparency and drains shareholder value. Bennedsen and Zeume (2018) argue that tax havens enable managers to derive private benefits at the expense of shareholders because operating in tax havens creates opacity that allows managers to hide information from shareholders.[57] They argue that when tax-haven countries sign tax information exchange agreements (TIEAs), both transparency and shareholder value increase. They find that the value of firms with subsidiaries in tax-haven countries that sign TIEAs increases by 2.5 percent, suggesting that the benefits of transparency accrue to shareholders. These findings are consistent with Balakrishnan, Blouin, and Guay (2018), who provide evidence that aggressive tax planning is correlated with lower corporate transparency; with Hope, Ma, and Thomas (2013), who find that managers that engage in tax planning give less information about the location of their earnings in geographic segment disclosures; and with Durnev, Li, and Magnan (2016), who provide evidence that firms incorporated in tax havens trade at a discount.[58]

investment by 4.7 percent of installed capital, increases payouts by 0.3 percent of sales, and decreases debt by 5.3 percent of total assets.

[57] See also Desai, Dyck, and Zingales (2007) who examine the interaction between corporate taxes and corporate governance. The authors predict and find evidence consistent with the sensitivity to corporate tax changes varying with the quality of corporate governance.

[58] The literature also examines other effects. For examples, see Desai et al. (2003), who study direct versus indirect ownership and the sensitivity to tax, and Dyreng, Lindsey, Markle, and Shackelford (2015), who study ownership chains.

Why Not? What are the Constraints on Tax Avoidance?

So far, this chapter has presented data showing that, in the aggregate, multinational firms pay a substantial amount of income tax. However, it has also presented evidence suggesting a significant amount of tax avoidance is occurring, especially by firms with certain characteristics and managers, and that tax avoidance is increasing. A question that naturally arises is why firms do not avoid more taxes. In other words, what are the constraints on tax avoidance?[59] An easy answer is tax avoidance stops when the marginal costs exceed the marginal benefits. But, what are the costs?

Some limited evidence is available in the literature. For example, in their survey of tax executives in 2007, Graham, Hanlon, Shevlin, and Shroff (2014) asked the question, "Has your company ever considered but decided not to implement a tax planning strategy proposed and/or marketed by an accounting, law, investment, or tax consulting firm?" For those that answered yes, the authors asked, "What factors were important in your company's decision not to implement the tax planning strategy that was proposed?" Admittedly this is narrower than the general question posed in this section, but such an approach is necessary in survey questions and provides helpful insights nonetheless.

The responses are summarized in their Figure 1 and reproduced in this chapter's Figure 6. The data are presented separately in the figure for public firms and private firms. The factor attracting the most (86 percent of the sample) "important and very important" responses (a rating of 3 or 4 on a Likert scale from 0 to 4) was that "the transaction lacked business purpose and/or economic substance." Related, the factor that received the third most "important or very important" responses (62 percent) was "risk of detection by the IRS." Thus, the validity of the tax planning,

[59] See Weisbach (2002) for a discussion of the costs and benefits of tax shelters in particular.

whether the company will be caught, and whether the tax planning benefits would be retained are among the most important costs considered by firms.

The factors that received the second and fourth most responses concern the company's reputation. The second most important factor in limiting engaging in tax planning was "potential harm to your company reputation" (69.5 percent overall rated it important or very important; 72.2 percent of publicly traded companies did). The fourth most important factor was "risk of adverse media attention (for example, Wall Street Journal coverage)" with 57.6 percent of companies (60 percent of public companies) stating that this factor was "important or very important" at their company in limiting tax planning. Thus, reputation effects seem to be a significant deterrent to engaging in tax planning strategies.[60]

Another factor that attracted a high importance rating by at least a large minority of firms, was the financial accounting implications of tax planning. Figure 6 reveals that more than 50 percent of publicly traded firms considered the possibility of having to restate accounting earnings when deciding on a tax planning strategy. In addition, more than 40 percent of publicly traded firms cited two other factors that were important in their decisions not to engage in tax planning: 1) a negative financial accounting effect (that is, financial accounting earnings that had to be reduced to lower taxable income), and 2) and not being able to record the tax benefits for financial accounting (for example, a deferral strategy or if the strategy was too risky).

The authors asked another question to explore the financial accounting constraint further. The survey asked respondents, "At your company, when evaluating a tax planning strategy that saves cash taxes, how important is it that the tax planning strategy…(1) …does not reduce earnings per share (EPS) and (2) …leads to reporting a higher earnings per share (EPS)." Figure 7 presents

[60] For other studies on reputation and tax avoidance see Hanlon and Slemrod (2009) and Dyreng, Hoopes, and Wilde (2016).

the results from Graham, Hanlon, Shevlin, Shroff (2014; Figure 3). Seventy percent of the publicly traded firms responded that it was important or very important that the tax planning did not reduce earnings per share. Furthermore, more than 50 percent of the publicly traded respondents stated that it was important or very important that the tax planning strategy increased earnings per share. As would be expected, the importance of financial accounting is much lower for private firms.[61]

Thus, based on these data, important constraints on tax planning are the risk of detection, reputation effects, and financial accounting concerns. And there are certainly others. The constraints must be significant because, as mentioned, multinational corporations are paying a substantial amount of taxes.

Early Evidence on BEPS and TCJA

Earlier, this chapter replicated and extended Dyreng, Hanlon, Maydew, and Thornock (2017) through 2018. One advantage of extending the trends is that it enables an examination of the early effects of the TCJA, which lowered the corporate statutory tax rate in the United States to 21 percent beginning in 2018. As Figure 5 shows, both purely domestic firms and multinational firms had distinct drops in cash effective tax rates in 2018 (as also shown in Figure 2, Panel F). The decrease is particularly noticeable for purely domestic firms, probably because their entire incomes where subjected to the lower tax rates, while only a fraction of multinational firms' incomes benefit from the reduced rates. The remaining fraction of multinationals' income continued to be subject to the tax rates of the foreign countries in which they operated (and potentially subject to the new tax on global intangible low-taxed income in the United States).

[61] This differential between public and private firms demonstrates the importance of being careful in comparing public and private firms using measures such as an effective tax rate or cash effective tax rate or any similar measure that is a tax measure relative to an accounting measure. Private firms place much less weight on financial accounting earnings and thus the metrics are not comparable across the two types of firms.

Many researchers are studying the immediate effects of the TCJA. One early study by Hanlon, Hoopes, and Slemrod (2019) examined firm actions and firm disclosures about their actions in response to the TCJA. The authors find that, in their sample, 4 percent of firms disclosed worker bonuses or increases in wages and 22 percent disclosed that they would increase investment. The authors find an increase in share repurchases, but the increase (at that time) was concentrated in a small number of firms. Other studies examined the limitations on interest deductibility and the effect on corporate leverage (Carrizosa, Gaertner, and Lynch, 2019), the investment effects of the TCJA (for example, Beyer, Downes, Mathis, and Rapley, 2019), compensation effects (Luna, Schuchard, and Stanley, 2019), and stock-repurchase behavior (Bennet, Thakor, and Wang, 2019). Many of these studies are not fully vetted yet and the post-TCJA time series of data is limited.

Many articles also provide anecdotes, commentary, and institutional details about what is occurring and what might be expected after the TCJA. For example, Horst (2020) provides excellent insights into companies repatriating intangible property after the TCJA. In addition, Horst (2019b) provides preliminary estimates of the revenue effects of the TCJA, and Horst (2019a) describes the impact on GAAP ETRs for large companies.

The experience of other countries can offer insight into what to expect, namely the United Kingdom and Japan when they lowered corporate tax rates and moved to territorial systems (though neither country adopted exactly the same rules as the United States). One paper that studied the move to territorial taxation by the United Kingdom is Liu (2019). It reports evidence that the territorial tax reform increased the investment of UK multinationals in low-tax countries by almost 16 percent. Liu tests investment in high-tax countries by UK firms and investment within the United Kingdom by these same firms and find no statistically significant changes in either.

Thus, she concludes the change to a territorial regime led to more outbound investment by UK firms and more investment overall.

Hasegawa and Kiyota (2017) examine the repatriation effects of Japan's changes. They report evidence consistent with increased dividend repatriation, but in a varied way. Firms with large amounts of retained earnings were more responsive and increased repatriations more. Interestingly, the authors find that withholding tax rates on dividends became more important in the decision to repatriate after the law change.

Whether or not similar results will occur in the United States remains to be seen. Identifying the different effects of the TCJA will be difficult because many of the provisions in the TCJA affected all companies at once and many tax rules were changed at the same time. In addition, many other events were occurring roughly around the same time as the law change, such as tariffs and also international tax rules from the OECD.

Indirect Taxes

As mentioned, this study focuses on income taxes but businesses also pay substantial amounts in other taxes. Some examples include payroll taxes, property taxes, customs and export duties, tariffs, and extractive taxes. In addition, businesses are often responsible for collecting and remitting consumption taxes such as the state retail sales taxes in the United States and the value-added tax or goods and services tax in many other countries. While consumption taxes in theory are passed on to consumers, evidence suggests businesses bear part of these taxes.[62]

Firms are not required to make substantial detailed disclosures about indirect tax payments, which makes these taxes more difficult to study. A few companies, however, voluntarily disclose

[62] See Baugh, Ben-David, and Park (2018) who study the effects of the implementation of the "Amazon Tax."

information about indirect taxes. The Appendix presents a few examples, including disclosures from Verizon and Exxon Mobil. Panel A of the Appendix provides Verizon's disclosure on income taxes, employment taxes, and property and other taxes. In 2017, taxes other than income taxes accounted for about 40 percent of the total taxes paid by Verizon. In 2018, indirect taxes constituted nearly 55 percent of total taxes paid, which reflects the decline in the statutory corporate income tax rate from 35 percent to 21 percent. Panel B provides Exxon Mobil's disclosure. Exxon Mobil reports income and "other taxes and duties" (that is, indirect taxes) separately for those incurred in the United States and foreign countries. In 2016, the company reported US income tax expense of about negative $3 billion but positive US indirect taxes of $4.4 billion. In 2016, the company reported nearly $27 billion in indirect taxes in non-US jurisdictions constituting 91 percent of its total tax expense for the year. In 2018, the company paid nearly $5 billion in indirect taxes to the United States and more than $30 billion to non-US jurisdictions. Indirect taxes constitute 81 percent of total US tax expenses and 78 percent of the total non-US tax expenses.

As more companies provide Corporate Social Responsibility reports (CSR reports), Environmental, Sustainability, and Governance reports (ESG), and reports under the Extractive Industries Transparency Initiative (EITI), somewhat more disclosures about various taxes will become available. For example, Freeport-McMorRan, a mining company, issues a report entitled "Transparency of Government Payments" as part of its disclosures via the EITI. Its table from this report is in Panel C of the Appendix.

RioTinto, another mining company issues what is likely the most comprehensive set of disclosures. The company's thirty-three-page report in 2018, "Taxes paid: Our economic contribution," highlights that it paid $6.6 billion in global taxes and royalties to various

governments. It reports a global effective income tax rate of 28.6 percent for 2018 and a global effective tax rate of all taxes and royalties paid of 37.4 percent.[63]

Indirect taxes can also affect foreign affiliate investments and output (Desai, Foley, and Hines, 2004), and cross-border mergers (Herger, Kotsogiannis, and McCorriston, 2016). In addition, researchers have found that indirect tax benefits affect location decisions, and in some cases increase employment (for example, Greenstone and Moretti, 2003).[64]

In addition to affecting real investment decisions, researchers have also found evidence that firms attempt to avoid indirect taxes. Opportunities for tax avoidance arise because there are differences in the location of taxation—place of supply (destination) or place of incorporation (origin) for different goods and services, and sometimes differences based on whether the sale is digital. Using value-added taxes as an example, companies can channel sales through affiliates in low-VAT-tax countries and sell into higher-VAT-tax countries when the origin principle is applied. For example, Poniatowski, Bonch-Osmolovskiy, and Belkindas (2016) reported a "VAT Gap" (that is, under payment of VAT) of 159.5 billion euro in 2014. There is also evidence in the United States that online retailers, in contrast to brick-and-mortar retailers, avoid a taxable nexus when consumption taxes increase (Bruce, Fox, and Luna, 2015).[65]

[63] The report is too large to reproduce, but can be found at https://www.riotinto.com/documents/RT_taxes_paid_2018.pdf for interested readers.

[64] See also Jacob, Michaely, and Muller (2018) for a study of consumption taxes and investment more generally using a value added tax change in the Netherlands. The authors find evidence consistent with consumption taxes decreasing investment, especially so for firms facing more elastic demand.

[65] There is evidence regarding the elasticities of goods and how this benefited online retailers such as Amazon. When online sales required a sales tax to be charged, households living in the states where the sales tax increased reduced Amazon purchases by more than 9 percent and for large purchases by roughly 30 percent (Baugh, Ben-David, and Park, 2018).

Conclusions

This chapter reviews, and at times extends, the literature on tax avoidance by multinational firms and its effects. First, multinational corporations pay a substantial amount of taxes, both direct and indirect. Nevertheless, there is 1) evidence of tax avoidance via income shifting and 2) evidence that real investment, debt, and employment are sensitive to taxation. Naturally, the two effects are not independent of each other. As noted in Hines (2014), if shifting income were possible without accompanying real changes to investments, those real investments would be insensitive to taxation because the negative consequences of taxes could be eliminated by simply shifting income to a more-favorable jurisdiction. Instead, firms face complex investment problems where the optimal solution often results in distorted real activities and accounting choices relative to a world without taxes. In addition, the fact that multinational firms pay substantial taxes suggests that there are constraints on tax avoidance. Also, the data suggest a great deal of variation in tax avoidance, meaning some firms seem to avoid taxes over a long period while others do not. Prior literature has identified some factors associated with this variation, but to date no single factor has been identified as really driving tax-avoidance.

Multinational corporations, relative to domestic-only corporations can avoid taxes by shifting income to low-tax jurisdictions. The literature provides a plethora of evidence that income shifting occurs, but the extent to which it occurs is still an open question. It appears, based on the evidence and many sources of data, that some of the estimates of income shifting seem implausibly large. Improvements may be obtained if (when) future researchers invent new methods of estimating income shifting or when new data become available. Better estimates (and more agreement about the estimates) will be imperative in evaluating the recent tax policies of the United States, the European Union, and the OECD (barring other research design issues).

Finally, most of this chapter's evidence is about US multinational corporations in the pre-TCJA tax regime. During the period over which most the studies referenced in this chapter were conducted, the data suggests that tax avoidance begets more tax avoidance. Once a company sets up a tax-avoidance structure, future behavior generally must fit within or support the structure. In addition, one consequence of tax avoidance in the pre-TCJA period for a multinational firm was trapped cash in foreign subsidiaries that led to more US borrowing, more investment (capital expenditures and M&A) in foreign locations, and at times a higher likelihood of having the subsidiary acquired by a foreign company.

What will occur post-TCJA and after the anti-BEPS initiatives remains to be seen. Presumably, the rules aim to more effectively mitigate tax avoidance. But, in general, it seems likely firms will continue to try to maximize shareholder value by lowering costs, including tax costs. However, there is a movement toward viewing firms via a stakeholder lens rather than a shareholder-only lens. This movement—combined with large government deficits, concerns about income inequality, and pressure from activist organizations and the media about taxes—may lead to less tax avoidance. Separately, identifying all these effects—rule changes, social changes, and political changes, and most recently COVID-19 and related governmental responses—will be both challenging and important work.

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Appendix
Disclosures of Non-Income Taxes

Panel A – Verizon Communications

The amounts of cash taxes paid by Verizon are as follows:

		(dollars in millions)	
Years Ended December 31,	**2018**	2017	2016
Income taxes, net of amounts refunded	**$ 2,213**	$ 4,432	$ 9,577
Employment taxes	**1,066**	1,207	1,196
Property and other taxes	**1,598**	1,737	1,796
Total	**$ 4,877**	$ 7,376	$ 12,569

Panel B – Exxon Mobil

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

19. Income and Other Taxes

	2018			**2017**			**2016**		
	U.S.	**Non-U.S.**	**Total**	**U.S.**	**Non-U.S.**	**Total**	**U.S.**	**Non-U.S.**	**Total**
				(millions of dollars)					
Income tax expense									
Federal and non-U.S.									
Current	459	9,001	9,460	577	6,633	7,210	(214)	4,056	3,842
Deferred - net	518	(614)	(96)	(9,075)	754	(8,321)	(2,801)	(1,422)	(4,223)
U.S. tax on non-U.S. operations	42	-	42	17	-	17	41	-	41
Total federal and non-U.S.	1,019	8,387	9,406	(8,481)	7,387	(1,094)	(2,974)	2,634	(340)
State	126	-	126	(80)	-	(80)	(66)	-	(66)
Total income tax expense	1,145	8,387	9,532	(8,561)	7,387	(1,174)	(3,040)	2,634	(406)
All other taxes and duties									
Other taxes and duties	3,498	29,165	32,663	3,330	26,774	30,104	3,209	25,811	29,020
Included in production and manufacturing expenses	1,245	857	2,102	1,107	747	1,854	1,052	808	1,860
Included in SG&A expenses	153	312	465	147	354	501	133	362	495
Total other taxes and duties	4,896	30,334	35,230	4,584	27,875	32,459	4,394	26,981	31,375
Total	6,041	38,721	44,762	(3,977)	35,262	31,285	1,354	29,615	30,969

Appendix, continued
Disclosures of Non-Income Taxes

Panel C – Freeport-McMoRan

Cash Payments to Governments [a]
($ Millions)

For the year ended December 31, 2018	U.S.	Chile	Peru	Indonesia	Other Countries [b]	Total
Corporate Income Taxes, Net of Refunds	$ (3)	$ 16	$ 162	$ 705	$ 22	$ 902
Withholding Taxes on Foreign Dividends	-	2	1	182	-	185
Employee Payroll Taxes [c]	309	11	83	54	23	480
Dividends	-	-	-	148	-	148
Royalties and Net Severance Taxes	24	1	41	214	-	280
Property Taxes	81	-	-	17	2	100
Other Taxes and Fees [d]	52	13	68	207	(26)	314
Total	**$ 463**	**$ 43**	**$ 355**	**$ 1,527**	**$ 21**	**$ 2,409**

a. This schedule reflects a voluntary effort by Freeport-McMoRan to capture its cash payments to governments (net of refunds).

b. Represents cash payments to governments by Freeport-McMoRan's other business groups that are located outside of the countries where Freeport-McMoRan conducts its primary operations.

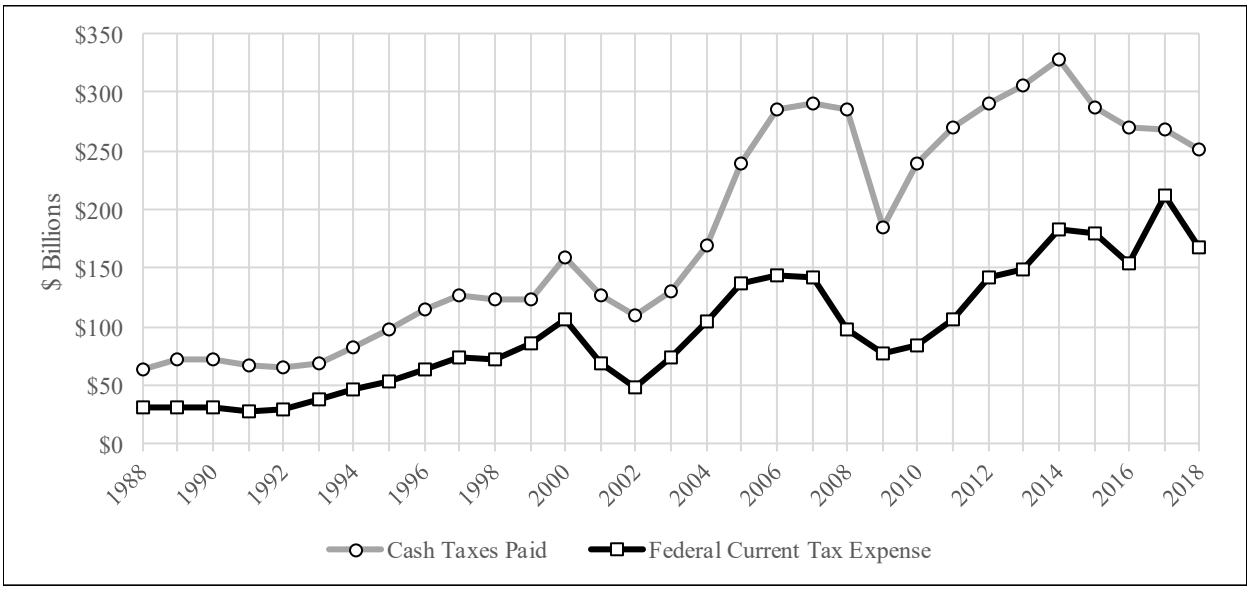
c. Includes payroll taxes collected on behalf of employees and paid to governments.

d. Includes customs and export duties, as well as withholding tax on foreign services.

Figure 1
Taxes Paid by Multinational Firms

Notes: The sample comprises all US-incorporated multinational firm-year observations in Compustat with beginning total assets (AT) of at least $10 million. Firm-years are defined as multinational if they report non-missing values of pretax foreign earnings (PIFO) or foreign tax expense (TXFO, TXDFO). In Panel B, GDP data was gathered from www.bea.gov.

Panel A: Sum of Taxes Paid Each Year between 1988 and 2018



Panel B: Sum of taxes paid scaled by US GDP each year between 1988 and 2018

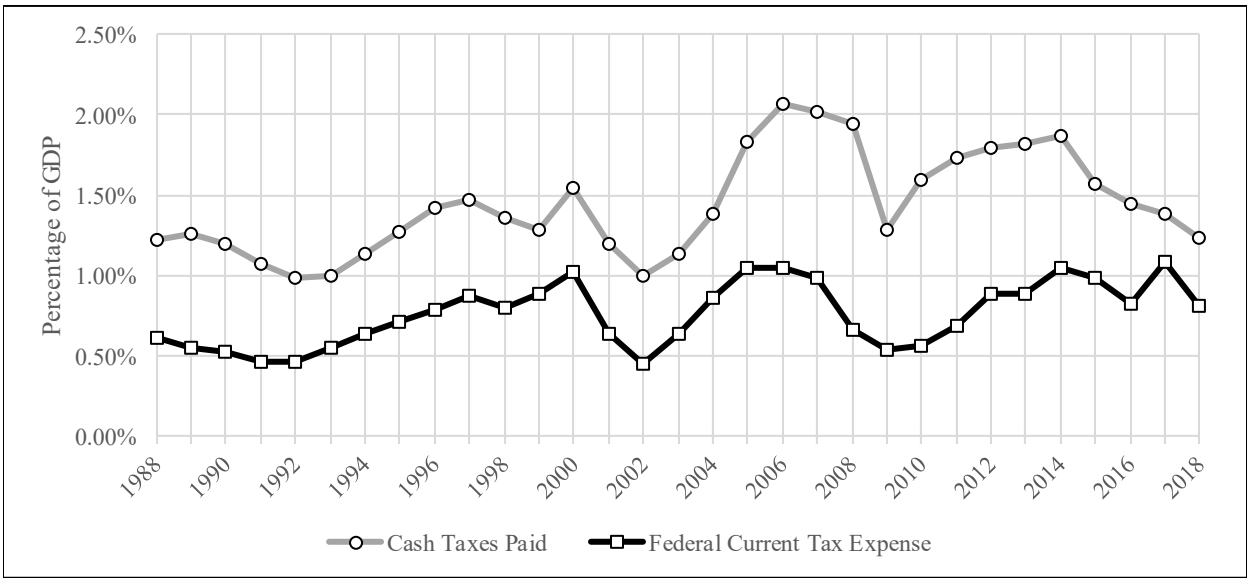
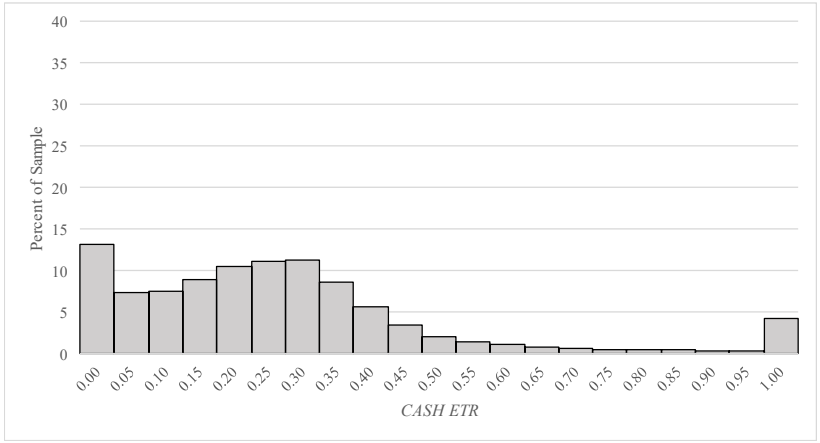


Figure 2
Distribution of *CASH ETR* for Multinational Firms over Various Horizons

Notes: The sample comprises all non-financial, non-utility US-incorporated multinational and domestic firm-year observations in Compustat (Compustat data pneumonics in parentheses with all caps) between 1988 and 2017 (Panel F includes the year 2018 only) with necessary data to calculate *CASH ETR*, defined as $\sum_t CASH\ TAX\ PAID_t\ /\ \sum_t PRETAX\ INCOME_t$, where $CASH\ TAX\ PAID_t$ is cash taxes paid as reported by the firm in the financial statement footnotes (TXPD) and $PRETAX\ INCOME_t$ is pretax accounting income as reported by the firm in the income statement (PI). Observations where $\sum_t PRETAX\ INCOME_t$ is negative are deleted. Observations with *CASH ETR* > 1 are reset to 1, and observations with *CASH ETR* < 0 are reset to 0. In Panel A, we show the distribution of one-year *CASH ETR*, i.e., *t*=0. In Panel B, we show the distribution of five-year *CASH ETR*, i.e., *t*=-4 to *t*=0. Panel C presents the distribution of ten-year *CASH ETR*, i.e., *t*=-9 to *t*=0, and in Panel D we show thirty-year *CASH ETR*, i.e., *t*=-29 to *t*=0. Panel E is the distribution of one-year *CASH ETR* for firms that have non-missing thirty-year *CASH ETR*. We define firm-years as multinational if they report non-missing values of pretax foreign earnings (PIFO) or foreign tax expense (TXFO, TXDFO) in any of the years necessary to compute the corresponding *CASH ETR*, domestic otherwise.

Panel A: One-year CASH ETR

Multinationals



Domestics

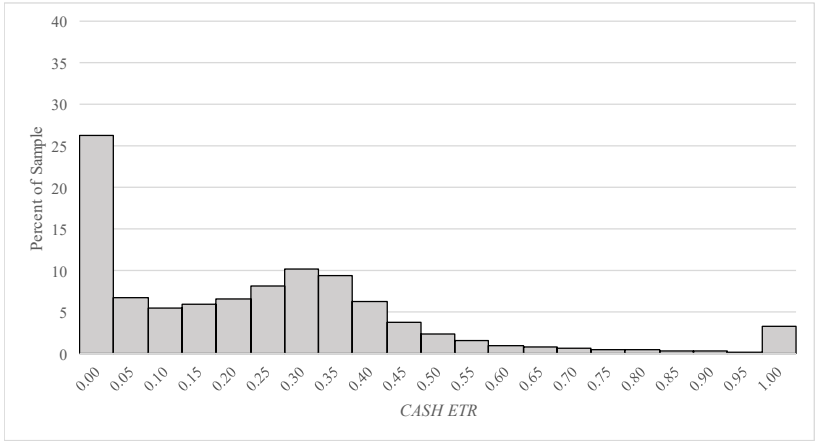
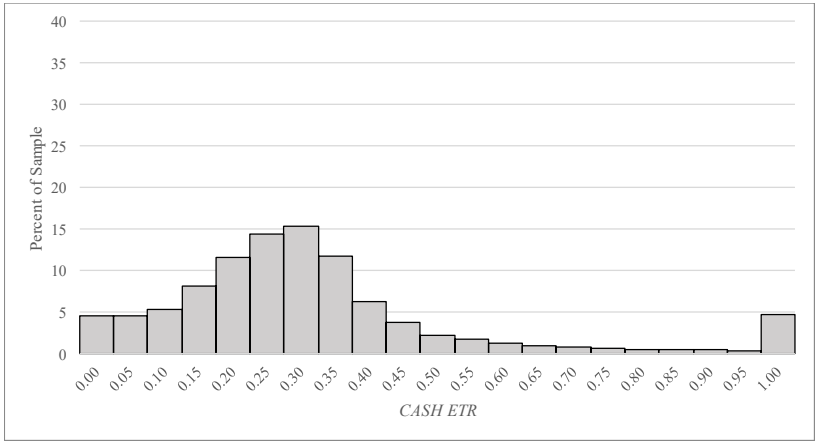


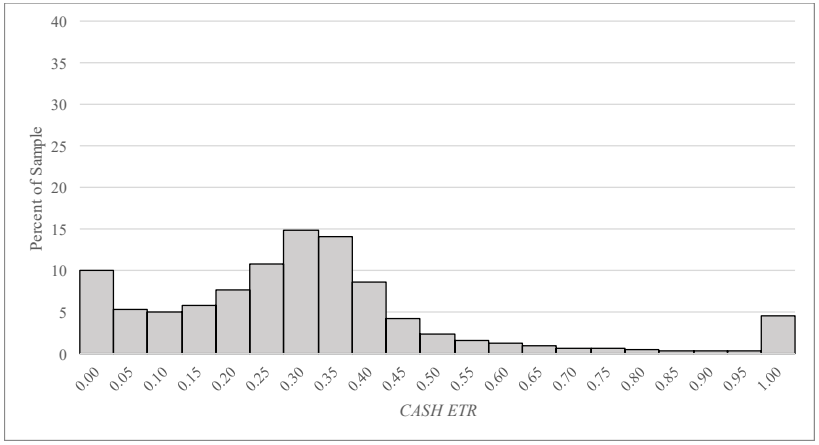
Figure 2 (continued)
Distribution of *CASH ETR* for Multinational Firms over Various Horizons

Panel B: Five-year CASH ETR

Multinationals

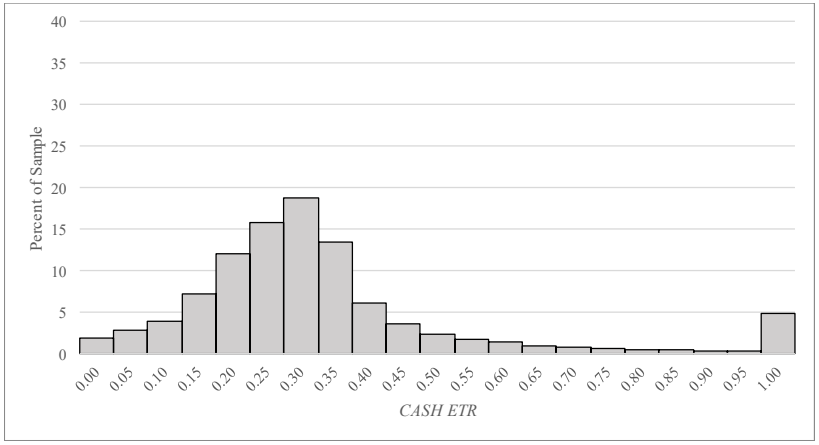


Domestics



Panel C: Ten-year CASH ETR

Multinationals



Domestics

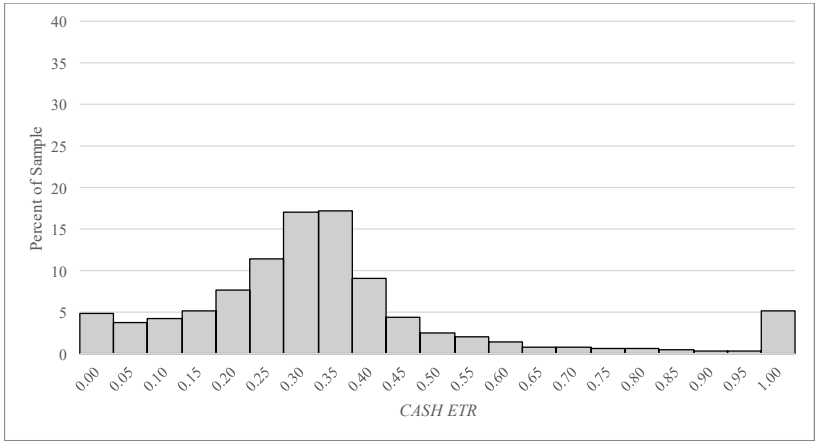
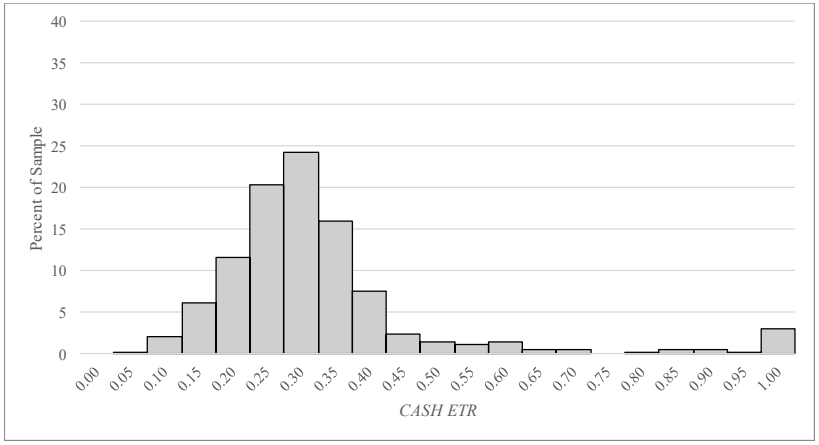


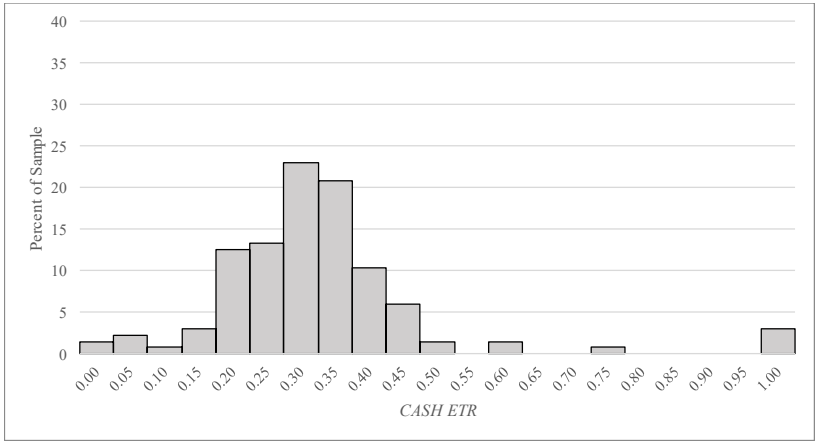
Figure 2 (continued)
Distribution of *CASH ETR* for Multinational Firms over Various Horizons

Panel D: Thirty-year CASH ETR

Multinationals

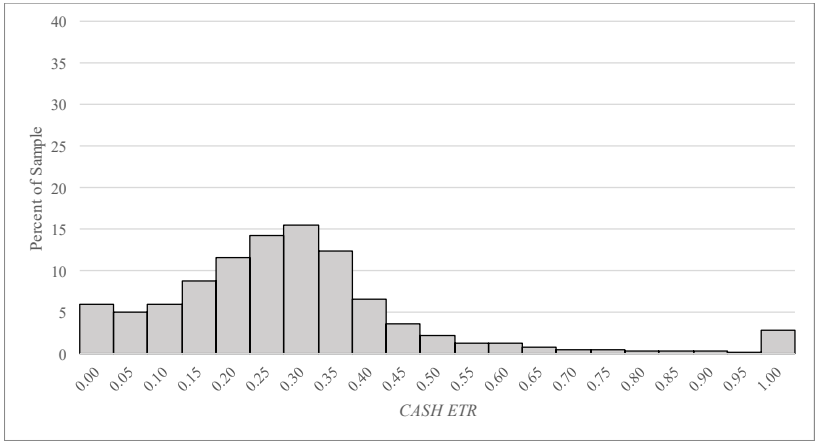


Domestics



Panel E: One-year CASH ETR for firms with non-missing Thirty-year CASH ETR

Multinationals



Domestics

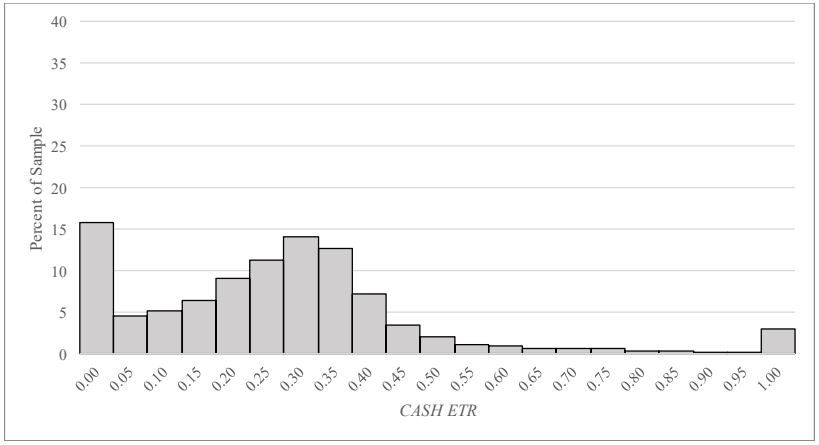
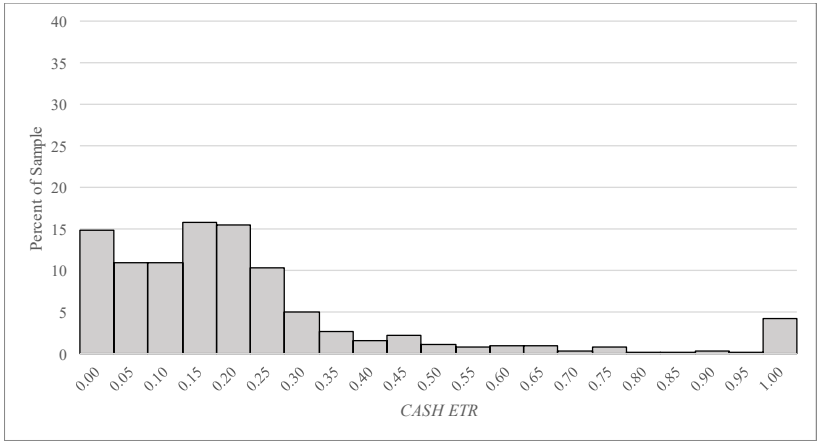


Figure 2 (continued)
Distribution of *CASH ETR* for Multinational Firms over Various Horizons

Panel F: One-year CASH ETR for 2018

Multinationals



Domestics

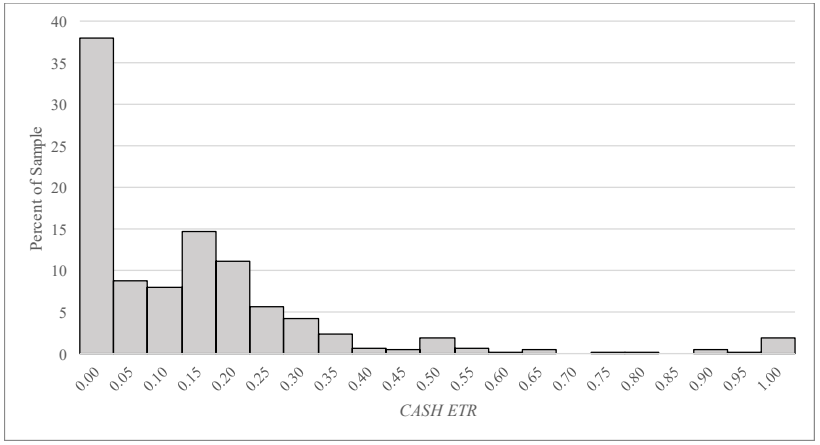
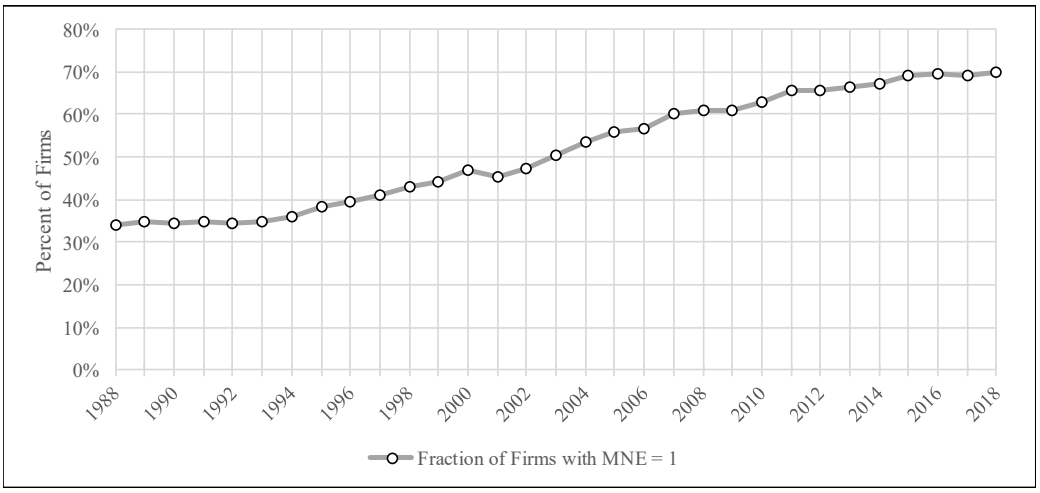


Figure 3
Multinationality over Time

Notes: MNE is equal to one if the firm has non-missing values of pretax foreign income (PIFO), current foreign-tax expense (TXFO), or deferred current-tax expense (TXDFO), zero otherwise. In Panel A, the sample selection follows Dyreng, Hanlon, Maydew, and Thornock (2017), and requires firms to be incorporated in the United States in non-financial, non-utilities industries, have positive pretax income (PI) and sales (SALE), and nonmissing values of cash taxes paid (TXPD) and total assets (AT) and the beginning and end of the period. Panel B relaxes the sample requirements by retaining all industries, and not requiring cash taxes paid (TXPD) or positive values of pretax income (PI). Panel C uses all firms with Exhibit 21 from Form 10-K filed with the SEC (see Dyreng and Lindsey, 2009 and Dyreng, Hoopes, Langetieg, and Wilde, 2019 for additional details).

Panel A: Fraction of Profitable Firm-years with Evidence of Multinational Operations in Earnings and Tax Disclosures



Panel B: Fraction of Young and Old Firm-years with Evidence of Multinational Operations in Earnings and Tax Disclosures

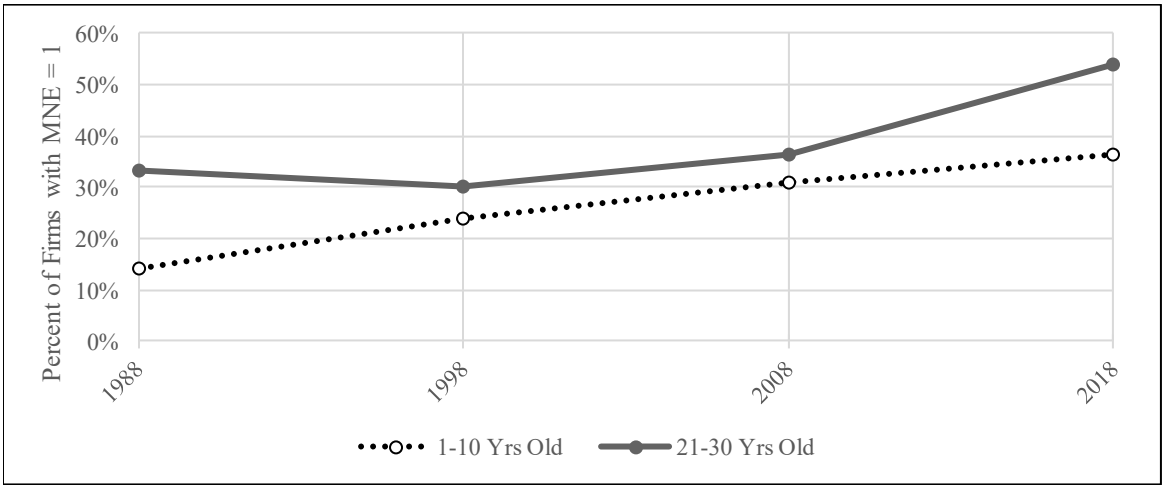


Figure 3, continued
Multinationality over Time

Panel C: Number of distinct countries hosting significant subsidiaries for the mean US multinational firm

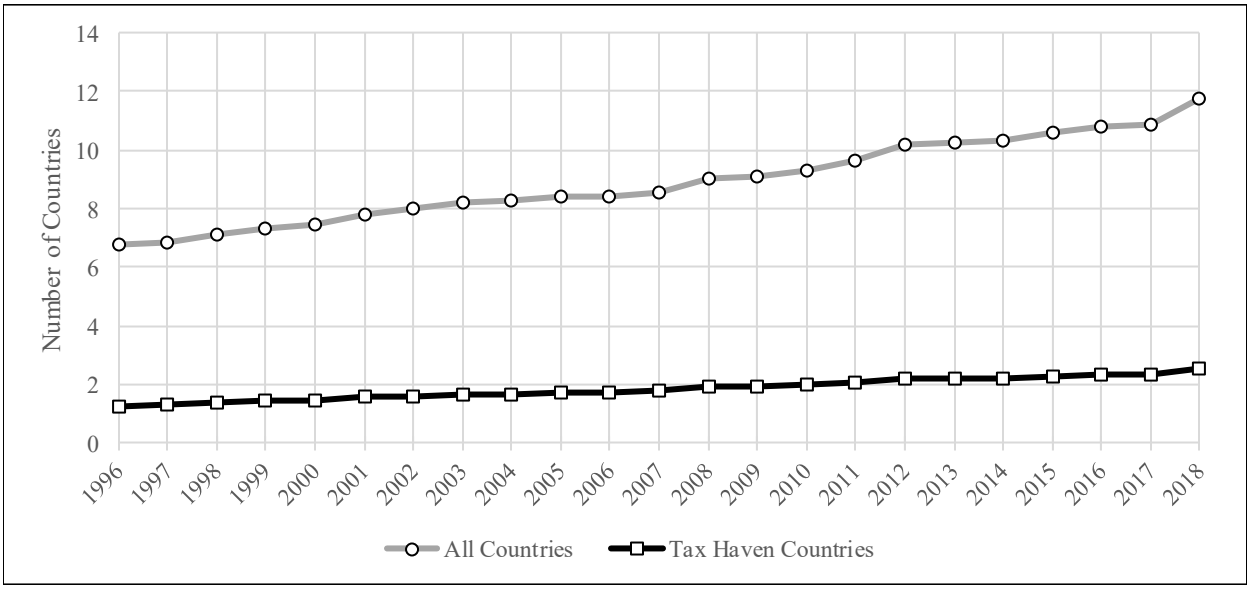


Figure 4
Statutory Tax Rate of OECD Countries over Time

Notes: This figure plots the average combined national and subnational statutory tax rate of OECD countries.
Source: https://stats.oecd.org/

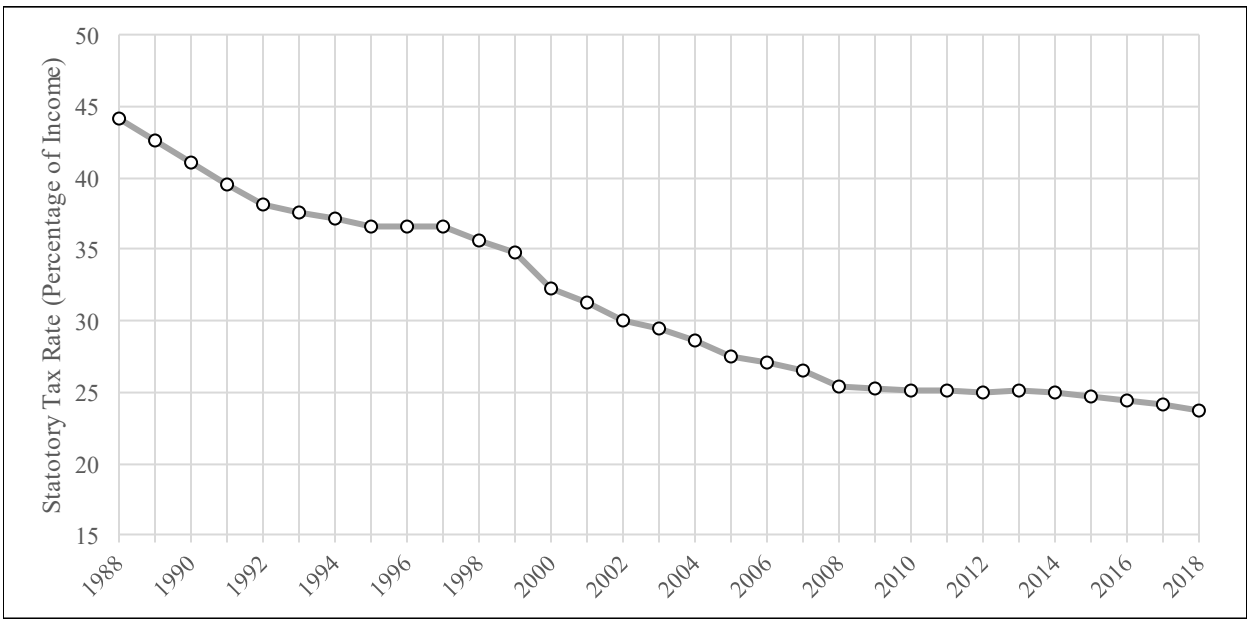


Figure 5
Mean CASH ETR over Time for US Multinational and US Domestic Firms

Notes: The sample comprises all non-financial, non-utility US-incorporated multinational firm-year observations in Compustat (Compustat data pneumonics in parentheses with all caps) between 1988 and 2018 with total assets greater than $10 million and necessary data to calculate one-year *CASH ETR* (TXPD/PI). We define firm-years as multinational if they report non-missing values of pretax foreign earnings (PIFO) or foreign tax expense (TXFO, TXDFO). In Panel B, high tech industries are defined as firms with three-digit SIC codes equal to 283, 357, 366, 367, 382, 384, 481, 482, 489, 737 or 873 following Kile and Phillips (2009). In Panel C, we assign firms to quintiles based on the quintiles of market value of equity of multinationals in each year. Domestics are then assigned to quintiles using the quintiles from the market value of equity of multinationals.

Panel A: Multinationals and Domestics

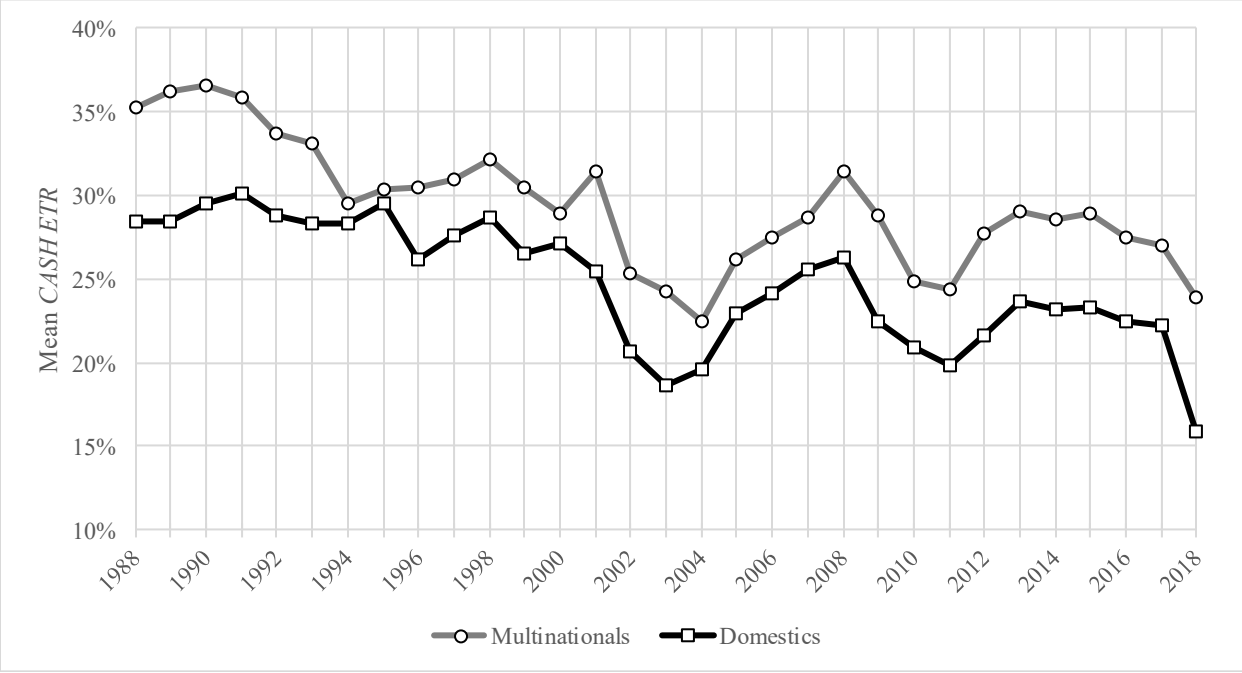
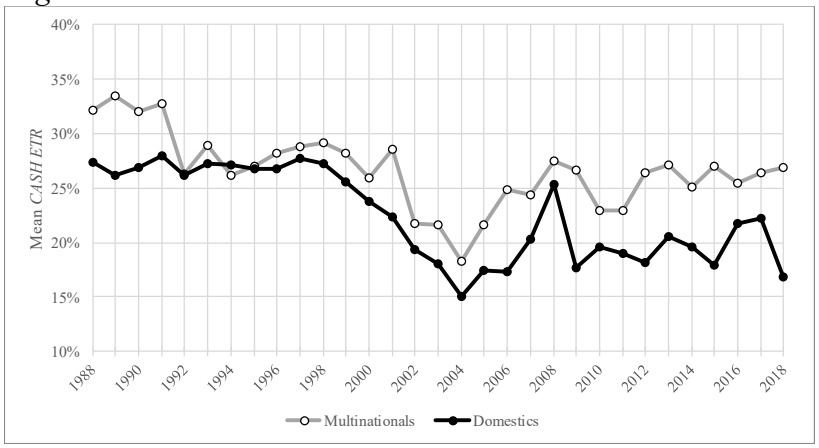


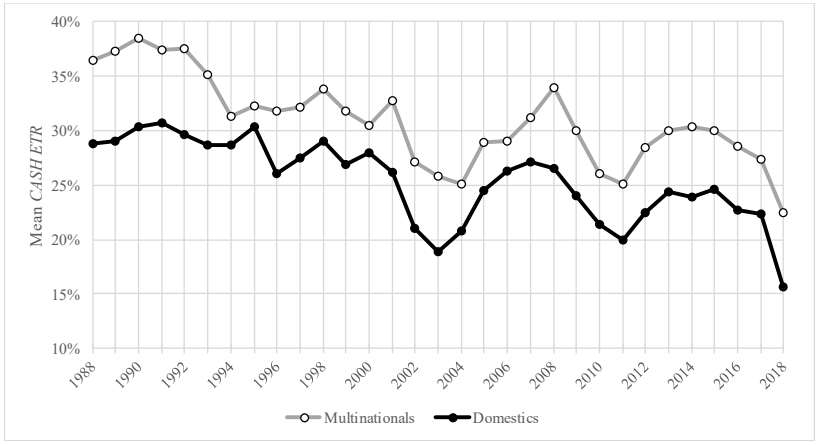
Figure 5, continued
Mean CASH ETR over Time for US Multinational and US Domestic Firms

Panel B: CASH ETR over time comparing high tech and other industries

High Tech Industries

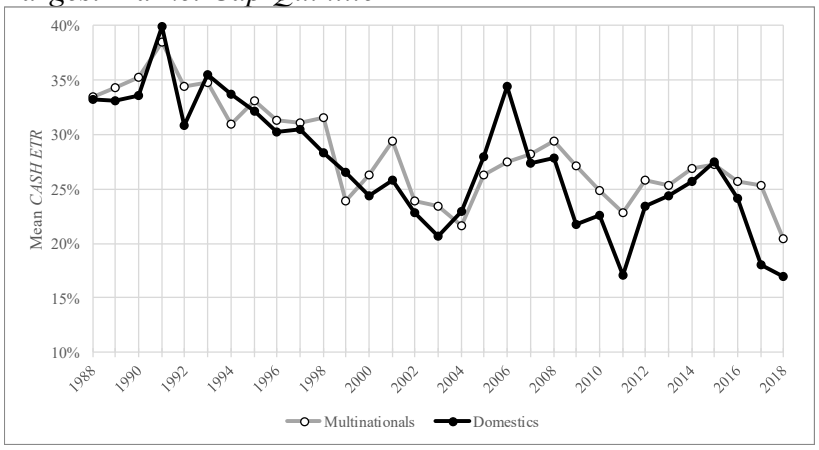


Other Industries



Panel C: CASH ETR over time comparing high market cap to low market cap firms

Largest Market Cap Quintile



Smallest Market Cap Quintile

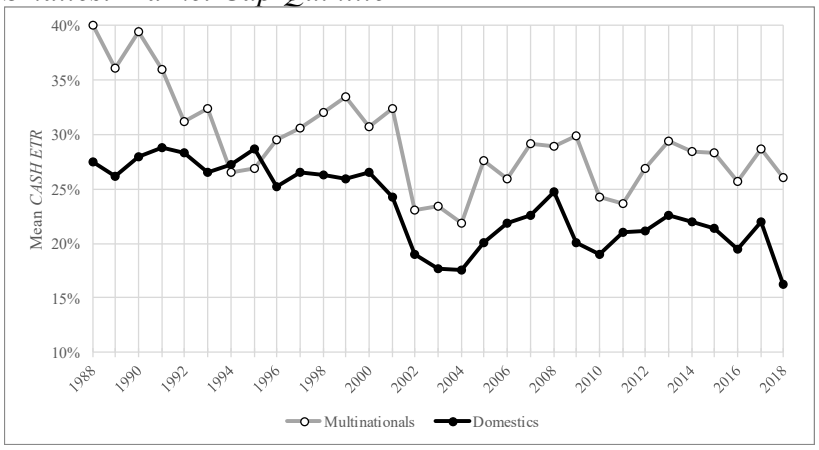


Figure 6
Incentives and Disincentives to Tax Plan

Notes: This figure is taken from Graham, Hanlon, Shevlin, and Shroff (2014) where data are analyzed from 600 tax directors' responses to survey questions about tax planning (and other topics). The figure is Figure 1 in the Hanlon Shevlin and Shroff (2014) paper. The figure presents the responses to the survey question "What factors were important in your company's decision not to implement the tax planning strategy that was proposed?" The survey provides a 5-point rating scale ranging from 0 to 4 with a rating of 0 labeled "Not at all important" and a rating of 4 labeled "Very important." This figure presents the percentages of respondents that gave a rating of 3 or 4 for each factor. The results are shown separately for public and private firms.

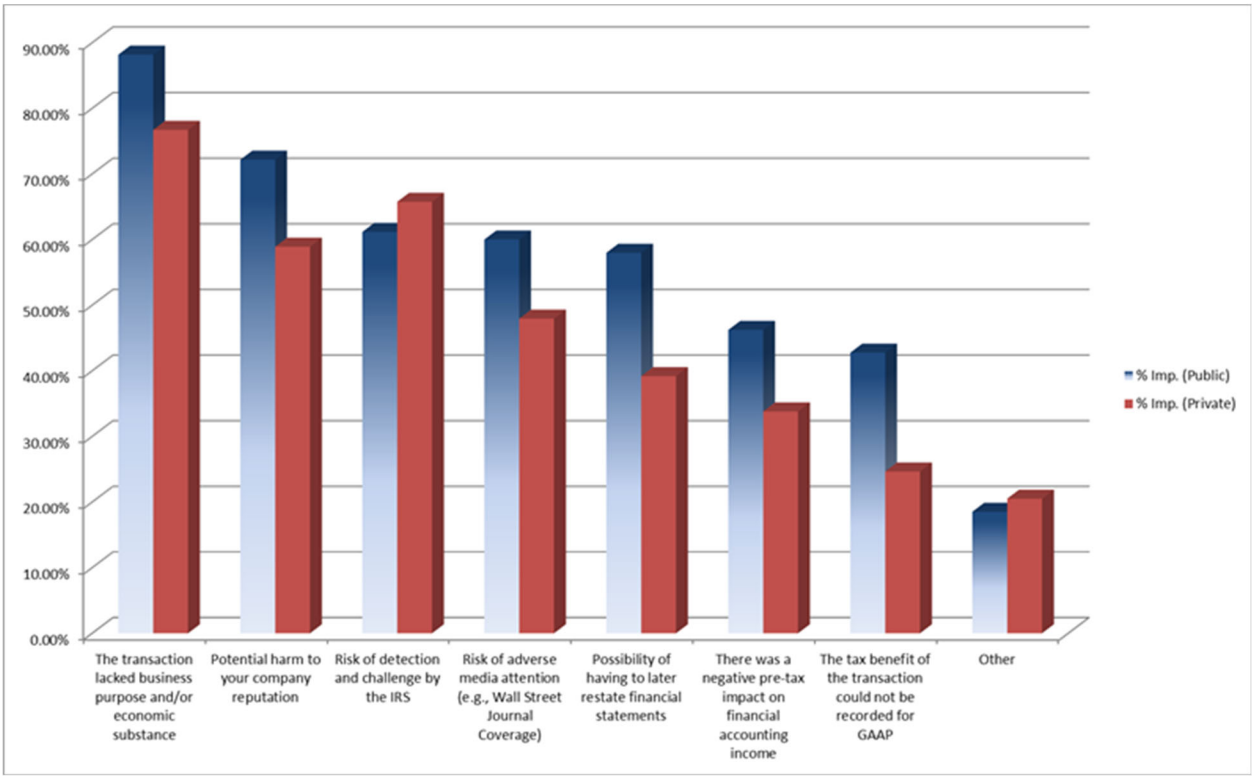


Figure 7
Financial Accounting Incentives for Tax Planning

Notes: Figure 7 is from Graham, Hanlon, Shevlin, and Shroff (2014; Figure 3). The figure presents the responses to the survey question "At your company, when evaluating a tax planning strategy that saves cash taxes, how important is it that the tax planning strategy…(1) …does not reduce earnings per share (EPS) and (2) …leads to reporting a higher earnings per share (EPS)." The survey provides a 5-point rating scale ranging from 0 to 4 with a rating of 0 labeled "Not at all important" and a rating of 4 labeled "Very important." This figure presents the percentages of respondents that gave a rating of 3 or 4 for each factor. The results are shown separately for public and private firms.

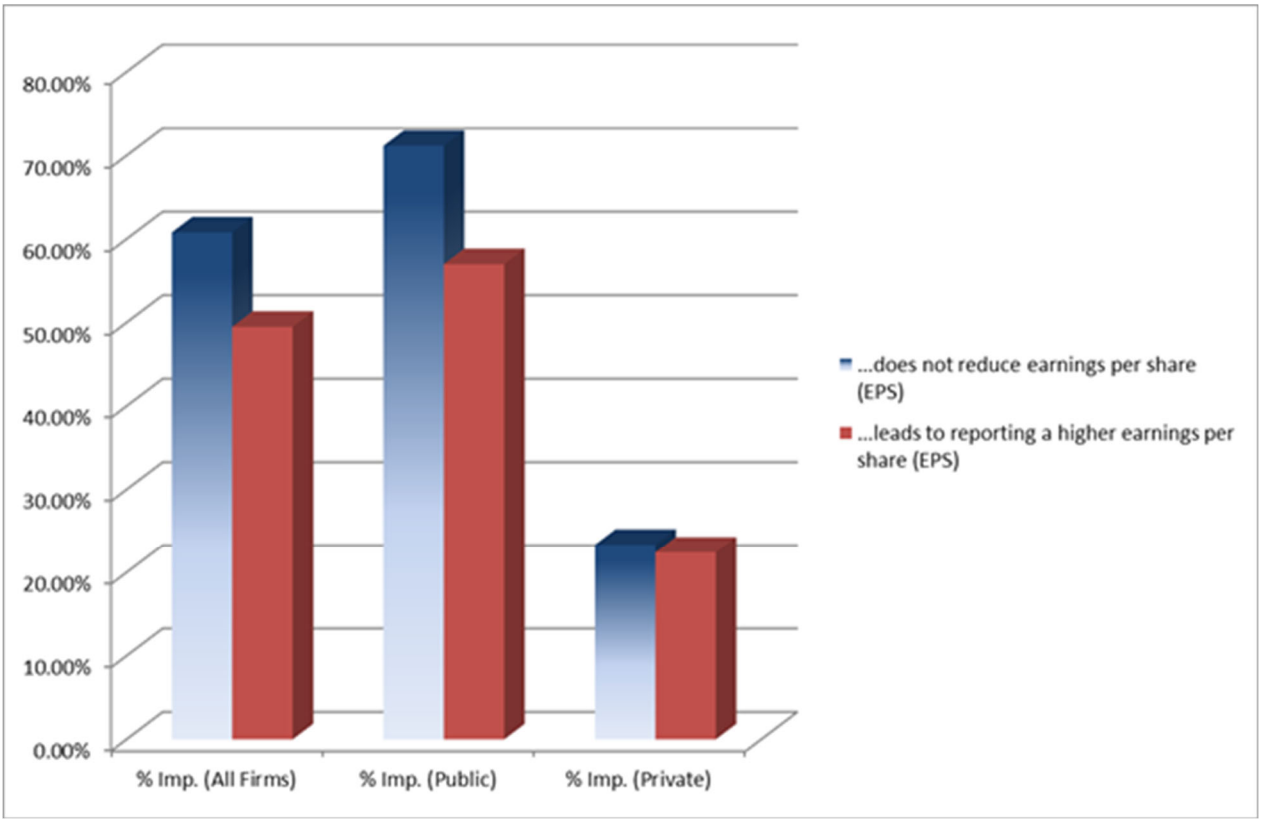


Table 1
Descriptive Statistics of *CASH ETR* over Various Horizons

Notes: The sample comprises all non-financial, non-utility US-incorporated firm-year observations in Compustat (Compustat data pneumonics in parentheses with all caps) between 1988 and 2018 with necessary data to calculate *CASH ETR*, defined as $\sum_t CASH\ TAX\ PAID_t\ /\ \sum_t PRETAX\ INCOME_t$, where $CASH\ TAX\ PAID_t$ is cash taxes paid as reported by the firm in the financial statement footnotes (TXPD) and $PRETAX\ INCOME_t$ is pretax accounting income as reported by the firm in the income statement (PI). Observations where $\sum_t PRETAX\ INCOME_t$ is negative are deleted. Observations with *CASH ETR* > 1 are reset to 1, and observations with *CASH ETR* < 0 are reset to 0. The different rows in the table show the descriptive statistics for *CASH ETR* computed over various horizons, as labeled in the first column.

Panel A: Multinationals

Variable	N	Mean	StdDev	P5	p25	p50	p75	P95
One-year *CASH ETR*	37,020	0.293	0.233	2.052	0.131	0.262	0.378	0.892
Five-year *CASH ETR*	29,095	0.339	0.219	0.055	0.211	0.304	0.395	0.954
Ten-year *CASH ETR*	19,752	0.356	0.209	2.806	0.239	0.317	0.395	0.971
Thirty-year *CASH ETR*	424	0.351	0.165	6.710	0.264	0.320	0.375	0.700
One-year *CASH ETR**	11,557	0.313	0.197	3.244	0.197	0.295	0.381	0.708
One-year *CASH ETR* for 2018	1,106	0.239	0.227	3.777	0.097	0.190	0.282	0.799

*Only for firms with non-missing Thirty-year *CASH ETR*

Panel B: Domestics

Variable	N	Mean	StdDev	P5	p25	p50	p75	P95
One-year *CASH ETR*	39,777	0.261	0.240	0.000	0.043	0.244	0.380	0.765
Five-year *CASH ETR*	23,577	0.331	0.227	0.014	0.190	0.319	0.405	0.934
Ten-year *CASH ETR*	11,941	0.363	0.219	0.051	0.246	0.338	0.415	1.000
Thirty-year *CASH ETR*	135	0.350	0.158	0.167	0.276	0.336	0.396	0.602
One-year *CASH ETR**	3,502	0.290	0.214	0.000	0.144	0.287	0.382	0.719
One-year *CASH ETR* for 2018	476	0.158	0.196	0.000	0.005	0.119	0.222	0.530

*Only for firms with non-missing Thirty-year *CASH ETR*