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The TCJA and Domestic Corporate Tax Rates

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The TCJA and Domestic Corporate Tax Rates

We study changes in tax positions for U.S. C corporations following passage of the 2017 tax legislation commonly known as the Tax Cuts and Jobs Act (TCJA). While existing research has focused primarily on publicly traded companies, data limitations have prevented more holistic analyses of the corporate sector. Using a representative sample of U.S. corporate tax returns, we highlight how trends in effective tax rates (ETRs) and exposure to the legislation's main provisions varied for public, private, multinational, domestic, and large versus small firms. We document several novel facts, including that ETRs *increased* on average for privately held, domestic firms and for firms in the bottom 90% of the firm sales distribution after TCJA. In contrast, public, multinational, and large firms saw substantial ETR cuts on average. We find that firms' pre-TCJA exposure to changes in the corporate tax rate and treatment of net operating losses have the strongest correlation with post-TCJA ETR changes. Overall, the analysis underscores the divergent impacts of TCJA on different firm types and illuminates the economic scope and relative significance of TCJA's myriad provisions.

Keywords: Corporate taxes, Tax Cuts and Jobs Act, tax reform

JEL Classification: H2, H25

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In 2017 the United States Congress passed legislation commonly known as the Tax Cuts and Jobs Act (TCJA), which introduced the most sweeping changes to American business taxation since the Tax Reform Act of 1986.¹ In this paper, we answer several fundamental descriptive questions about firms' tax positions before and after the law's enactment: How did the effective tax rates (ETRs) paid by C corporations change after TCJA? How do changes in ETRs vary with firm characteristics, such as firm size and whether a firm is public, private, domestic, or multinational? And which of TCJA's many provisions appear most relevant in explaining changes in firms' ETRs?

Despite the importance of these questions for understanding and analyzing policy, existing research has not been able to comprehensively answer them, primarily due to data limitations. While prior empirical studies have focused on publicly traded firms, research suggests that smaller private domestic firms and startups are engines of innovation and growth, especially in economically important sectors such as technology and health (Decker et al., 2014). These types of firms are concentrated in private domestic firms, which account for the vast majority of C corporations and approximately one-third of C corporation employment. Among multinational firms, private C corporations outnumber their public counterparts five-to-one, and comprise approximately 18 percent of total C corporation employment. Understanding trends in both public and private firms is thus critically important for analyzing TCJA's effects on the broader U.S. economy. Moreover, even among public firms, limitations in commonly used databases have prevented researchers from documenting key information such as, for example, the share of firms subject to the corporate alternative minimum tax prior to its post-TCJA repeal.

We fill these gaps in existing research using a representative sample of de-identified corporate tax returns from 2010-2019. The rolling panel from the Internal Revenue Service's Statistics of Income (SOI) files includes both public and private firms, and both domestic and multinational firms, allowing us to provide a holistic picture of the changing landscape of firms' tax positions before and after TCJA.

The analysis proceeds in three parts. First, we document time series trends in average domestic cash ETRs for different groups of firms, highlighting especially the divergence in trends for public/private, domestic/multinational, and small/large firms. Second, we show how the full distribution of firms' ETRs shifted before and after TCJA. Third, we document basic evidence on the share of firms likely to have been affected by TCJA's various provisions (which we call "exposure measures"), and show how these exposure measures correlate with firms' ETR changes after TCJA. We note that the descriptive analysis is not intended to provide evidence on the causal effects of TCJA's individual provisions; rather, our aim is to highlight previously undocumented patterns, to provide clear evidence on the relative scope and economic significance of TCJA's various provisions, and to discuss implications for policy analysis and future research.

¹Public Law 115-97 is titled "An act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018."

From the analysis, we document three descriptive facts. First, we show that ETRs declined sharply for publicly traded firms and for privately owned multinationals. These firms pay the lion's share of federal corporate income taxes and account for approximately 69% of C corporation employment. This result is broadly consistent with Henry and Sansing (2018); Dyreng et al. (Forthcoming); Wagner, Zeckhauser, and Ziegler (2020); however, our analysis paints a more nuanced picture relative to existing research due to our focus on domestic cash ETRs for multinational firms, as opposed to global ETRs.

The second fact—which, from our perspective, appears to be less commonly appreciated in public and academic discourse—is that, in contrast to publicly traded and multinational firms, average ETRs *increased* for private domestic firms. While private domestic firms do not pay a large share of federal corporate income taxes, they do account for the vast majority of corporate firms and 31% of C corporation employment. An analysis based on matching firms in the SOI panel between 2016 and 2019 shows that a large majority (approximately 81%) of U.S. C corporations with positive book income, representing a sizeable fraction of U.S. sales and employment, faced a corporate income tax increase following TCJA.

Third, when assessing the relative importance of TCJA's various corporate provisions, we find that pre-TCJA exposure to the marginal corporate income tax rate changes (*i.e.*, the increase in rates at the bottom of the tax schedule, and the decrease at the top) and the net operating loss (NOL) restriction are most strongly correlated with changes in firms' ETRs after TCJA. By contrast, exposure to the alternative minimum tax, interest limitation, and multinational provisions was moderately correlated with changes in firms' ETRs, while exposure to bonus depreciation-related changes and repeal of the domestic production activities deduction was only very weakly associated with changes in firms' ETRs. We also discuss how firms' behavioral responses to these provisions may generate second-order changes in ETRs, which are also captured in our estimates.

These findings contribute to researchers' understanding of this historically large corporate tax reform along two primary dimensions. First, we use a dataset that is representative of public and private firms in the United States. Virtually all prior related work has used data on publicly traded companies or non-representative samples of private companies, even as private companies comprise the vast majority of U.S. corporations, account for approximately half of C corporation employment, and contribute significantly to innovative activity in the economy. Second, our analysis of the components of the corporate tax reform provides valuable information on the scope and relative economic significance of different provisions of TCJA. Doing so sheds new light on the breadth and depth of reforms that comprise TCJA, beyond the most conspicuous corporate income tax rate changes.

This paper also contributes to the broad body of research in economics, finance, and accounting that studies trends in and determinants of corporate tax rates and tax-related financial positions

both domestically and globally (Slemrod, 2004; Clausing, 2007; Dyreng et al., 2017; Gaertner, Glover, and Levine, 2021; Wier and Zucman, 2022). In related studies examining corporate tax trends around TCJA, Dowd, Giosa, and Willingham (2020) use IRS data and document that large firms engaged in considerable behavioral and tax-shifting responses to the legislation. Dyreng et al. (Forthcoming) and Wagner, Zeckhauser, and Ziegler (2020) use data from public financial filings to study trends in global ETRs around TCJA and examine the association between ETR changes and firm characteristics. Henry and Sansing (2018) study scaled cash tax differences for public firms in addition to ETRs and find that TCJA had no effect on tax-favored status for public firms overall but reduced the share of tax-favored profitable firms.² Several concurrent papers also examine certain provisions of TCJA in isolation, including the interest limitation (Carrizosa, Gaertner, and Lynch, 2020) and the international provisions (Clausing, 2020; Garcia-Bernardo, Jansky, and Zucman, 2022; Albertus, Glover, and Levine, 2023).

Our work is also related to the growing literature studying effects of TCJA on firm behavior.³ The majority of the current research studies effects of TCJA on public firm behavior. However, research on private firms suggests considerable differences in tax-related incentives and behavior of private firms compared to public firms (Mills and Newberry, 2001; Graham et al., 2014; Hoopes et al., 2020; Dobridge, Lester, and Whitten, 2021). Given the different post-TCJA trends that we document in tax positions for private domestic firms, our work raises the question of how other outcomes may have differed for private firms compared to public firms after TCJA as well. Overall, our results underscore that TCJA's policy effects for private domestic firms are likely to be very different from public firms and multinationals.

I Overview of TCJA Corporate Tax Provisions

In this section, we provide a short summary of the numerous domestic and international corporate tax changes in TCJA.⁴ Beginning with the domestic business-related changes, the Joint Committee

²The scaled cash tax difference is defined as year-to-year changes in cash taxes paid divided by the market value of assets, which can be calculated for firms with losses. The authors define tax-favored status as if a firm's cash ETR continued to be less than the statutory rate or if scaled cash tax differences continued to be negative after TCJA.

³See, for example, work on corporate actions and statements following TCJA enactment (Hanlon, Hoopes, and Slemrod, 2019), contributions to defined benefit pension plans (Gaertner, Lynch, and Vernon, 2020), changes in executive compensation (De Simone, McClure, and Stomberg, 2022), reclassification of business costs (Laplante et al., 2021), organizational structure (Henry, Plesko, and Utke, 2018), earnings management (Kubick, Lockhart, and Robinson, 2021), bank deposit rates and lending (Fox and Pyle, 2022), and employment, worker earnings, and capital investment (Kennedy et al., 2022). Auerbach (2018) discusses predicted economic impacts of TCJA and Gale et al. (2019) examines TCJA's effects on aggregate domestic activity, including nonresidential fixed investment, non-farm employment, and real earnings.

⁴A detailed description of all the statutory changes enacted under TCJA and an explanation of the prior law's provisions are presented in Joint Committee on Taxation (2018), estimated budget effects are included in Joint Committee on Taxation (2017), additional discussion of the legislative motive for the changes is contained in Dowd, Giosa, and Willingham (2020), and discussion of aspects of the policy debate is included in Auerbach (2018).

on Taxation estimated these provisions would reduce federal revenue by \$650 billion over the 10-year budget window following TCJA—fiscal years 2018 to 2027. The most substantial change, in terms of revenue consequences, was the change in the corporate tax rate schedule from an approximately graduated statutory tax schedule, with a top marginal tax rate of 35% on income in excess of \$18 million, to a flat tax schedule with a rate of 21%. TCJA also repealed the corporate alternative minimum tax (AMT) while allowing firms to offset tax liability or receive a credit for unused AMT credits.

Three aspects of TCJA directly affected deductions for capital expenditures, interest expenses, and business activity associated with domestic production. First, under TCJA, the depreciation schedule for most capital investment was changed to full expensing through 2022. Second, TCJA imposed a new limit on the deductibility of interest expenses to 30% of adjusted taxable income.⁵ Third, TCJA repealed the domestic production activity deduction (DPAD), which had provided taxpayers a deduction of 9% for income from qualifying activities related to producing goods and services domestically.⁶

There were also key provisions related to the tax treatment of losses. Prior to TCJA, firms were permitted to apply NOLs against taxable income for 2 years prior (“carryback”) or apply NOLs against taxable income as many as 20 years into the future (“carryforward”). TCJA eliminated NOL carrybacks and changed the limitation on carryforwards to 80% of pre-NOL taxable income for 20 years.

TCJA made extensive changes to tax provisions related to foreign income and operations as well. To provide a sense of scale, the JCT estimated that the total international tax reform changes would raise about \$325 billion from 2018 to 2027.

First, the legislation changed the treatment of foreign income from a worldwide system of taxation, whereby foreign earnings were generally taxed only when they were repatriated to the United States, to a territorial system that eliminates the tax on repatriated or unrepatriated foreign earnings (*i.e.*, gives a 100% deduction for dividends received from foreign subsidiaries). The legislation also included a one-time transition tax on the previously untaxed earnings of U.S. multinationals of 8% on non-cash assets and 15.5% on cash assets held overseas.

Second, several new international tax provisions were implemented related to firm income-shifting incentives, particularly: the base erosion and anti-abuse tax (BEAT), the global intangible low-taxed income (GILTI) provision, and the foreign derived intangible income (FDII) provision. The switch to a territorial international tax system increased incentives, to some extent, for firms to move operations and income overseas because any tax savings from doing so would be permanent

⁵Through 2021, adjusted taxable income was defined as taxable income excluding business interest income and expense, depreciation, amortization, depletion, and NOLs. After 2021, adjusted taxable income was defined as taxable income excluding business interest income and expense and NOLs. Other TCJA provisions related to deductions included the limitation of deductions for fringe benefits and expanding the definition of executive compensation for the purposes of Section 162(m).

⁶See Dobridge, Landefeld, and Mortenson (2021) and Ohn (2018) for detailed discussions of the DPAD.

instead of deferred. The BEAT, GILTI, and FDII were intended to counteract these effects and decrease incentives to move business activity overseas. The BEAT imposed a minimum 10 percent U.S. tax on modified taxable income, which excluded deductible transactions made between related parties (*i.e.*, payments made from a U.S. parent to a controlled foreign corporation). GILTI was intended to reduce incentives for firms to relocate operations to lower-tax countries by levying a minimum tax on a firm's foreign earnings greater than 10% of total foreign tangible assets. FDII reduced firm taxes on U.S. earnings derived from foreign sales and was intended to incentivize firms to locate intangible capital domestically.

II Description of the Corporate Tax Data

The corporate tax return data we use for this analysis are sourced from Form 1120 corporate tax filings and related schedules, as provided by the Statistics of Income (SOI) Division of the Internal Revenue Service (IRS). In particular, we use data from a stratified random sample of C corporation tax returns that is created, cleaned, and edited each year by the SOI (U.S. Internal Revenue Service, 2013). We refer to these data as the “SOI sample.” We focus on tax years 2010 to 2019, corresponding to the period after the Global Financial Crisis in 2007-2009 but before the Covid-19 pandemic in 2020. The SOI sample from 2010-2019 includes, on average, approximately 54,000 firms per tax year. For the main analysis, we use data on tax payments from the front page of Form 1120 and data on book income from Schedules M-1 and M-3.⁷

Our primary variable of interest is the domestic U.S. corporate effective cash tax rate (ETR), which we define as total taxes paid over domestic pre-tax book income. We calculate this for all firms with positive book income, following the approaches of Hoopes et al. (2020) and Dobridge, Lester, and Whitten (2021).⁸ Detailed definitions for all variables used in this study, including IRS form and line numbers, are reported in Appendix A.

We split the SOI sample along several firm characteristics to study the heterogeneous effects of TCJA. These characteristics include public ownership, private ownership, multinational operations, domestic-only operations, and size bins of domestic sales. We define a firm as public if it ever

⁷We exclude from the SOI corporate sample filings of Forms 1120-S, 1120-L, 1120-RIC, 1120-F, 1120-REIT, and 1120-PC. Note that total taxes paid will include some U.S. taxes on foreign source income which is subject to tax. Prior to TCJA, this included dividends from controlled foreign corporations (CFCs), foreign branch income, and subpart F income. After TCJA, this could also include tax owed on GILTI and tax on the one-time transition tax for unrepatriated foreign earnings.

⁸Specifically, when a firm reports attaching a Schedule M-3 to the Form 1120 (Box A4), we calculate the ETR as taxes paid (Form 1120, line 31) divided by pre-tax financial statement income, where pre-tax financial statement income is the sum of net income (Schedule M-3, Part I, line 11), U.S. current income tax expense (Schedule M-3, Part III, line 1), and U.S. deferred income tax expense (Schedule M-3, Part III, line 2). However, only firms with assets above \$10 million are required to file the Schedule M-3. When a firm does not report attaching a Schedule M-3, we define pre-tax financial statement income as the sum of net income per book (Schedule M-1, line 1) and federal income tax per books (Schedule M-1, line 2).

reports having publicly traded voting common stock on Schedule M-3, line 3a, during the sample period from 2010 to 2019, and categorize all other firms as private firms.⁹ We define a firm as multinational if it ever reports having a controlled foreign corporation (CFC) (*i.e.*, a foreign subsidiary) by filing Form 5471 during the sample period. Finally, to study firms of different sizes, we separate them across categories of the firm domestic sales distribution, using total domestic gross receipts reported on line 1c of Form 1120.

We construct several different analysis samples of firms in this paper. For our analysis of the time trends in U.S. domestic cash ETRs, we require a firm to have non-negative and non-zero book income in a given year to be included in the sample for that year, such that we are able to calculate a cash ETR for each firm (designated “ETR sample”). For our analysis of changes in the domestic cash ETR from 2016 to 2019, we require a firm to have a non-missing cash ETR in both of those years (designated “ETR change sample”). Finally, when we examine firms’ likely exposure to various TCJA provisions based on pre-TCJA characteristics, we study the full SOI sample of firms.

Panel A of Table 1 presents summary statistics for the ETR sample of firm characteristics in 2016, prior to TCJA enactment, for multinational, domestic, public, and private firms. All samples are weighted using SOI sampling weights to produce firm-weighted population averages. The panel highlights stark average differences across firm types in variables such as receipts, assets, taxes paid, and employment, with public multinationals being the largest and private domestic firms being the smallest. Online Appendix Figure B1 shows the industry distribution of firms in the sample by firm type. Panel A of Table 1 also documents the mean ETRs for 2016 and 2019 by firm-type.¹⁰ The decrease in mean ETRs for public firms and private multinationals is in stark contrast to the increase for private domestic firms.

Panel B emphasizes these differences further, reporting the share of each firm type in aggregate firm counts, sales, taxes, and employment. Among C corporations, public multinationals account for a small share of firms (less than 1%) but account for approximately half of gross receipts, two-thirds of taxes paid, and 45% of employment. By contrast, private domestic businesses account for over 98% of firms but account for approximately 22% of gross receipts, 14% of taxes paid, and 31% of employment.

⁹This method of identifying publicly traded firms misclassifies as private any publicly traded firm that was not required to file a schedule M-3.

¹⁰Due to large outliers in ETRs, the ETR and change in ETR are winsorized at the 5% level throughout the paper.

Table 1: Summary Statistics

Panel A: 2016 Means by Firm Type

	(1) Public Multinational	(2) Public Domestic	(3) Private Multinational	(4) Private Domestic
Sales (000s)	5,135,210	451,470	361,645	4,711
Total assets (000s)	22,839,687	6,105,553	677,701	7,141
Depreciable assets (000s)	3,132,429	477,687	161,130	1,752
Payroll (000s)	843,377	86,666	53,704	888
Net income (000s)	529,296	42,473	20,470	224
Taxes paid (000s)	116,925	12,547	5,048	61
U.S. employment	14,421	2,151	1,027	26
ETR in 2016	17.5	17.5	18.8	12.0
ETR in 2019	10.7	11.9	12.6	15.1
Unique firms	1,542	1,345	8,081	602,717

Panel B: 2016 Share of Aggregates by Firm Type

Share of C Corp	(1) Public Multinational	(2) Public Domestic	(3) Private Multinational	(4) Private Domestic
# Firms	0.002	0.001	0.012	0.985
Gross Receipts	0.517	0.039	0.222	0.221
Tax Paid	0.665	0.051	0.147	0.136
Employment	0.454	0.057	0.176	0.314

Panel A reports 2016 sample means of firm characteristics for firms in the ETR sample, separately by firm type. Panel B reports the share of each firm type in 2016 aggregate firm counts, sales, taxes paid, and employment. The dataset was created by the authors using IRS administrative tax data, and variables are defined in Appendix A. The data are weighted using SOI sampling weights to reflect the U.S. population of C corporations.

III Results

III.A Trends in Domestic Cash ETRs

We begin our analysis by presenting trends in average ETRs from 2010 to 2019 in Figure 1. Figure 1a separately displays ETRs for different types of firms: public multinational, public domestic, private multinational, and private domestic. Figure 1b presents ETRs at different points in the size distribution by total sales: firms above the 95th percentile, firms in the 90th to 95th percentile, and firms below the 90th percentile. As in Table 1, all samples are weighted using SOI sampling weights to produce firm-weighted population averages.

In Figure 1a, we observe a similar trend in average firm domestic cash ETRs for public C corporations as documented by Dyreng et al. (Forthcoming) for the average firm global cash ETR of public U.S. firms. After fluctuating between about 17% and 18% between 2012 and 2017, cash ETRs for public multinational and domestic firms declined sharply in 2018 after passage of TCJA, to about 11%. In 2019, ETRs declined further for public multinationals (to around 10%) and increased somewhat for public domestic C corporations (to around 13%). Private multinational firms experienced a similar change as public multinational firms, though their average ETRs were one or two percentage points higher than public firms in the five years leading up to TCJA passage, and they experienced a somewhat smaller drop in ETRs after passage, to about 13% in 2018 and 12% in 2019.¹¹

Trends in the ETRs of private domestic firms were starkly different than those of public firms or private multinationals. After a gradual increase in ETRs over most of the pre-TCJA sample period, ETRs increased discontinuously in 2018 and ticked up again in 2019. By 2019, the average ETR for domestic private firms was *higher* than for public firms or for private multinational corporations—about 14% for private domestics compared to about 10% for public multinationals, for example—a striking reversal of the pre-TCJA trend when average ETRs were considerably lower for private domestic firms than for public firms and private multinationals.¹²

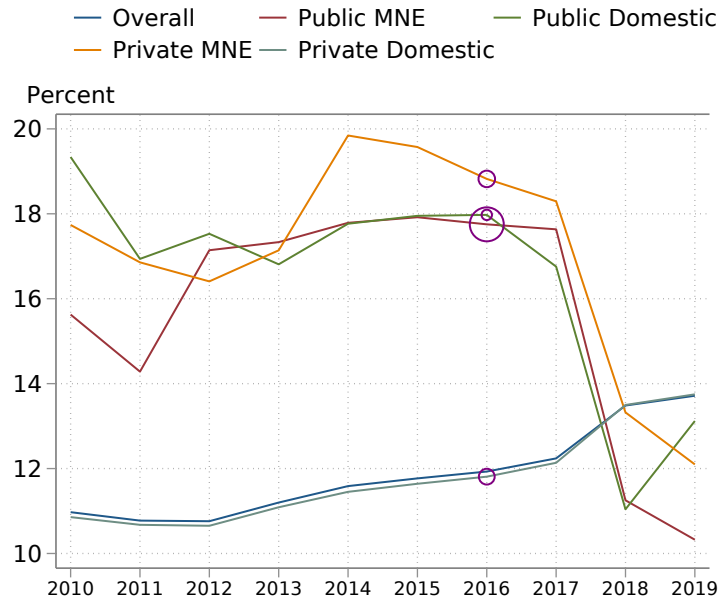
Figure 1b decomposes trends by firm size, and illustrates that the largest tax cuts were concentrated amongst the largest firms. For firms in the top five percent of the sales distribution, average ETRs declined from about 23% in 2016 to 16% in 2019. Firms in the 90 to 95th percentile

¹¹For completeness, in Online Appendix Figure B2 we also report time series extending to tax year 2020; the data from 2020 should be interpreted with caution and care due to the economic effects and policy responses related to the pandemic-induced recession.

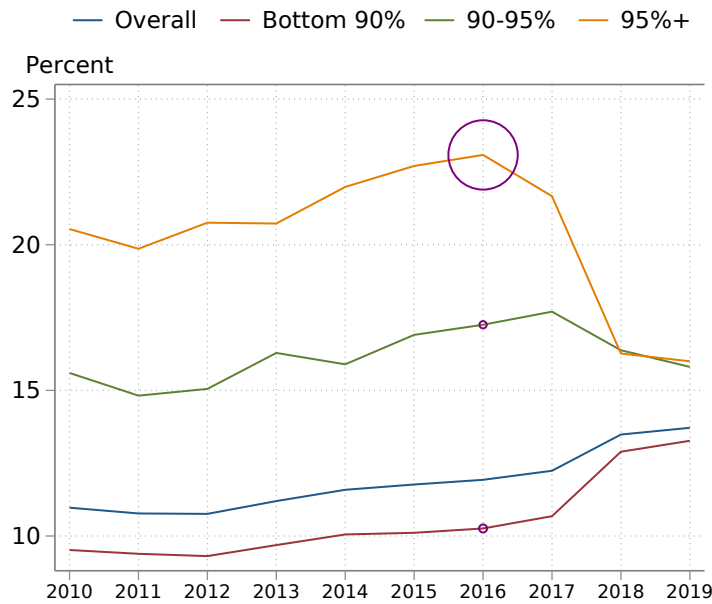
¹²As cash ETRs can only be calculated for observations with positive book income, the Online Appendix contains figures displaying trends in a complementary measure of firm tax positions that can be calculated for the full SOI firm sample: the fraction of firms that pay taxes, by firm type (Figure B3a) and firm size (Figure B3b). Consistent with the ETR analysis, we observe that the fraction of public firms, private multinational firms, and large firms that pay taxes declines notably after passage of TCJA. In contrast, the fraction of private domestic firms and small firms (the bottom 90th of the employment size distribution) that pay taxes increased a bit from 2017 to 2018 and rose somewhat further in 2019.

in terms of sales had relatively small average ETR declines, from 17% in 2016 to 16% in 2019, while small firms experienced an average ETR increase.

Figure 1: Effective Tax Rates for C Corporations: 2010 to 2019



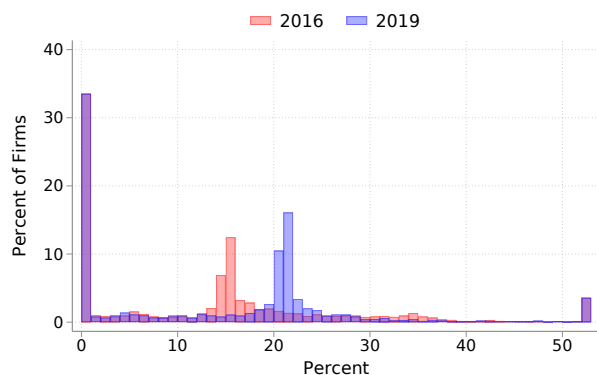
(a) By Public and Multinational Status



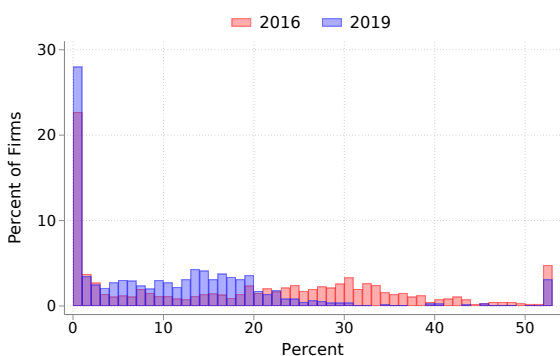
(b) By the Distribution of Sales

This figure presents trends in average domestic cash effective tax rates from 2010 to 2019 for U.S. C corporations. Figure 1a presents trends for firms overall, for public multinationals (MNEs), public domestic firms, private MNEs and private domestic firms. Figure 1b shows trends for firms overall, for firms in the 95th percentile of the firm sales distribution in 2016, firms in the 90th to 95th percentile of the sales distribution in 2016, and firms below the 90th percentile in 2016. All panels were created by the authors using IRS administrative tax data and variables are defined in Appendix A. Bubble sizes are proportional to the aggregate share of 2016 federal corporate tax revenue collected from each firm type. All samples are weighted using SOI weights to produce firm-weighted population averages.

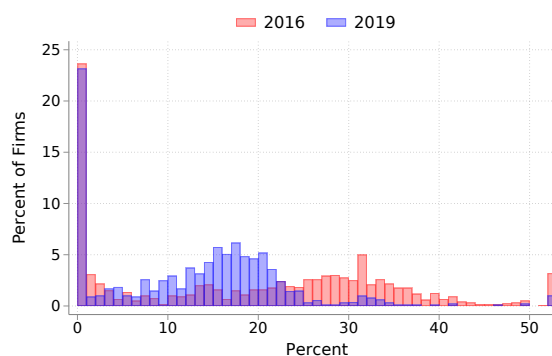
Figure 2: Distribution of ETRs: 2016 and 2019



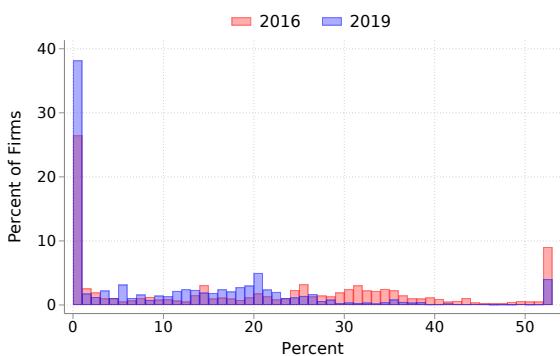
(a) Full Sample



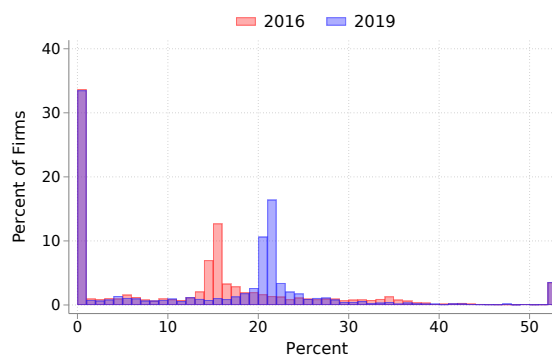
(b) Public Multinational



(c) Public Domestic



(d) Private Multinational



(e) Private Domestic

This figure presents the distribution of ETRs prior to TCJA passage, in 2016, and following passage, in 2019. Figure 2a shows the distribution for all firms, and Figures 2b, 2c, 2d, and 2e show the distributions for public multinationals, public domestic firms, private multinationals, and private domestic firms, respectively. All panels were created by the authors using IRS administrative tax data and variables are defined in Appendix A. All samples are weighted using SOI weights to produce firm-weighted population averages.

To further investigate dispersion in ETR changes across firms, we examine the distribution of ETRs before and after TCJA. Figure 2a presents a histogram of the distribution of ETRs in 2016 and 2019. We focus on 2016 and 2019 as our points of comparison due to evidence that firms engaged in tax-shifting behaviors in 2017 and 2018 to minimize their tax liabilities (Dowd, Giosa, and Willingham, 2020). We find that annual ETR averages mask considerable variation in ETRs across firms. In both 2016 and 2019, the distribution of ETRs is bimodal, with the most frequent observations around zero ETR in both years, reflecting the large fraction of firms with positive book income but zero U.S. federal cash taxes paid. In 2016, the distribution shows a second mass around 15%, corresponding to the marginal tax rate for firms with taxable income less than \$50,000.¹³ In 2019, the distribution shows a second mass around 21%, corresponding to the newly introduced, flat corporate tax rate for all C corporations.

Figures 2b through 2e show the distribution of ETRs in 2016 and 2019 by firm type. Consistent with Figure 1, the distribution of ETRs shifted to the left for public firms and for private multinationals, but shifted to the right for private domestic firms. Given that private domestic firms make up the majority of U.S. C corporations, the figure documents an important fact about the distribution of ETRs before and after TCJA: the vast majority of U.S. C corporations with positive book income experienced an ETR increase between 2016 and 2019 (approximately 81% of all C corporations), despite the reduction in marginal tax rates for most of the pre-TCJA tax brackets.¹⁴

The picture is considerably different for public firms and private multinationals, where the distribution of ETRs shifts to the left in 2019. This picture is similar to findings for public multinationals documented by Wagner, Zeckhauser, and Ziegler (2020) for the distribution of changes in firms' global cash ETRs after TCJA. In addition, the mass of public and private multinationals at a zero ETR increased in 2019 relative to 2016.

III.B Exposure to TCJA Corporate Provisions

In this section, we move beyond studying the ETR—an “overall” measure of tax liability—and examine the scope and economic salience of specific TCJA provisions. Given the lack of transparency and scarcity of available granular information about many firms' financial and tax positions, it can be challenging for researchers and policymakers to understand the exposure of different types of firms to the various legislative changes in the bill. To fill this gap in the literature, we document firms' tax-related characteristics in 2016, one year prior to the passage of TCJA and two years prior to most provisions taking effect, as a proxy for exposure to different provisions

¹³Average and marginal tax rates are the same in the first bracket of a graduated rate structure.

¹⁴We approximate the share of firms receiving a tax increase by matching firms with positive book income from the 2016 and 2019 SOI sample based on their sampling weight, which is a function of the firm's assets, and comparing the difference in their ETRs. We then compute the weighted share of firms that received a tax increase.

prior to TCJA.

Table 2 reports sample means for a list of firm-level indicators that serve as proxy measures for exposure to TCJA's major provisions. The fraction of exposed firms is presented for all firms in column 1, public multinationals in column 2, public domestic firms in column 3, private multinationals in column 4, and private domestic firms in column 5.

The centerpiece of TCJA corporate provisions was the change from an approximately graduated corporate tax schedule, with a maximum rate of 35%, to a flat corporate income tax rate of 21%. To better understand the relative importance of the corporate tax rate change, we examine the share of firms in each tax bracket in 2016. From that baseline, a substantial fraction of private domestic U.S. firms would have had higher ETRs under TCJA's new tax rate schedule (*ceteris paribus*): 43% were in the first tax bracket (with a 15% tax rate) in 2016 and 36% of private domestic firms paid no tax. In contrast, virtually 0% of public firms were in the first tax bracket while a similar fraction of private multinationals and public firms paid no tax. For firms with positive taxable income, the largest fraction of public domestic and private multinationals were in the 34% bracket (with between \$335 thousand and \$10 million in taxable income) and for public firms, 57% were in the top 35% tax bracket, with greater than \$18 million in taxable income.

The corporate AMT repeal and DPAD repeal were more likely to affect multinationals and public firms than domestic private firms. In 2016, the AMT affected few private domestic firms (about 1%), but around 12% and 9% of public and private multinationals, respectively, and about 16% of public domestic firms. The DPAD was most utilized by multinationals, claimed by 45% and 24% of public and private multinationals in 2016, respectively, compared to just 9% of public domestic firms and 6% of private domestic firms.

The other two provisions with wide applicability were the NOL limitations and the capital expensing provisions. Sixty-one percent of public multinationals and 50% of public domestic firms were able to claim an NOL carryforward, as well as 43% and 46% of multinational and domestic private firms, respectively. A large majority of public firms and private multinational firms also claimed depreciable capital expenditures in 2016, which would likely have been eligible for immediate, full bonus depreciation (and lower current-year taxable income) under TCJA. This was more common for public multinationals and domestic firms (94% and 85%, respectively) than private multinationals (73%). Of private domestic firms, 38% claimed depreciable capital expenditures in 2016.¹⁵

The interest limitation—which was based on the amount of interest expense relative to adjusted taxable income—would have affected a small share of U.S. firms. While a large fraction of firms had positive interest expenses, a small fraction had positive taxable income and interest expense above the limitation in 2016: around 5% of public and private multinationals, for example.

¹⁵Note that prior to TCJA, many smaller firms were already able to expense a portion of their capital expenditures through Section 179.

Table 2: Exposure to TCJA Provisions

TCJA Provision	(1) All Firms	(2) Public Multinational	(3) Public Domestic	(4) Private Multinational	(5) Private Domestic
Income Tax Bracket					
Zero taxable income, >0 net income	0.310	0.173	0.210	0.251	0.311
Zero taxable income, ≤0 net income	0.050	0.120	0.135	0.077	0.049
15% tax bracket (< 50K taxable income)	0.427	0.000	0.001	0.043	0.435
25% bracket (\$50K-75K taxable income)	0.053	0.001	0.001	0.006	0.054
34% bracket (\$75K-100K taxable income)	0.032	0.000	0.008	0.012	0.033
39% bracket (\$100K-335K taxable income)	0.069	0.005	0.029	0.119	0.069
34% bracket (\$335K-10M taxable income)	0.052	0.086	0.282	0.340	0.047
35% bracket (\$10M-15M taxable income)	0.001	0.026	0.053	0.033	0.001
38% bracket (\$15M-18M taxable income)	0.001	0.016	0.027	0.013	0.000
35% bracket (> \$18M taxable income)	0.005	0.573	0.255	0.106	0.001
Exposure to Select Deductions					
Paid the corporate AMT	0.015	0.124	0.162	0.092	0.013
Had an NOL carryforward	0.456	0.608	0.501	0.433	0.455
Used an NOL carryforward	0.430	0.513	0.385	0.382	0.431
Depreciable capital expenditures	0.388	0.936	0.845	0.725	0.381
Claimed the DPAD	0.064	0.456	0.087	0.244	0.060
Above interest limit, >0 taxable income	0.031	0.057	0.014	0.045	0.031
Positive net interest expense	0.420	0.764	0.325	0.636	0.416
Exposure to International Provisions					
Unrepatriated foreign earnings	0.005	0.593	0.000	0.290	0.000
Positive foreign E&P	0.010	0.834	0.000	0.587	0.000
Received dividends from CFCs	0.003	0.298	0.033	0.094	0.001
Foreign E&P in excess of DTIR	0.006	0.547	0.000	0.327	0.000

The table presents descriptive statistics of the share of firms exposed to various TCJA corporate tax provisions in 2016, prior to the law's enactment. Statistics are provided for all firms in column (1) and four groups of firms in columns (2) to (5): Public multinationals, public domestic firms, private multinationals, and private domestic firms. Statistics are firm-weighted using SOI weights to be representative of the U.S. population of C corporations. The table was created by the authors using IRS administrative tax data and variables are defined in Appendix A. All samples are weighted using SOI weights to produce firm-weighted population averages.

Lastly, we examine the relative importance of the corporate international provisions.¹⁶ A cornerstone of the multinational policy changes was the switch from a worldwide tax system, whereby foreign earnings were taxed when repatriated to the United States, to a territorial tax system, whereby foreign earnings would be taxed at foreign, local rates. Approximately 83% of public multinationals and 59% of private multinationals had positive foreign earnings overall in 2016. About 30% of public multinationals and 9% of private ones repatriated earnings to the United States in that year, which manifests as a U.S. parent receiving a dividend from a CFC. Finally, we also evaluate the global intangible low-taxed income (GILTI) provision. GILTI exacts at least a 10.5% tax on a firm’s foreign earnings that are greater than 10% of qualified business asset investments (QBAI). In 2016, we observe that 55% of public multinationals and 33% of private multinationals had foreign earnings in excess of 10% of tangible assets, a proxy for QBAI.

III.C Correlates of ETR Changes

How was exposure to various TCJA provisions correlated with changes in firms’ effective tax rates? This section estimates the relative salience of different provisions to observed ETR changes documented in Section III.A. We regress firm-level ETR changes from 2016 to 2019 on indicators for pre-TCJA firm-level exposure to significant provisions of TCJA, using the following specification:

$$\Delta ETR_f = \alpha + \beta_1 \cdot \leq 2ndMTRBracket_f + \beta_2 \cdot \geq 4thMTRBracket_f + \beta_3 AMT_f + \beta_4 NOL_f + \beta_5 Bonus_f + \beta_6 DPAD_f + \beta_7 InterestLimitation_f + \beta_8 MNC_f + \epsilon_f \quad (1)$$

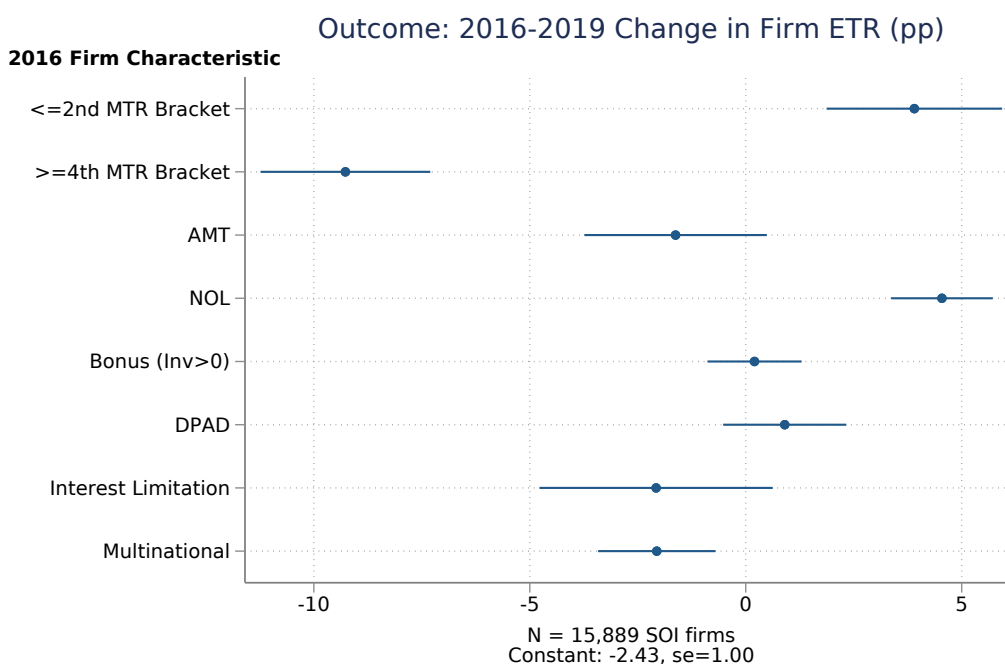
In the regression, the outcome ΔETR_f is the 2016 to 2019 change in the cash ETR, measured at the firm level (f), and all the regressors are defined using firm characteristics in 2016. $\leq 2ndMTRBracket$ is an indicator variable equal to 1 if a firm was in the first (15%) or second (25%) tax bracket or paid zero tax as defined in Table 2; $\geq 4thMTRBracket$ is an indicator variable equal to 1 if a firm was in the fourth tax tax bracket or higher as defined in Table 2; AMT is an indicator variable equal to 1 if a firm paid the corporate AMT, NOL is an indicator variable equal to 1 if a firm used an NOL carryforward; $Bonus$ is an indicator variable equal to 1 if a firm reported any capital expenditures on Form 4562; $DPAD$ is an indicator equal to 1 if a firm claimed the DPAD; $InterestLimitation$ is a dummy variable equal to 1 if a firm is above the interest limitation and had positive taxable income (denoted *Above interest limitation*, $> taxable\ income$ in Table 2); and MNC is a dummy variable equal to 1 if a firm has a CFC during the sample period. The regression is weighted using SOI sampling weights and the standard errors

¹⁶The international provisions generally may lead to a change in the amount of U.S. corporate tax owed by a corporation without any change in their domestic book income.

are clustered by firm.

The coefficient estimates from this specification capture not only correlations between exposure to TCJA’s provisions and changes in ETRs, but may also reflect firms’ behavioral responses to the policies that generate secondary effects on their ETRs. For example, while the direct effect of a cut in the corporate income tax rate may be to reduce the firm’s ETR, the firm in response may engage in behaviors that increase its taxable profits, which in turn may have the second-order effect of increasing the firm’s tax liability and offsetting the ETR cut. We abstract from these second-order effects in the following analysis but note that firms’ behavioral responses to similar policy provisions have been studied in Kennedy et al. (2022), Dobridge, Landefeld, and Mortenson (2021), Dowd, Giosa, and Willingham (2020), and Zwick and Mahon (2017), among others.

Figure 3: Coefficient Estimates: TCJA provisions and ETR Changes



The figure presents coefficient estimates and 95% confidence intervals of a regression of the change in ETRs from 2016 to 2019 on indicators measuring a firm’s exposure in 2016 to various future TCJA provisions, as defined in Section III.C. The figure was created by the authors using IRS administrative tax data. The regression is weighted using SOI sampling weights and is tabulated in Online Appendix Table B1. Further information about variable construction is included in Appendix A.

Figure 3 displays the estimated coefficients and 95% confidence intervals for the policy-specific indicator variables in equation 1.¹⁷ These coefficient estimates suggest exposure to the statutory marginal tax rate changes and the NOL changes have the largest conditional correlations with ETR

¹⁷The regression results are tabulated in Online Appendix Table B1. The table also presents results including two-digit industry fixed effects in the specification, which are very similar.

changes.

Being in the first or second MTR bracket or paying no tax in 2016 is associated with about a four percentage point larger increase in ETR from 2016 to 2019, compared to firms in the third MTR bracket (the 34% bracket—the omitted group in the regression).¹⁸ By contrast, being in the fourth MTR bracket or above in 2016 is associated with about a $9\frac{1}{4}$ percentage point ETR cut compared to firms in the third bracket. Using an NOL carryforward in 2016 is associated with about a $4\frac{1}{2}$ percentage point higher ETR change. The coefficient on pre-TCJA AMT exposure has the expected negative association with the ETR change, although the coefficient on the interest limitation is not positive as expected; in both cases, however, the magnitudes are smaller than the income tax rate changes and NOL changes, and the correlations are not statistically significant. Exposure to bonus depreciation had almost no conditional correlation with ETR changes, while DPAD exposure was weakly and positively correlated. Multinational firm status was associated with a 2 percentage point reduction in ETR.¹⁹ Overall, the results provide suggestive evidence that TCJA’s changes to the corporate tax rate schedule and to the tax treatment of NOL’s were particularly economically relevant for explaining changes in firms’ tax positions in the years immediately following the policy change.

IV Conclusions

In this paper, we use a representative sample of U.S. C corporation tax returns to summarize the direct effects of TCJA corporate tax provisions on the tax positions of corporations. While the decline in public firm ETRs after TCJA has been well-documented by other researchers and TCJA’s corporate tax cuts are commonly discussed in media and other public venues (*e.g.*, see Rubin and Francis (2018) and Rubin and Francis (2021)), we present several novel facts about changes in ETRs and the relative importance of several aspects of this complex reform.

We document that a majority of U.S. firms with positive book income saw an increase in their ETR after passage of TCJA and that the average domestic ETR increased for U.S firms overall as well. Both trends were driven by an increase in ETRs for private domestic firms. We show that similar to public MNCs, private MNCs saw a decline in ETRs after TCJA, but a smaller decline than was experienced by public multinational and domestic firms. As of 2019, the average ETR for private domestic firms with positive book income was *higher* than for public firms or for private

¹⁸The third bracket was omitted because it is the first with an unambiguous reduction in the average and marginal statutory tax rates. The point estimate on the constant term indicates firms in that bracket had an ETR reduction of around $2\frac{1}{2}$ percentage points.

¹⁹The complex nature of the international reforms makes it difficult to form an *ex-ante* prediction on the sign of the multinational status indicator. Some provisions, like FDII, were unambiguously rate cuts and some, like the BEAT, were unambiguously increases. GILTI, on the other hand, may have acted as a rate cut for some and an increase for others. The original JCT score of the international provisions of TCJA indicated a slight revenue loss excluding the repatriation tax under section 965.

multinationals—a striking reversal of the pre-TCJA ETR positions of these firms. Finally, we find that the change in statutory tax rates and the limitation on net operating losses had the strongest correlation with changes in firm ETRs from 2016 to 2019. Exposure to the corporate AMT repeal, the interest limitation, and the multinational provisions had smaller, negative correlations, while exposure to the bonus depreciation and DPAD changes had little effect.

Our work contributes to the body of existing research by presenting a more comprehensive picture than previous work of the effects of TCJA on tax positions of U.S. corporations, the majority of which are privately held, domestically based, and small in terms of total assets and employment. Given the opaqueness of tax positions of privately held firms that do not file public financial statements, as well as limited information even about tax positions included in public firm financial statements, it is challenging to evaluate changes in the U.S. tax code. This study provides a resource for researchers, policymakers, and the general public to better understand the direct effects of this sweeping reform, including its component parts.

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Online Appendix A: Variable Definitions

The table below provides our variable definitions. All data are sourced from the IRS. Forms and lines referenced are for 2016 unless otherwise noted.

Table A1: Variable definitions

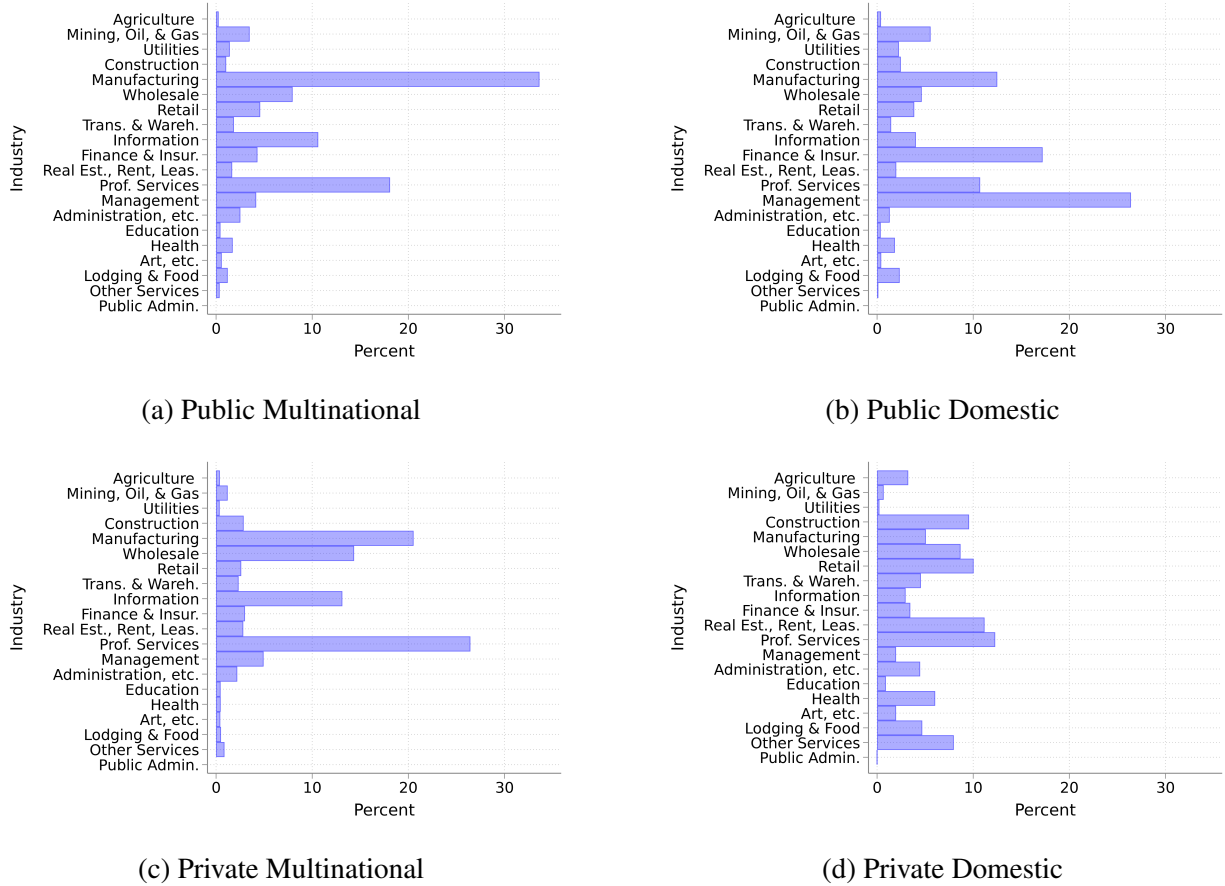
Variable	Definition
<i>Taxes paid</i>	Form 1120: line 31
<i>Domestic cash effective tax rate (ETR)</i>	When a firm reports attaching a Schedule M-3 to the Form 1120 (Box A4): $Taxes\ paid / [Net\ income\ (loss)\ per\ income\ statement\ of\ includible\ corporations\ (Schedule\ M-3,\ Part\ I,\ line\ 11) + U.S.\ current\ income\ tax\ expense\ (Schedule\ M-3,\ Part\ III,\ line\ 1) + U.S.\ deferred\ income\ tax\ expense\ (Schedule\ M-3,\ Part\ III,\ line\ 2)]$ When a firm does not report attaching a Schedule M-3: $Taxes\ paid / [Net\ income\ (loss)\ per\ books\ (Schedule\ M-1,\ line\ 1) + Federal\ income\ tax\ per\ books\ (Schedule\ M-1,\ line\ 2)]$.
<i>Positive taxes paid (0/1)</i>	Indicator variable equal to 1 if $Taxes\ Paid > 0$
<i>Total assets</i>	Form 1120: Schedule L, line 15 (column d)
<i>Sales</i>	Form 1120: line 1c
<i>Depreciable assets</i>	Form 4562: sum of lines 19a (column c) to line 19i (column c) + line 20a (column c) + line 20b (column c) + line 20c (column c) + line 14 + line 15 + line 16
<i>Net income</i>	Form 1120: line 28
<i>Taxable income</i>	Form 1120: line 30
<i>Payroll</i>	Sum of total wages reported on employee Form W-2s (Box 5, Medicare Wages) of a given firm, after SOI firm sample is merged to universe of employee W-2s (see Dobridge, Landefeld, and Mortenson (2021) for more detail on the SOI merge)
<i>U.S. employment</i>	Sum of total firm employees after SOI sample is merged to universe of employee W-2s, as described in Dobridge, Landefeld, and Mortenson (2021)
<i>Paid the corporate AMT</i>	Indicator variable equal to 1 if the corporate alternative minimum tax (AMT) (Form 1120: Schedule J, line 3) > 0
<i>Had an NOL carryforward</i>	Indicator variable equal to 1 if the net operating loss (NOL) stock (Form 1120: Schedule K, line 12) > 0

Variable definitions

<i>Used an NOL carryforward</i>	Indicator variable equal to 1 if Form 1120: line 29a > 0
<i>Bonus or Had depreciable capital expenditures</i>	Indicator variable equal to 1 if a firm reported any capital expenditures on Form 4562.
<i>Claimed the DPAD</i>	Indicator variable equal to 1 if the Domestic Production Activities Deduction (DPAD) (Form 1120: line 25) > 0
<i>Had positive net interest expense (0/1)</i>	Indicator variable equal to 1 if interest deduction minus interest income (Form 1120: line 18 minus Form 1120: line 5) > 0
<i>Above interest limitation</i>	Indicator variable equal to 1 if net interest expense (Form 1120: line 18 minus Form 1120: line 5) > 0 30 percent of firm earnings before interest, taxes and depreciation (EBITDA) (Form 1120: line 28 plus Form 1120: line 18 + Form 1120: line 20 + Form 1120: line 25)
<i>Above interest limitation, > 0 taxable income</i>	Indicator variable equal to 1 if <i>Above interest limitation</i> = 1 and if <i>Taxable income</i> > 0
<i>Positive net interest expense</i>	Indicator variable equal to 1 if depreciation deduction (Form 1120: line 18) > 0
<i>Unrepatriated foreign earnings</i>	Indicator variable equal to 1 if total foreign earnings and profits (E&P) reported on Form 5471: Schedule H, line 5d is non-zero
<i>Positive foreign E&P</i>	Indicator variable equal to 1 if total foreign earnings and profits (E&P) reported on Form 5471: Schedule H, line 5d is non-zero
<i>Repatriated earnings</i>	Indicator variable equal to 1 if positive dividends reported on Form 1120: Schedule C, lines 7, 8, or 13.
<i>Foreign E&P in excess of DTIR</i>	Indicator variable equal to 1 if foreign E&P (Form 5471: Schedule H, line 5d) is > deemed tangible income return (DTIR). DTIR is 10% of Form 5471 Schedule F: line 8a

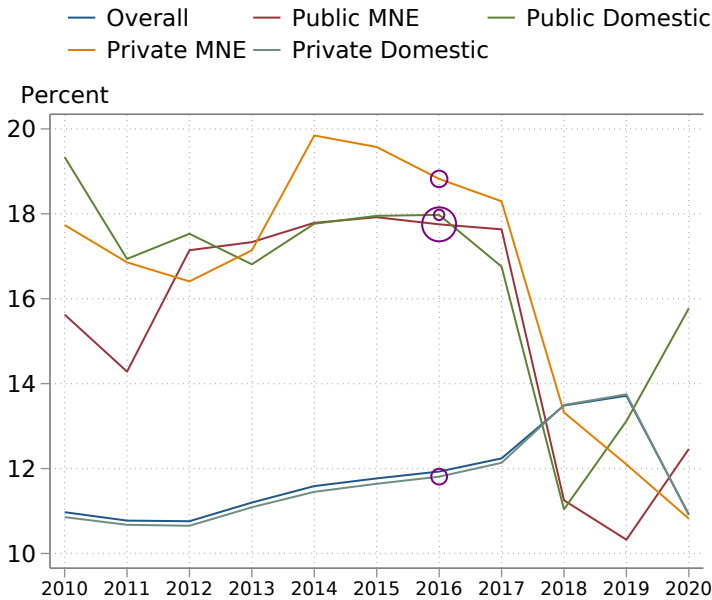
Online Appendix B: Supplementary Figures and Tables

Figure B1: Industry distribution by firm type

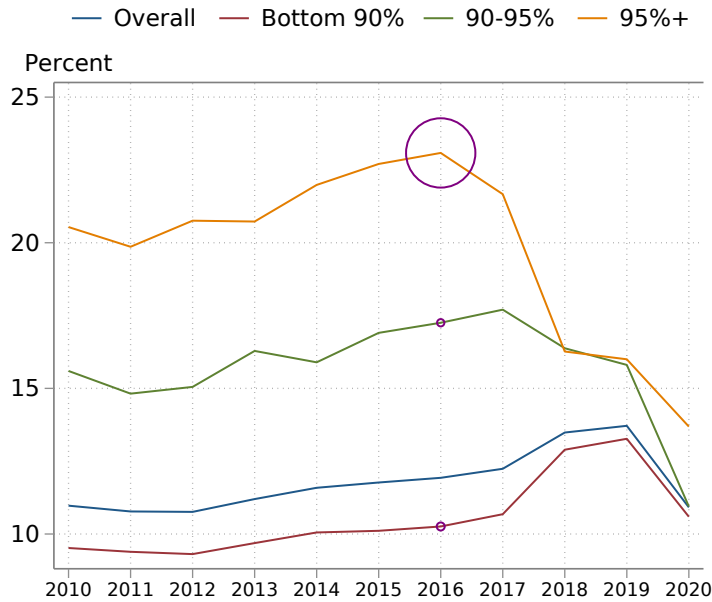


This figure presents the share of firms in the sample in each SOI industry by firm type. Panels (a), (b), (c), and (d) show the distributions for public multinationals, public domestic firms, private multinationals, and private domestic firms, respectively. All panels were created by the authors using IRS administrative tax data and variables are defined in Appendix A. All samples are weighted using SOI weights to produce firm-weighted population averages. Note that private domestic firms make up 98 percent of the total firms in the sample and account for at least 94 percent of the total firms in each industry category.

Figure B2: Effective Tax Rates for C Corporations: 2010 to 2020



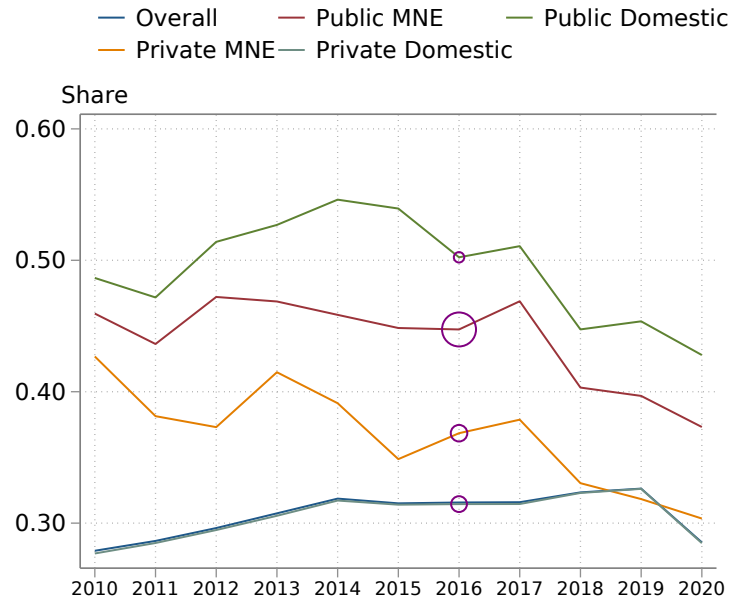
(a) By Public and Multinational Status



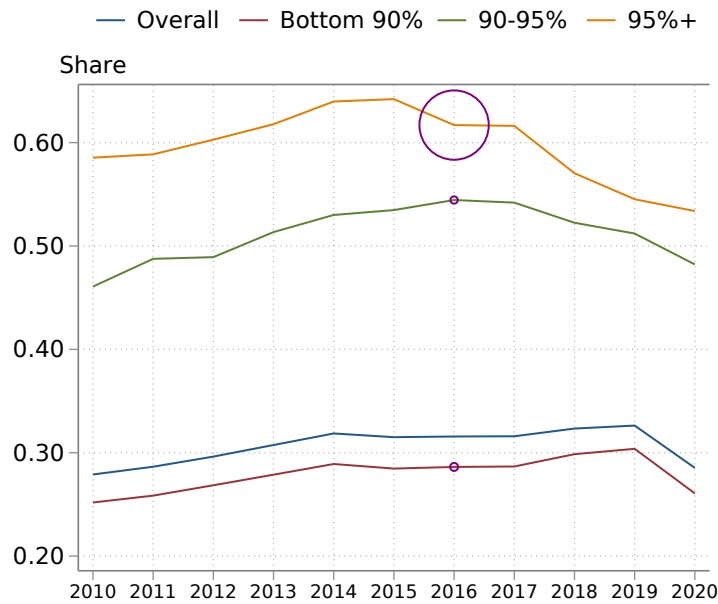
(b) By the Distribution of Sales

This figure presents trends in average domestic cash effective tax rates from 2010 to 2020 for U.S. C corporations. Panel (a) presents trends for firms overall, for public multinationals (MNEs), public domestic firms, private MNEs and private domestic firms. Panel (b) shows trends for firms overall, for firms in the 95th percentile of the firm sales distribution in 2016, firms in the 90th to 95th percentile of the sales distribution in 2016, and firms below the 90th percentile in 2016. All panels were created by the authors using IRS administrative tax data and variables are defined in Appendix A. Bubble sizes are proportional to the aggregate share of 2016 federal corporate tax revenue collected from each firm type. All samples are weighted using SOI weights to produce firm-weighted population averages.

Figure B3: Fraction of U.S. firms paying U.S. federal taxes



(a) By Public and Multinational Status



(b) By the Distribution of Sales

This figure shows the fraction of various subsets of U.S. firms paying U.S. corporate income tax from 2010 to 2019. Panel (a) shows trends for U.S. firms overall, for public and private multinational firms, and for public and private domestic firms. Panel (b) shows trends for firms overall, for firms in the 95th percentile of the firm sales distribution in 2016, firms in the 90th to 95th percentile of the sales distribution in 2016, and firms below the 90th percentile in 2016. All panels were created by the authors using IRS administrative tax data and variables are defined in Appendix A. Bubble sizes are proportional to the aggregate share of 2016 federal corporate tax revenue collected from each firm type. All samples are weighted using SOI weights to produce firm-weighted population averages.

Table B1: TCJA provisions and ETR changes

	(1)	(2)
	Δ ETR	Δ ETR
\leq 2nd MTR Bracket	3.904*** (1.037)	4.083*** (1.063)
\geq 4th MTR Bracket	-9.269*** (1.003)	-9.185*** (1.038)
AMT	-1.625 (1.077)	-2.162** (1.092)
NOL	4.543*** (0.601)	4.831*** (0.631)
Bonus (Inv>0)	0.203 (0.556)	0.130 (0.564)
DPAD	0.903 (0.728)	0.916 (0.861)
Interest Limitation	-2.074 (1.377)	-2.170 (1.351)
Multinational	-2.060*** (0.693)	-1.659** (0.796)
Constant	-2.425** (0.999)	-2.655** (1.042)
Industry FE	No	Yes
R2	0.19	0.21
N Firms	15,889	15,889

This table presents regression results on the association between changes in firms' ETRs from 2016 to 2019 and pre-TCJA exposure to various significant provisions of the TCJA, estimated according to the specification in Equation 1. Column (1) presents results without fixed effects (as shown in Figure 3) and column (2) includes two-digit SOI industry fixed effects (equivalent to two-digit NAICS industries). The outcome variable ΔETR is the 2016 to 2019 change in the cash ETR, measured at the firm level, and all of the regressors are defined using firm characteristics in 2016. $\leq 1stMTRBracket$ is an indicator variable equal to 1 if a firm was in the first (15%) tax bracket or paid zero tax as defined in Table 2; $\geq 3rdMTRBracket$ is an indicator variable equal to 1 if a firm was in the third tax bracket or higher as defined in Table 2; *AMT* is an indicator variable equal to 1 if a firm paid the corporate AMT, *NOL* is an indicator variable equal to 1 if a firm used an NOL carryforward; *Bonus* is an indicator variable equal to 1 if a firm reported any capital expenditure on Form 4562; *DPAD* is an indicator equal to 1 if a firm claimed the DPAD; *InterestLimitation* is a dummy variable equal to 1 if a firm is above the interest limitation and had positive taxable income; and *MNC* is a dummy variable equal to 1 if a firm has a CFC during the sample period. Further information about variable construction is included in Appendix A. The regression is weighted using SOI sampling weights and the data source is IRS administrative tax data. Standard errors are clustered by firm and reported in parentheses. ***, ** and * indicate levels of 1 percent, 5 percent, and 10 percent significance, respectively.