Foreign Tax Advantages after the U.S. Tax Reform of 2017

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Abstract

We construct a firm-year panel of income-tax rate reconciliations from annual 10-K filings of public companies to study the effects of the Tax Cuts and Jobs Act (TCJA) on U.S. multinational profit shifting. These reconciliations decompose the gap between company-level effective tax rates and the federal statutory corporate tax rate, allowing us to isolate the contribution of foreign tax advantages before and after the reform. We find that TCJA significantly reduced the tax rate gap and increased effective tax rates for companies most exposed to pre-TCJA international tax benefits. This resulted in an onshoring of profits with foreign profit shares falling 1.3 percentage points per percentage point of tax increase. Among more exposed companies, we find no differential change in investment, employment, or the geographic distribution of sales and installed capital. A neoclassical model of a multinational that chooses where to book its income rationalizes this pattern: the reform raised the average tax on income booked abroad relative to income booked at home, which governs where profits are reported, while the marginal tax on capital, which governs investment, changed by an amount common to all firms. The tax reform also changed company balance sheets through a one-time remeasurement of deferred taxes. Companies with larger remeasurement gains did not invest more, and controlling for these gains leaves our main results unchanged.[1]

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1 Introduction

One of the central policy goals of the Tax Cuts and Jobs Act (TCJA) of 2017 was to reduce incentives for profit shifting by U.S. multinationals and to encourage the onshoring of profits in the United States. Toward this goal, the federal corporate tax rate was lowered from 35 to 21 percent, special deductions for foreign-derived income were created, tax floors for foreign intangible income and deductible payments to foreign affiliates were introduced, and indefinite tax deferrals abroad were disallowed. This paper provides a post-TCJA policy evaluation using a novel dataset from Securities and Exchange Commission (SEC) filings of company annual reports. We combine automated rule-based parsing with large language models (LLMs) to extract the full income tax reconciliation table that is reported on SEC 10-K forms. The table reconciles a company's effective tax rate and the federal statutory corporate income tax rate by listing all adjustments for items such as foreign and local tax differentials, tax credits, one-time changes in law, and valuation adjustments.[2] This reconciliation in turn is used along with a difference-in-differences strategy to estimate the causal impacts of TCJA and the extent to which the tax reform achieved the stated objective of onshoring profits.

The empirical strategy exploits cross-sectional variation in pre-TCJA exposure to foreign tax benefits and compares company post-TCJA outcomes, most notably, effective tax rates, foreign profit shares, and real productive activities. To measure foreign exposure, we use adjustment items in the income tax reconciliation table related to the taxation of foreign corporate profits. In the pre-TCJA period, companies reported foreign and domestic corporate income tax rate differentials. In the post-TCJA period, companies also included adjustments related to the international provisions of the tax reform act such as the tax floor on foreign intangible income. We aggregate all reconciliation items reflecting differences in the taxation of foreign and domestic income and use this international contribution to the overall tax rate gap as our main explanatory variable in the difference-in-differences regression. We also include firm and industry-year fixed effects and perform preliminary validity checks to verify that there is meaningful within-industry variation in our measure of international exposure and parallel pre-TCJA trends.

The main data input for the empirical analysis is a reproducible firm-year panel of income tax

[2]The Compustat North America Fundamentals Annual database (hereafter Compustat (2026b)) reports the effective tax rate, but does not provide details on reconciliation adjustments.

reconciliation tables over 1998–2024, linked to the Compustat (2026b) database. For every 10-K filing of a Compustat firm available from the SEC Electronic Data Gathering, Analysis, and Retrieval System database (hereafter EDGAR (2026)), an automated parser locates the reconciliation table and a second stage parser—that is rule-based if the table is regular, and a large language model if it is not—converts it to a common row format. Every extracted table must satisfy the accounting identity that the statutory rate plus the reported adjustments equals the reported effective rate. The panel covers 95.7 percent of Compustat sales for our main sample period 2013–2024.

Once we have the firm-year panel, we group reconciliation adjustments into economically meaningful categories. There are two main categories related to TCJA. The first category, which was described earlier, includes all adjustments related to differences in taxation of profits booked in the United States and profits booked abroad. The second category includes all adjustments related to current-year changes in law such as those indicating a change under TCJA in 2017. We document a significant closure in the average sales-weighted gap between the effective and statutory tax rates after the 2017 reform. We find that the largest changes are attributable to the international and one-time adjustments, with very little change in the remaining reconciliation categories—namely, federal credits, state and local taxes, and general accounting adjustments. We find similar patterns across industries, with the largest changes in the international tax gap occurring in technology, pharmaceuticals, manufacturing, and oil and gas.

Using our difference-in-differences framework, we estimate that one percentage point more pre-TCJA exposure is associated with a 0.78 percentage points closure in the international contribution to the tax rate gap. Furthermore, we find there was a significant pass-through to higher effective tax rates: one percentage point more pre-TCJA exposure is associated with a 0.61 percentage points increase in the rate. To provide context, consider two companies in the same industry whose international contributions to the tax rate gap differed by 5 percentage points before the reform—say, -10 and -5. After TCJA, the more exposed company's international contribution closed by 3.9 percentage points more than the less exposed company's, and its effective tax rate rose by 3.1 percentage points more. The difference between the two is what companies recovered through the remaining reconciliation categories.

The same empirical strategy is used to estimate the extent of post-TCJA onshoring and changes in real activities. We find that TCJA significantly lowered reported foreign profit shares of the

internationally exposed companies, but that more exposed companies did not differentially change their productive activities—neither the location nor the scale. For every one percentage point of TCJA-induced effective tax rate increase, the company's foreign profit share falls by 1.32 percentage points. Because the reform's changes to the user cost of capital were common to all companies in an industry, our design is silent on whether investment rose in the aggregate. We find that companies most responsive in relocating reported profits are R&D intensive with large cash balances relative to total assets, but we find no difference in income shifting for firms with and without subsidiaries in tax havens. While the companies shifted profits back to the United States, the geography of their sales and installed capital hardly changed. Similarly, levels of capital and R&D expenditures and growth in sales and employment show no significant response to the reduction in foreign tax benefits.

Separately from the international tax benefits, the domestic corporate tax cut of 14 percentage points under TCJA generated a one-time deferred-tax windfall that could relax financial constraints for many companies and spur investment—potentially confounding our baseline empirical results. We investigate whether this one-time gain translated into higher investment by exploiting differences in net deferred tax liabilities across company balance sheets. We run a difference-in-differences regression with the main right-hand-side variable being the windfall gain that is equal to the net deferred tax balance—deferred tax assets less liabilities—in 2016 divided by the total assets in 2015 and multiplied by the tax change. We find no detectable effect on capital expenditures or R&D expenses in the aggregate or across different subgroups of firms. As a robustness check on our baseline results, we also include the windfall variable as a control and find the main results are unchanged.

To interpret our empirical findings, we propose a minimal neoclassical model of a multinational that chooses R&D, tangible investment at home and abroad, and where to book its income. In the model, investment depends on marginal user costs of capital, and booking depends on the wedge between the domestic and foreign tax rates on booked income. TCJA changed user costs by amounts common within an industry, which our fixed effects absorb, and collapsed the tax wedge—most for the firms that had booked the most income abroad, which is what the international exposure measure captures in our empirical design. We use our difference-in-differences regression coefficients and key relations in the model to estimate the share of the foreign tax advantage—as

measured by the international contribution in the income tax reconciliation table—attributable to pure profit-shifting to tax havens with no substantive productive operations. We find shares ranging from 28 to 66 percent, depending on the effectiveness of the *global intangible low-taxed income* (GILTI) provisions. The implied foreign tax rates on income that was not shifted are in the range of 12 to 19 percent.

1.1 Related Literature

The income tax reconciliation table has been studied before, but collected by hand and used to answer different questions. Dyreng et al. (2017) document a quarter-century decline in the effective tax rates of U.S. companies. Drake, Hamilton, and Lusch (2020) hand-collected reconciliation items over the period 1996–2015 and use it to study the role of valuation allowances in explaining differences in effective tax rates over time and across companies. Schwab, Stomberg, and Xia (2022) use the reconciliation table to separately study factors related and unrelated to tax avoidance over the period 2008–2016. We automate the extraction over every 10-K filer on EDGAR from 1998 to 2024 and link the result to Compustat, which is what makes it possible to follow the international contribution to the tax gap across the 2017 reform for the full population of public companies rather than a hand-collected subset. Donohoe, McGill, and Outslay (2012) catalogue what these SEC disclosures cannot reveal about a multinational's foreign operations. The classification diagnostics in Appendix A.2 are our accounting of those limits.

The main focus of our paper is multinational profit shifting. Since Hines and Rice (1994), who regressed affiliates' reported profits on tax-rate differences across countries, the responsiveness of booked income to tax differentials has been estimated many ways. Dharmapala (2014) surveys this literature. Dowd, Landefeld, and Moore (2017) use U.S. tax returns to show that profit-shifting responses are highly nonlinear, which is why we distinguish rates in tax havens from the average rates on foreign operations when interpreting the data through the lens of neoclassical theory (in Section 4). At the aggregate level, Tørsløv, Wier, and Zucman (2023) estimate that roughly a third of global multinational profits are shifted to tax havens, with U.S. companies shifting more than half of their profits and multinationals from other nations shifting about a quarter. Their estimates are the natural comparison for the pre-TCJA profit shifted shares we recover later in Section 4. Guvenen et al. (2022) show that this profit shifting distorts measured U.S. output, productivity,

and the labor share.

Closest to our analysis are the studies by Grubert (2003, 2012), who used company-level Internal Revenue Service (IRS) microdata from Forms 1120 and 5471. Grubert (2003) studied R&D intensive controlled foreign corporations and estimated that half of observed differences in profitability between high and low-tax countries was due to shifting income derived from R&D operations. Grubert (2012) estimates that a one percentage point increase in foreign effective tax rates reduces the foreign share of multinational income by roughly 0.7 percentage points. His empirical strategy relies on variation across firms in the change in their effective foreign tax rates between 1996 and 2004, whereas we exploit TCJA as a large policy shock and compare firms with different pre-reform exposure to foreign tax advantages. This empirical design provides a more transparent policy-induced source of identifying variation for estimating the effect of tax incentives on the location of reported profits. In terms of the estimate of interest, we find a larger response of reported foreign profits to tax incentives than in Grubert's pre-TCJA sample, most likely because TCJA generated a larger and more salient shock to tax incentives than the cross-country variation exploited in the earlier work. With our dataset that includes information on capital expenditures, research and development, and growth in sales and employment, we also extend the analysis of Grubert (2012) who did not have such measures of real activity.

The literature evaluating TCJA is already large (see, for example, Dharmapala (2024) and Gravelle and Marples (2025) for surveys). Two findings in that literature frame ours. First, on aggregate profit shifting, Garcia-Bernardo, Janský, and Zucman (2026) combine survey, tax, and financial-statement data and find that the share of U.S. multinationals' profits booked abroad fell by only one to five percentage points after the reform and that the haven share of foreign profits was roughly stable. Dharmapala (2024) concludes that shifting fell by no more than the rate cut alone would predict. Our design is complementary rather than contradictory. We do not estimate the aggregate impacts. Instead, we estimate how much more the most exposed companies onshored than their less exposed peers within the same industry. We find that response to be large and concentrated in R&D-intensive firms—the heterogeneity the aggregate studies observe but cannot attribute. Second, on investment, Chodorow-Reich et al. (2024) and Kennedy et al. (2022) identify responses to the reform's changes in the user cost of capital. Those changes were largely common to firms within an industry and are absorbed by fixed effects in our regressions.

The theory used to interpret our empirical findings distinguishes between two tax margins. Firms choose where to book income based on average tax-rate differences across jurisdictions and how much to invest based on marginal user costs. This distinction follows Grubert and Slemrod (1998) and mirrors the standard distinction between average and marginal effective tax rates in Devereux and Griffith (1998, 2003). The theory combines the user-cost framework of Hall and Jorgenson (1967), the standard treatment of deferral in Hartman (1985), and the concealment-cost approach to profit shifting in Hines and Rice (1994).

2 Data

The central contribution of our data construction is a new firm-year panel of income tax reconciliation tables extracted from SEC Form 10-K filings. In this section, we first describe the reconciliation tables and then the procedures used to extract and link them to the Compustat (2026b) database.[3]

2.1 Reconciliation Table Description

SEC filings of Form 10-K must be prepared in accordance with the U.S. Generally Accepted Accounting Principles (GAAP), which are officially organized and referenced within the Accounting Standards Codification (ASC). The specific code of interest here is ASC 740, which governs how companies must account for income taxes under GAAP. Companies are required to reconcile their effective corporate tax rate starting from the U.S. federal statutory rate by disclosing reconciling adjustments such as foreign tax differentials, federal credits, state and local taxes, valuation allowances, and other accounting remeasurements in accordance with ASC 740.

In Table 1, we provide an example of an income tax reconciliation table, which was sourced from the 2018 annual report of Alphabet, Inc. As is standard for larger filers, the table has three columns of data for the reporting year and two prior years. The first row of the table reports the federal statutory rate. Over the period 2016–2018, Alphabet reported a rate of 35 percent for 2016 and 2017 and then 21 percent for 2018.[4] An important part of the parsing step is to find this row and the associated columns with the filing years. We also check if the company uses tax rates or tax

[3]Details on the samples and methods used to extract data are provided in Appendix A and online code repository.

[4]Not every filer reports 35 or 21 percent. Firms with non-calendar fiscal years report a blended rate for the year straddling the enactment date, and foreign-domiciled filers report their home-country rate. In all cases, we measure the adjustments relative to the statutory rate reported in the table itself.

Table 1: Example Income Tax Reconciliation: Alphabet, 2018 Form 10-K

	2016	2017	2018
U.S. federal statutory tax rate	35.0	35.0	21.0
Foreign income taxed at different rates	(11.0)	(14.2)	(4.9)
TCJA one-time transition tax	0.0	37.6	(0.1)
TCJA deferred tax effects	0.0	(1.4)	(1.2)
Research credit	(2.0)	(1.8)	(2.4)
Stock-based compensation expense	(3.4)	(4.5)	(2.2)
European Commission fine	0.0	3.5	3.1
Deferred tax asset valuation allowance	0.1	0.9	(2.0)
Other adjustments	0.6	(1.7)	0.7
Effective tax rate	19.3	53.4	12.0

Notes: Entries are percentage-point contributions to the effective tax rate. Parentheses denote negative contributions. The table reports Alphabet's reconciliation from the U.S. federal statutory corporate tax rate to its effective tax rate for fiscal years 2016–2018.

amounts and, if the latter, we convert the amounts to rates using the pretax income from continuing operations reported in the filing itself. As we can see from Table 1, Alphabet reports rates. The next set of rows reports the tax rate adjustments used to compute the effective tax rate. These adjustment rows can be different company by company, but the first and last row of the table are always the same. Once we have extracted a table, we verify that the reported adjustments sum to the reported effective tax rate. Because reconciliation tables satisfy a simple accounting identity—the statutory rate plus all reported adjustments must equal the reported effective tax rate—this check validates the extracted data before they enter our analysis.

Alphabet's reconciliation shows large adjustments for the domestic–foreign rate differential in every year and, in 2017–2018, for the one-time TCJA items. We think of 2016—the first column of Table 1—as a pre-TCJA tax year with the two TCJA adjustments equal to zero. In that year, lower foreign corporate tax rates implied an 11 percentage-point lower effective tax rate when compared to the 35 percent U.S. federal statutory rate. The research credit row shows tax credits on R&D yielding a further -2 percentage-point adjustment. Another negative adjustment is made for stock-based compensation expenses if the company's stock price rises between the grant date

and the vesting date. In the case of Alphabet, these expenses lowered the effective rate another 3.4 percentage points. The valuation-allowance row near the bottom of the table records changes in how much of its future tax benefits the company expects to be able to use. When the company writes down those benefits, its reported tax rate rises, as in 2016 and 2017. When it restores some of them, its reported tax rate falls, as in 2018. The final adjustment called "other" includes small adjustments not elsewhere classified.

When TCJA passed in 2017, new items appeared on the income tax reconciliation as shown in the second column of Table 1, namely, the one-time transition tax and the deferred tax effects. The transition tax—sometimes listed as IRC Section 965—is a tax on foreign earnings that had not yet been repatriated under the previous world-wide tax system. Under TCJA, the United States moved toward a territorial system, in which dividends from foreign subsidiaries are exempt from U.S. tax through a 100 percent dividends-received deduction. The one-time transition allowed companies to apply discounted tax rates: 15.5 percent on accumulated deferred foreign earnings held in cash-like assets and 8 percent on the remainder. Despite the discounted rates, the one-time transition implied a positive adjustment of 37.6 percentage points for Alphabet.

Deferred tax effects reflect the remeasurement of existing deferred tax assets and liabilities following changes in tax law. Because TCJA reduced the statutory corporate tax rate from 35 to 21 percent, both were written down. The sign of the adjustment therefore depends on a firm's net position: companies with net deferred tax liabilities saw future obligations revalued downward and recorded a one-time reduction in tax expense, while companies with net deferred tax assets saw future deductions become less valuable and recorded an increase. Both are common in our sample, and it is this variation that the deferred-tax windfall analysis of Section 3.2.4 exploits. For Alphabet, the adjustments were -1.4 and -1.2 percentage points in 2017 and 2018, respectively. In addition to the new TCJA items, Alphabet also paid non-deductible fines to the European Commission, which generated a positive adjustment to the effective tax rate.

In Table 2, we provide a general taxonomy to classify the different categories of adjustments to be used in our empirical analysis.[5] The first category on the list—which we will later call

[5]In December 2023, the Financial Accounting Standards Board (FASB) issued ASU 2023-09, which expands the required disclosure detail in the income tax reconciliation tables. It requires the reconciliation to be disaggregated into prescribed categories—including foreign tax effects by jurisdiction—and reconciling items above a quantitative threshold of 5 percent of pretax income times the statutory rate to be reported separately. The standard is effective for public companies for annual periods beginning after December 15, 2024, so apart from any early adopters it takes

international—is the primary focus of our study. Here, we include foreign rate differentials, foreign tax credits and withholding taxes, jurisdiction-specific tax holidays, Subpart F inclusions, and the three international provisions of TCJA: GILTI, *foreign-derived intangible income* (FDII), and *base erosion and anti-abuse tax* (BEAT). GILTI and FDII both require companies to compute a deemed 10 percent return on tangible assets and classify income in excess of that return as residual income for further tax calculations. GILTI subjects foreign residual income to a minimum tax, while FDII provides a deduction for qualifying domestic residual income derived from exporting goods and services. BEAT is a minimum tax on deductible payments made to foreign affiliates. Subpart F, which predates TCJA, taxes some categories of foreign income to the U.S. parent as it is earned rather than when it is repatriated. In the second category, which we call *one time*, we include adjustments arising from the enactment of a change in tax law, including the provisional amounts firms record on enactment and the revisions they make as those amounts are finalized. In the case of TCJA, these are the Section 965 transition tax and the deferred tax remeasurements discussed earlier in the case of Alphabet, which appear mainly in 2017 and 2018 rather than in the year of enactment alone.[6]

The remaining categories in Table 2 are not directly related to the international provisions of TCJA, though some are affected by its other provisions. The reform repealed the Section 199 deduction, which sits in *federal credits*, and lowered the federal benefit of deducting state taxes, which mechanically raises the *state & local* contribution at a 21 percent rate. Both are useful for our descriptive analysis of the pre- and post-reform period. The category in the third row is *Federal credits* and includes federal tax credits such as the research credit and, before its repeal by TCJA, the 9 percent Section 199 deduction for qualified production activities inside the United States. Next is *state & local*, which is primarily state corporate income taxes. The *valuation* category includes adjustments arising from the measurement of deferred tax assets and tax reserves and from revisions to prior-year estimates. These include valuation allowances, uncertain tax positions, adjustments related to net operating losses, and true-ups that reconcile the tax provision booked on financial

effect after our sample period ends and does not affect the disclosures we extract. It should make reconciliation tables more comparable going forward.

[6]SEC Staff Accounting Bulletin 118 granted a one-year measurement period to complete the accounting, and fiscal-year filers recorded the transition tax in fiscal 2018. Earlier reforms enter the same category: the repatriation charges taken under the American Jobs Creation Act of 2004, which will be visible in Figure 1, are one-time consequences of a change in tax law rather than an ongoing rate differential.

Table 2: Taxonomy of Income Tax Reconciliation Adjustments

Category	Included Tax Adjustments
International	Foreign rate differentials; foreign tax credits and withholding; tax holidays; Subpart F; GILTI; FDII; BEAT
One time	TCJA rate remeasurement; Section 965 transition tax
Federal credits	R&D credit; Section 199 domestic production deduction
State & local	State corporate income tax net of federal benefit
Valuation	Valuation allowances; uncertain tax positions; NOL; true-ups
Book v. tax	Non-deductibles; stock comp; goodwill; tax-exempt income; M&A; percentage depletion
Other	Unclassified residual; other adjustments n.e.c.

Notes: The categories are constructed from reconciliation line items reported in SEC Form 10-K filings. GILTI denotes global intangible low-taxed income; FDII denotes foreign-derived intangible income; NOL denotes net operating losses; M&A denotes mergers and acquisitions; and stock comp denotes stock-based compensation. True-ups are revisions to prior tax estimates resulting from updated information, audit resolutions, or amended filings.

statements to the actual liability calculated on the filed tax return. Purely temporary differences between tax and financial records do not appear in the reconciliation at all: they change when tax is paid and therefore leave the total tax expense—and hence the effective rate—unchanged. The *book v. tax* category includes adjustments related to permanent differences between tax and financial records. These include non-deductible expenses, stock-based compensation, goodwill, tax-exempt income, expenses related to mergers and acquisitions, and percentage depletion in excess of cost depletion. Reconciliation items that are not elsewhere categorized (n.e.c.) are included in *other*. Using Table 1 as an example, the foreign-rate row is *international*, the two TCJA rows are *one time*, the research credit is *federal credits*, stock compensation and the European Commission fine are *book v. tax*, the valuation allowance is *valuation*, and "other adjustments" is *other*.[7] Throughout what follows, a firm-year's contribution in a given category is the sum of the percentage-point values of all its rows assigned to that category, winsorized at plus or minus 15 percentage points.

[7]Categorizing the free-text row labels required a set of guidelines, which are detailed in Appendix A.2.

2.2 Reconciliation Table Extraction

We next describe the procedure used to extract income tax reconciliation data from company annual 10-K reports. We start from the annual filings on the SEC's EDGAR (2026) system for firms in Compustat (2026b) with a CIK–GVKEY link—forms 10-K, 10-K405, 10-KSB, 10-KSB40, 10-KT, and their amendments—supplemented by a small number of manually audited links for firms whose link was missing. The universe is therefore Compustat-linked filings rather than all of EDGAR. In this section, we describe how we first parse the 10-K filings to find tables and text most likely to contain the reconciliation data and then parse the results from the first stage for a second stage in which we construct a panel of standardized tables. The panel data are the inputs to our empirical analysis.

We begin with 123,835 unique 10-K filings from EDGAR (2026). Of these unique filings, 103,304 are available in HTML format suitable for our parsing procedures. Each of these filings is parsed into text blocks and candidate tables, which are scored according to how closely their language and structure resemble an income tax reconciliation table. For example, text blocks or tables containing phrases such as "effective tax rate," "statutory tax rate," or "rate reconciliation" would have high scores. We use the scores to rank candidates, not to exclude filings: every packet goes to the second stage, which turns it into standardized rows. We parse with a rule-based procedure if the structure of the table allows it and otherwise with a large language model. We then apply an arithmetic check to every observation. This recovers reconciliation data from 82,853 filings and 224,308 filing-year observations. Appendix A describes the parsing steps and reports the counts at each of them.

Because these tables typically report three years of data, the same firm-year often appears in as many as three filings. When a firm-year appears in more than one filing, we prefer the observation from the earliest filing year, then one that passes the arithmetic check, then an original 10-K over an amendment, and finally a higher-confidence extraction. The repetition serves a dual purpose. It gives an independent check on the arithmetic of each table, and it recovers firm-years whose own filing could not be parsed. We find that 23.0 percent of the panel comes from the prior-year column of a later filing rather than from the filing for that year. Once we have eliminated duplicates, we link filings to Compustat (2026b), keeping observations for 1998–2024. From this process, we have panel of 77,199 firm-year reconciliations. As a final check, we compare the extracted effective tax

rate with the one implied by Compustat (2026b): across linked firm-years the two agree to within half a percentage point in 83.8 percent of cases, with a median absolute difference of 0.02 percentage points.

Over the period 1998–2024, the year-by-year coverage rate has grown dramatically in line with higher usage of the HTML formatting. In 1998, our coverage is 8.3 percent but 79.5 percent by 2008 (see Appendix A for the full series). In Table 3, we report the coverage rates when compared to all firm-years in Compustat (2026b) for the period 2013–2024 of our empirical analysis. Rows in the table are subsamples of the population of companies and columns report coverage. The first column gives the number of Compustat firm-years in the group, which for the top-100, top-250, and top-500 groups is fixed by construction. Our sample contains 1,165 of them, a coverage rate of 97.1 percent for that group. Across the full population of 48,740 firm-years we cover 41,010, or 84.2 percent. On an equal-weighted basis, the highest coverage is achieved by firms with the most sales, which implies that the sales-weighted coverage is even higher. The coverage rate for the full sample—when sales-weighted—is 95.7 percent and 97.1 percent for companies in the top 100 of sales.

Averages are sales-weighted throughout, and industries follow the SIC-based classification reported in Appendix Table A.6. Beyond the reconciliation tables themselves, we use Compustat (2026b) for sales, pretax income, capital expenditures, research and development, employment, deferred taxes, and geographic segment sales.

3 Results

In this section, we use the income tax reconciliation panel dataset described in Section 2 to investigate the impact of TCJA on effective tax rates, profit shifting, real activity, and company balance sheets. We start with descriptive evidence that motivates our empirical strategies and case studies.

3.1 Descriptive Evidence

In this section, we report summary statistics for our income tax reconciliation database—at the aggregate and disaggregate levels and by industry. We document that the largest post-TCJA changes in the gap between effective and statutory corporate tax rates are attributed to a reduction

Table 3: Coverage of Extracted Tax Reconciliations, 2013–2024

Group	Compustat Firm-years	Covered Firm-years	Equal-weighted Share (%)	Sales-weighted Share (%)
Top 100	1,200	1,165	97.1	97.1
Top 250	3,000	2,884	96.1	96.7
Top 500	6,000	5,709	95.2	96.3
Full Sample	48,740	41,010	84.2	95.7

Notes: The Compustat population is Compustat (2026b) firm-years for fiscal years 2013–2024 that are incorporated in the United States, excluding depository institutions, investment offices, and real estate investment trusts. The top 100, 250, and 500 are those with the highest sales within the year, so their Compustat firm-year counts are fixed by construction. The equal-weighted share is the average across years of the covered share of firm-years. The sales-weighted share is the sales of covered firm-years as a fraction of the sales of all firm-years in the group.

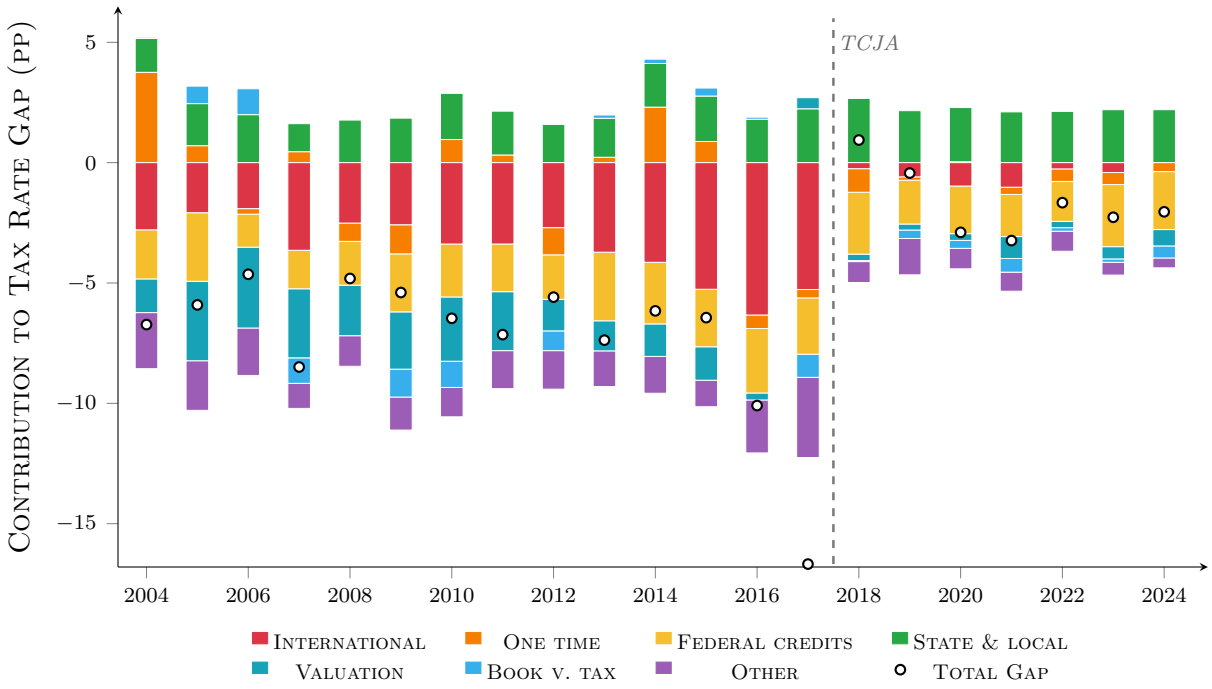
in foreign tax advantages. The figures and tables that follow use every covered firm-year with positive sales, whether or not the firm was profitable: 10,602 firm-years in 2013–2016 and 14,720 in 2019–2024, with 2017 and 2018 omitted as transition years around enactment.

3.1.1 Aggregate

In Figure 1, we plot contributions to the gap between the effective corporate tax rates and the U.S. federal statutory rate over the period 2004 to 2024, when coverage of the companies for which we have parsed reconciliation tables is at least two-thirds of the merged Compustat (2026b) sample. Each colored segment of the figure shows the sales-weighted average contribution to the rate gap—in percentage points—of that income tax reconciliation category for the given year. These categories match the list in our taxonomy of Table 2 and are constructed as described in Section 2. Across the sample, we see that some categories—like state and local corporate taxes—increase effective rates, and some categories—like federal tax credits—decrease effective rates. The dotted line marks the TCJA enactment and hollow circles show the sales-weighted average total gap in the year.

We use Figure 1 to provide a stark visual description of the aggregate impact of TCJA on the effective tax rates paid by publicly traded firms reporting to the SEC. The most notable change is the collapse of the international contribution (in red). Prior to TCJA, the international contribution provided the largest tax relief on average. The post-TCJA collapse is especially noticeable against

Figure 1: Contributions to the Gap Between Statutory and Effective Tax Rates



Notes: The figure reports the sales-weighted average contribution of each reconciliation category to the gap between the effective corporate tax rates of companies and the U.S. federal statutory rate. Negative values reduce the effective tax rate relative to the statutory rate. The dashed vertical line marks the enactment of the Tax Cuts and Jobs Act (TCJA) of 2017.

the other categories, none of which changes by more than 0.9 percentage points in absolute value between the two periods, against 4.3 for international. Averaging over 2013–2016, we find a total gap of −7.5 percentage points, with the international contribution equal to −4.8. Averaging over 2019–2024, the total gap falls to −2.1 percentage points with the international contribution down to −0.5.

3.1.2 Distributional

In Table 4, we show the full distributional results of the tax rate gaps. The first column shows the firm-year counts, which differ across categories because a firm-year enters a category only if the firm reports an entry. The second column shows the sales-weighted averages for 2013–2016 in the pre-TCJA panel and 2019–2024 in the post-TCJA panel. As in Figure 1, the largest average change occurs in the international category. In the last columns, we report selected sales-weighted

percentiles of the distribution. Here, we see how much variation there is and how the entire distribution shifts toward zero after TCJA. For example, the international contribution has a pre-TCJA median gap of −4.0 percentage points and an interquartile range of [−9.6,−0.9]. Because of its importance, the wide range in this category translates into a wide range for the overall tax rate gap. After TCJA, the range for the international contribution collapses to [−3.3,1.4] with the median close to zero. A perusal of the remaining categories also shows relative stability across these periods. For example, the distribution of state and local tax contributions changes only slightly.

3.1.3 By Industry

Next, we investigate the differences in income tax reconciliation contributions before and after TCJA for selected industries.[8] As before, we compute the difference between the effective and statutory rates. In Figure 2, we report sales-weighted industry averages of the tax gap in percentage points (pp) in two panels. Panel A shows the average total gap for 2013–2016 and 2019–2024 by industry. Panel B shows the change in the average reconciliation contributions, that is, the post-TCJA averages less the pre-TCJA averages.

Consider the total gap changes in Panel A of Figure 2. Here, we report sales-weighted averages for 2013–2016 (circles) and 2019–2024 (squares). As an example, the top row shows the changes for technology companies that had an average tax rate gap of −16.3 percentage points in the pre-TCJA period and −8.9 percentage points in the post-TCJA period. As the figure shows, the tax rate gaps close for all industries except utilities. Panel B shows that the main source of the closure—with utilities again the exception—is the international category of reconciliations. This closure contributes 7.1, 5.3, 5.7, and 5.4 percentage points for technology, pharmaceuticals, manufacturing, and oil and gas, respectively.

In Table 5, we reconsider the distributional impacts of TCJA, in this case by industry. We report the counts in the first column with the pre-TCJA data in the top panel and the post-TCJA in the bottom. The sales-weighted averages from Figure 2 are repeated here in the second column for convenience. The final columns show the sales-weighted 25^{th}, 50^{th}, and 75^{th} percentiles of the distribution for the pre- and post-TCJA periods. Comparing these periods, we find a significant shift to higher rates across industries and a narrowing of the interquartile ranges for all but utilities.

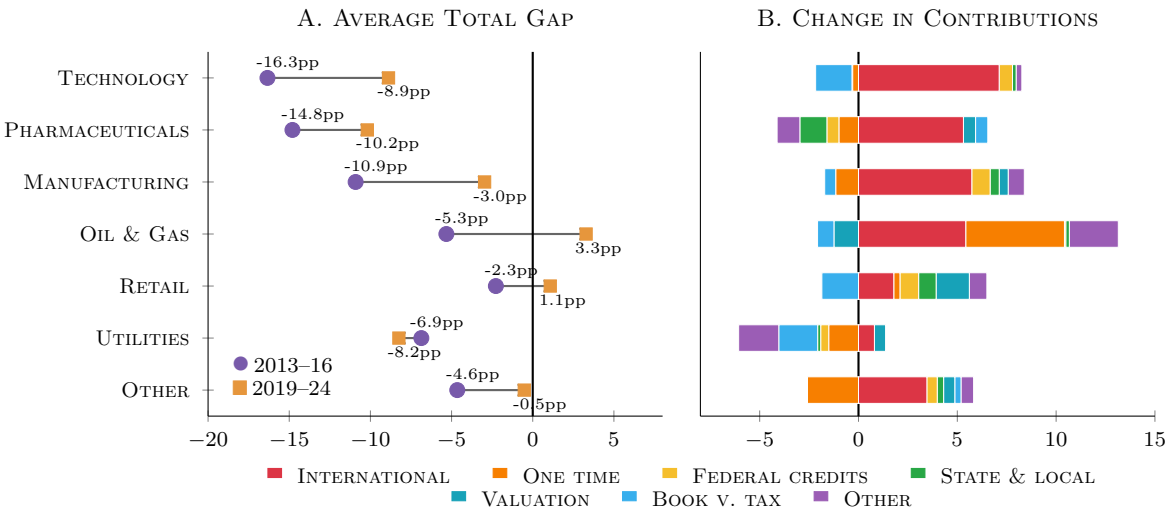
[8] See the Appendix A for details on industry categorizations by SIC code.

Table 4: Distribution of the Tax Rate Gap by Contribution

Contribution	Counts	Mean	Percentiles		
			25th	50th	75th
		Pre-TCJA			
International	5,283	−4.8	−9.6	−4.0	−0.9
One time	949	0.6	−1.0	0.1	2.0
Federal Credits	4,767	−2.6	−3.3	−1.8	−0.9
State & local	9,614	1.8	0.9	1.8	2.8
Valuation	6,942	−1.1	−2.6	−0.2	1.3
Book v. tax	6,625	0.2	−1.8	0.2	1.6
Other	9,108	−1.6	−2.9	−0.7	0.3
Total Gap	10,602	−7.5	−12.4	−4.3	1.0
		Post-TCJA			
International	7,628	−0.5	−3.3	−0.5	1.4
One time	2,394	−0.3	−0.6	−0.1	0.4
Federal Credits	7,319	−2.1	−2.8	−1.4	−0.8
State & local	13,432	2.2	1.0	2.2	3.4
Valuation	11,128	−0.5	−1.7	0.1	1.7
Book v. tax	11,765	−0.3	−1.8	−0.4	1.0
Other	12,971	−0.8	−1.9	−0.2	0.6
Total Gap	14,720	−2.1	−6.2	0.3	3.7

Notes: Entries report the distribution of the contribution of each reconciliation category to the gap between the effective tax rate and the statutory tax rate, in percentage points. The *Total gap* row is computed on the full sample using sales as weights. All other rows are computed using sales as weights for the subset of firm-year observations in which that contribution category is present in the reconciliation. The pre-TCJA period is 2013–2016 and the post-TCJA period is 2019—2024. Transition years 2017-–2018 are omitted. Negative values indicate items that reduce the effective tax rate relative to the statutory rate.

Figure 2: Industry Differences in Tax Rate Gap Before and After TCJA



Notes: The figure reports sales-weighted industry averages of the gap between the effective tax rate and the U.S. federal statutory corporate tax rate, and changes in the average contribution of each reconciliation category to that gap. The industries are categorized using SIC codes reported in the appendix. Panel A shows the average total gap for 2013–2016 and 2019–2024. Panel B shows the change in average reconciliation contributions between the two periods (2019–2024 minus 2013–2016). Contributions are measured in percentage points. Negative values reduce the effective tax rate relative to the statutory rate. The sample is the full sample, including loss firms. Years 2017 and 2018 are omitted as transition years around TCJA enactment. Industries follow the SIC-based classification used elsewhere in the paper.

The main takeaways from the descriptive evidence are twofold. First, the largest change in the tax gap decomposition comes from the international reconciliation category. Second, aggregate effective tax rates hide significant heterogeneity across companies and industries.

3.2 Causal Estimates of TCJA

In this section, we exploit pre-TCJA heterogeneity in company income tax reconciliation and balance sheet items to estimate causal effects of the post-TCJA outcomes. Of particular interest is the policy response of profit shifting and real productive activities.

3.2.1 Effective Tax Rate Pass-Through

We first test the pass-through of TCJA policies to higher effective tax rates. In Section 3.1, we provided descriptive evidence that TCJA compressed the tax rate gap by reducing foreign tax advantages. Here, we estimate the pass-through to effective tax rates.

Table 5: Distribution of the Tax Rate Gap by Industry

Industry	Counts	Mean	Percentiles		
			25^{th}	50^{th}	75^{th}
	Pre-TCJA				
Technology	1,644	−16.3	−19.3	−14.7	−8.4
Pharmaceuticals	906	−14.8	−19.3	−14.7	−9.9
Manufacturing	3,307	−10.9	−14.6	−8.6	−3.0
Oil & gas	412	−5.3	−6.2	−1.4	3.1
Retail	798	−2.3	−4.7	−0.7	1.9
Utilities	445	−6.9	−9.2	−2.1	2.3
Other	3,090	−4.6	−7.6	−1.8	2.1
	Post-TCJA				
Technology	2,349	−8.9	−11.6	−5.3	−2.0
Pharmaceuticals	1,852	−10.2	−13.4	−9.3	−3.4
Manufacturing	4,347	−3.0	−6.9	−1.7	2.4
Oil & gas	465	3.3	−1.0	3.4	7.3
Retail	1,003	1.1	−1.6	2.7	4.4
Utilities	527	−8.2	−15.6	−7.0	0.0
Other	4,177	−0.5	−2.1	1.3	4.3

Notes: Entries report the distribution of the gap between the effective tax rate and the statutory tax rate, in percentage points, by industry. All statistics are computed on the full sample using sales as weights. *Counts* are the number of firm-year observations in each industry-period cell. The *pre-TCJA* period is 2013–2016 and the *post-TCJA* period is 2019—2024. Transition years 2017–2018 are omitted. Negative values indicate effective tax rates below the statutory rate. Industries follow the SIC-based classification used elsewhere in the paper.

Our empirical strategy follows the standard difference-in-differences framework described in Angrist and Pischke (2009). Our treatment intensity is each firm's average pre-TCJA international contribution $\bar{x}^{\text{pre}}_{\text{Intl},i}$ to the tax rate gap in percentage points for company i over period 2013–2016. Firms with larger negative values had greater exposure to foreign tax advantages before TCJA. We compare these firms with less exposed firms after the reform. More specifically, we use the following specification

$$y_{it} = \alpha_i + \lambda_{j(i)t} + \beta\big(\bar{x}^{\text{pre}}_{\text{Intl},i} \times 1[t \in \text{post}]\big) + \varepsilon_{it} \tag{1}$$

where y_{it} is the outcome variable for i in t, α_i is a firm fixed effect, $\lambda_{j(i)t}$ are industry by year fixed effects, and "post" is 2019–2022. Transition years 2017 and 2018 are excluded, so the pooled specification compares 2019–2022 to 2013–2016. Standard errors are clustered at the firm level. The sample we will use when estimating β in equation (1) includes all companies observed at least twice before and twice after the reform and, for the tax and profit-location outcomes, with positive pretax income.[9]

We run the regression in equation (1) using different outcome variables (y_{it}). We first study tax outcomes before turning to profit shifting and real activity. We start with the international contribution for company i in year t, which we denote by $x_{\text{Intl},it}$. Since $\bar{x}^{\text{pre}}_{\text{Intl},i}$ is negative for companies doing business in low-tax foreign jurisdictions, we expect β to be negative if the tax rate gap closes more for those with larger pre-TCJA foreign tax advantages. We then explore the effective tax rate for firm i in t, denoted here by ETR_{it}. Because the industry-by-year effects absorb the change common to an industry, a negative coefficient β in this case says that companies with larger pre-TCJA foreign tax advantages had larger increases in their effective tax rates.

Before reporting results for the difference-in-differences regressions, we provide some checks on our empirical strategy. Identification comes from comparisons of companies facing different pre-TCJA foreign tax advantages within the same industry. Thus, we have included industry-year fixed effects. In Table 6, we report on the distribution of $\bar{x}^{\text{pre}}_{\text{Intl},i}$ by industry for the sample of companies used to estimate β in (1). We find that for most of the sample—especially companies in technology, pharmaceuticals, and manufacturing—there is large within-industry variation in

[9]The regressions also end earlier than the descriptive tables of Section 3.1, comparing 2019–2022 with 2013–2016 rather than running through 2024. We use the shorter window because it is the more conservative one: extending the post-period to 2024 moves the international coefficient from −0.779 to −0.806.

international exposure. For example, in the case of technology companies, the standard deviation of $\bar{x}^{\text{pre}}_{\text{Intl},i}$ is 6.5 percentage points and values at the 25$^{\text{th}}$ and 75$^{\text{th}}$ percentiles are -13.2 and 0.0, respectively. Because a firm-year with no international line is assigned a contribution of zero, we also report the percentage of firms with a nonzero value—the share reporting an international line at all. For technology companies, we find 84.4 percent do. If we include all firms, the share of nonzeros is 61.4 percent, with all industries but utilities having a significant share of companies with international exposure.

A second check on the empirical strategy is to run the following first-stage regression:

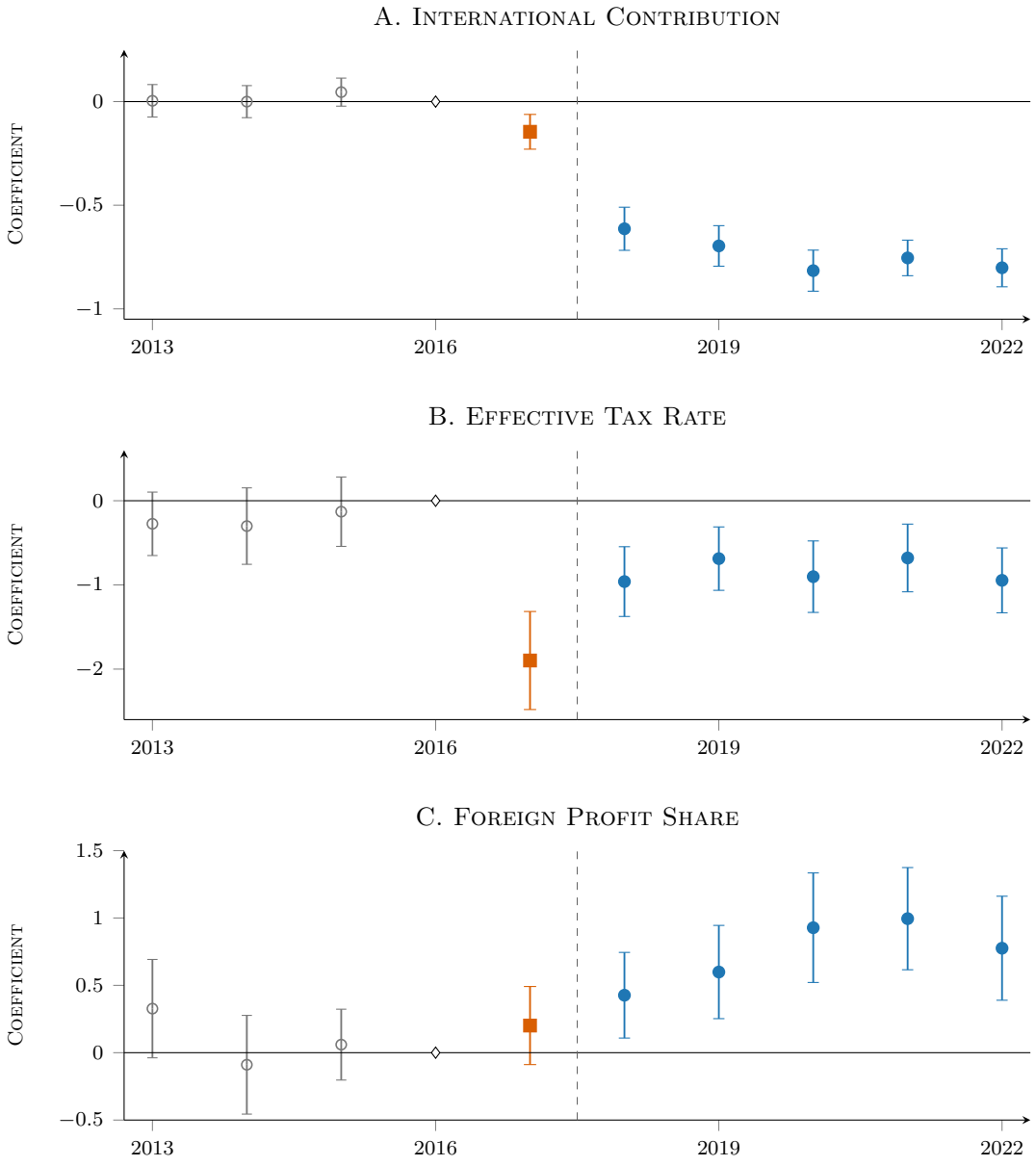
$$y_{it} = \alpha_i + \lambda_{j(i)t} + \sum_{s \neq 2016} \beta_s \big(\bar{x}^{\text{pre}}_{\text{Intl},i} \times 1[t = s]\big) + \varepsilon_{it}, \tag{2}$$

with β_{2016} normalized to zero. We want to make sure that the estimates $\hat{\beta}$ are close to zero before TCJA and significantly different from zero after TCJA. In Panels A and B of Figure 3, we report results using the international contribution and the effective tax rate as outcomes, respectively.[10] In both panels, we find coefficients around zero prior to 2016 and significantly negative afterward. A negative $\hat{\beta}$ in Panel A means that companies with a larger pre-TCJA international contribution had a larger move toward zero than their less-exposed peers. A negative $\hat{\beta}$ in Panel B means the effective tax rate faced by the more-exposed companies rises more after TCJA than for the less-exposed companies. In 2017, there is a large decline in Panel B because of the one-time transition tax assessed on foreign earnings that have not yet been repatriated (Section 965). After 2018, we see that both sets of coefficients in Panels A and B stabilize to levels that provide information on the differential impacts for companies that were different in their pre-TCJA exposure to foreign tax advantages.

We turn now to the main results for the pooled difference-in-differences regression in (1), which are shown in Table 7. Results for the international contribution and the effective tax rate are shown in the first two rows. The coefficient in the first column is $\hat{\beta}$ in the regression, with standard errors reported in parentheses. The last two columns provide information on the counts of firms and total observations for our samples. Throughout, we write $\hat{\beta}_{\text{Intl}}$, $\hat{\beta}_{\text{ETR}}$, and, below, $\hat{\beta}_{\text{Share}}$ for the estimates of β in (1) when the outcome y_{it} is the international contribution, the effective tax rate,

[10] Panel C is discussed in the next section.

Figure 3: Event Study Responses to Pre-TCJA International Exposure



Notes: Each panel reports year-by-year coefficients from event-study regressions of the indicated outcome on firms' pre-TCJA International exposure, $\bar{x}^{\text{pre}}_{\text{Intl},i}$, interacted with calendar-year indicators. The omitted reference year is 2016. Panel A uses the international reconciliation contribution, measured in percentage points; Panel B uses the effective tax rate, also in percentage points; and Panel C uses foreign profit share, reported in percentage points. All specifications include firm and industry-by-year fixed effects, and standard errors are clustered at the firm level. The treatment variable $\bar{x}^{\text{pre}}_{\text{Intl},i}$ is each firm's average international contribution over 2013–2016. More negative values correspond to larger pre-TCJA International tax benefits. Accordingly, negative coefficients in Panel A indicate greater post-TCJA closure of the international contribution, negative coefficients in Panel B indicate larger post-TCJA increases in effective tax rates, and positive coefficients in Panel C indicate larger post-TCJA declines in foreign profit share among more exposed firms. The dashed vertical line marks 2017, the year of TCJA enactment. The number of firm-year observations for Panels A, B, and C are 11,355, 11,355, and 7,237, respectively; these exceed the counts in Table 7 because the event study also uses the 2017 and 2018 transition years.

Table 6: Distribution of Pre-TCJA International Exposure by Industry

Industry	Counts	Mean	Std. Dev.	Percentiles			% Nonzero
				25th	50th	75th	
Technology	154	−5.9	6.5	−13.2	−3.9	0.0	84.4
Pharmaceuticals	38	−5.2	6.4	−10.6	−4.3	0.0	86.8
Manufacturing	459	−4.0	5.1	−7.3	−2.2	0.0	78.0
Oil & gas	37	−1.1	3.8	−1.0	0.0	0.0	43.2
Retail	116	−0.8	2.4	−1.0	0.0	0.0	42.2
Utilities	80	−0.1	1.0	0.0	0.0	0.0	8.8
Other	423	−1.1	2.8	−1.3	0.0	0.0	49.4
All in sample	1,307	−2.7	4.7	−4.6	−0.0	0.0	61.4

Notes: Entries report the distribution of firms' pre-TCJA international reconciliation exposure, $\bar{x}^{\text{pre}}_{\text{Intl},i}$, by industry. For each firm, $\bar{x}^{\text{pre}}_{\text{Intl},i}$ is the average international contribution over 2013–2016. The firms in the sample must have positive pretax income, and have at least two pre-TCJA and two post-TCJA observations. The final column reports the share of firms with nonzero pre-TCJA international exposure. Industries follow the SIC-based classification used elsewhere in the paper.

and the foreign profit share, respectively. Both are ratios of percentage points to percentage points and so are dimensionless. Our estimate of $\hat{\beta}_{\text{Intl}}$ is −0.779: for each additional percentage point of pre-TCJA international exposure, the international contribution closes by 0.779 percentage points after TCJA. Our estimate of $\hat{\beta}_{\text{ETR}}$ is −0.612, so the same firm's effective tax rate rises by 0.612 percentage points. The ratio of these coefficients $\hat{\beta}_{\text{ETR}}/\hat{\beta}_{\text{Intl}}$—which is roughly 79 percent—is the pass-through to higher effective rates.

To put these estimates in context, consider the impact of TCJA on effective tax rates in the technology sector. The average international contribution in the income tax reconciliation before TCJA was −10.7 percentage points. After TCJA, this fell to −3.5, implying a closure of 7.1. We can see this change in the first row of Figure 2, Panel B. Using our estimates from Table 7, we compute an implied increase in the effective tax rate of 5.6 percentage points (or, $\hat{\beta}_{\text{ETR}}/\hat{\beta}_{\text{Intl}} \times 7.1$). This is smaller than the closure itself because part of it is returned through the other reconciliation categories. Appendix Table B.1 estimates equation (1) category by category. The coefficients sum to −0.566, against −0.612 for the effective tax rate itself, so the decomposition is close to exact.

Table 7: Pooled Difference-in-Differences Estimates of TCJA Pass-Through

Outcome	Coefficient	Firms	Firm-years
International contribution	−0.779***	1,307	9,203
	(0.031)		
Effective tax rate	−0.612***	1,307	9,203
	(0.108)		
Foreign profit share	0.750***	876	5,855
	(0.157)		
Foreign sales share	0.060	1,172	7,823
	(0.088)		

Notes: Entries report pooled difference-in-differences estimates relating post-TCJA outcomes to firms' pre-TCJA International exposure. The international contribution, effective tax rate, and foreign profit share are all reported in percentage points. The pooled specification compares 2019–2022 to 2013–2016, omitting 2017–2018, and includes firm and industry-by-year fixed effects. Standard errors clustered at the firm level are reported in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Outside international the coefficients sum to 0.213, or 27 percent of the international closure, and the two categories that carry it are valuation allowances and the residual category. For technology that is roughly 1.9 of the 7.1 point closure. Companies did find some other ways to offset the loss in foreign tax benefits, but they recovered only about a quarter of it.

3.2.2 Profit Shifting

These results prompt an obvious follow-up question: was there any impact on the geography of profits and sales or, more generally, on real productive activity? To answer this, we use the same empirical strategy as above, but now apply it to different outcomes, namely, foreign profit share, foreign sales share, capital investment, research and development, employment growth, and sales growth.

We start by investigating the location of booked profits, which was a central focus of the TCJA reform. We estimate the change in the foreign profit share—that is, the ratio of foreign profits to total profits as a percent—in response to TCJA-induced changes in effective tax rates. As a first-stage check, we rerun the regression in (2) to make sure that the identification strategy is sound. In Panel C of Figure 3, we report the first-stage regression results with y_{it} given by the

foreign profit share. Here, again, we find that the coefficients prior to 2016 are not significantly different from zero, while the coefficients after 2018 are. Given this, we proceed with the pooled difference-in-differences regression in (1). In Table 7, we report our estimate in the third row, namely $\hat{\beta}_{\text{Share}}$ equal to 0.750. Dividing this by $\hat{\beta}_{\text{Intl}}$ re-estimated on the same 876 firms gives 1.040, which implies that a firm's foreign profit share fell by about that many percentage points for each percentage point of closure in its international contribution.

The last step is to construct an interpretable estimate of the impact of profit-shifting in response to tax changes using the coefficient for the regression with the effective tax rate as the outcome variable. To be consistent, we need to use the same sample of companies that have nonmissing values for foreign profit (that is, variable, pifo in Compustat (2026b)). When we do, we find the coefficient in the effective tax rate regression is -0.570. This means that a 1 percentage point TCJA-induced effective tax rate increase is associated with a 1.32 percentage point decline in the foreign profit share. To put this into perspective, the average pre-TCJA exposure among firms with a negative international contribution is -6.0 percentage points, and those firms held 44.7 percent of their pretax income abroad. The estimate implies a fall of 4.5 percentage points in the foreign share for such a firm, or about a tenth of the pre-TCJA share.

To put these estimates in context, we can compare our estimation strategy and results to earlier work by Grubert (2012). Grubert (2012) used tax filings of 754 large multinational companies between 1996 and 2004 and studied the responsiveness of foreign profit location to tax incentives using variation in firms' average effective foreign tax rates. We instead exploit a large tax reform and compare firms with different pre-reform exposure to foreign tax advantages. Our measure of tax incentives is derived from firms' tax reconciliation disclosures rather than tax return data, and the variation we study primarily reflects changes in the tax advantage associated with foreign operations because the international contribution is so large. The TCJA therefore provides a more direct source of identifying variation while retaining a close connection to the tax incentives examined by Grubert.

In terms of headline results, Grubert (2012) estimates the change in the foreign profit share with a change in the foreign effective tax rate and finds it is -0.7 for his preferred empirical specification. Our estimate of -1.32 is the change in the foreign profit share associated with a change in the total effective tax rate induced by the policy reform. Since we have already established that most of the

induced change occurs through lower foreign tax advantages, the two ratios are conceptually close. Our larger response is perhaps unsurprising given that our identification comes from a major tax reform that substantially reduced incentives for locating profits abroad, whereas Grubert relies on variation across firms in effective foreign tax rate changes. Furthermore, our treatment intensity is based on firms' pre-reform exposure to foreign tax advantages—and thus our empirical strategy exploits variation across firms with different opportunities to engage in profit shifting.

In his study of the multinational tax filings, Grubert (2012) was also able to track the location of sales.[11] Here, we investigate the impact of TCJA on location of sales using the same empirical strategy as for profits. Specifically, we run the first-stage regression in (2) and then the pooled difference-in-differences regression in (1). The main finding, like Grubert's famous title, is that profits—not sales—are being globalized. In the first-stage regression, coefficients in all years are insignificantly different from zero. In the pooled difference-in-differences regression, which is shown in the fourth row of Table 7, the coefficient is also insignificantly different from zero—the value is 0.060 with a standard error of 0.088. This stands in contrast to the foreign profit share, where the corresponding coefficient is 0.750 and precisely estimated.

To investigate this finding further, we consider a variant of our difference-in-differences specification as follows:

$$y_{it} = \alpha_i + \lambda_{j(i)t} + \beta D_{it} + \delta(Z_i \times 1[t \in \text{post}]) + \gamma(D_{it} \times Z_i) + \varepsilon_{it} \tag{3}$$

where $D_{it} = \bar{x}^{\text{pre}}_{\text{Intl},i} \times 1[t \in \text{post}]$ and Z_i equal to a characteristic of company i with a continuous value that is winsorized and standardized. The idea is to improve our prediction of the profit-location responses using pre-TCJA firm characteristics. Obvious candidates based on earlier work are R&D intensities, measures of intangibles or intellectual property (if available), use of tax haven subsidiaries, foreign scope (for example, counts of jurisdictions or subsidiaries), and balance sheet items (for example, cash or debt).

With the specification in equation (3), we find that the profit-location response is concentrated in companies that are R&D-intensive and liquid. Appendix Table B.2 reports $\hat{\gamma}$ one characteristic at a time. A one standard deviation higher pre-TCJA R&D-to-assets ratio raises the response

[11] To construct data on foreign sales, we use the geographic segments in Compustat (2026a) and keep all firms in our sample with nonmissing data.

by 2.103 percentage points of the foreign profit share with a standard error of 0.851, and a one standard deviation higher cash-to-assets ratio raises it by 0.771 (0.261). Our measures of the use of tax havens, on the other hand, do not predict the response: the coefficient on having any haven or conduit subsidiary is 0.709 (0.511), and on the count of such subsidiaries is −0.003 (0.158).

3.2.3 Investment and Growth

We next investigate if companies that lose their foreign tax advantages change the scale or location of their real activity once reported income shifts back to the United States. More specifically, we rerun our baseline first-stage and pooled difference-in-differences regressions with y_{it} given by one of seven outcomes. The real-activity outcomes are capital expenditures, R&D expenditures, sales, and employment. The profit-location outcomes are pretax income, foreign pretax income, and domestic pretax income.[12]

In the first-stage regression results (not shown here), we find no significant change in capital expenditures, R&D, sales, or employment for more internationally exposed firms in any year. In Table 8 we report the coefficients and firm and firm-year counts for the pooled difference-in-differences regression. Here, again, we find no response in any of the four real-activity outcomes. The lower panel shows where the response does occur. Total pretax income is unchanged—the coefficient is −0.055 with a standard error of 0.556—while the coefficients on foreign and domestic pretax income are 1.835 and −1.544, so that foreign profits fall and domestic profits rise for more exposed firms. More exposed firms did not become smaller or invest less but instead booked the same profits in different places. If we check firm balance sheets, we find the contraction in cash is tax driven with firms paying a transition tax on earnings not yet repatriated when they switched from the world-wide tax system to a territorial system. If we rerun regression (1) with balance sheet items divided by lagged assets, we find the coefficient on cash is 0.455 (0.130) and the coefficient on cash taxes paid is −0.057 (0.010). In other words, cash falls and taxes paid rise for more exposed firms. Dividends increase modestly, −0.026 (0.012). There is no response in share repurchases, 0.005 (0.026), in debt, −0.052 (0.147), or in acquisitions, 0.047 (0.041).

Because annual 10-K filings report consolidated worldwide operations, they may mask changes in the geographic location of real activity. To investigate this, we use the Compustat (2026a)

[12]The Compustat (2026b) variables used are capx, xrd, sale, emp, pi, pifo, and pidom.

database to track domestic and foreign property, plant, and equipment. We construct foreign shares of capital expenditures and capital stock and rerun the first-stage regression in equation (2) and pooled difference-in-differences regression in equation (1) (with Compustat variables capxs and ppents).[13] In the case of capital expenditures, we cannot rule out differential trends prior to TCJA. The pre-TCJA event-study coefficients are negative and the post-TCJA ones, though positive, are individually insignificant, so the pooled estimate of 0.654 (0.272) percentage points rests in part on that pre-trend. In the case of capital stocks, the results are much clearer: there is no evidence of any shift in the location of the installed capital stock. The pooled coefficient is 0.050 (0.242), and no year is significant.

One caveat applies to every regression in this subsection. The industry-by-year effects absorb whatever TCJA did to all companies in an industry, so these coefficients measure how much *more* the exposed companies invested, hired, or sold, not whether investment rose after the reform. The reform's largest changes to the incentive to invest—the cut in the statutory rate and full expensing—moved the user cost of capital for every company, and our design is silent on this. Our results therefore do not speak directly to the debate between Chodorow-Reich et al. (2024) and Gravelle and Marples (2025), who use variation in the user cost of capital.

Overall, the main takeaway from the difference-in-differences regression using variation in international exposure is that the loss in foreign tax advantages resulted in a significant profit relocation for more R&D-intensive and liquid companies, with little differential response in real activities.

3.2.4 Deferred-Tax Windfall

TCJA affected more than just the tax on foreign income. After the reform, deferred tax balances were revalued, and that revaluation raises a question about how to interpret results in the previous sections. Companies carrying net deferred tax liabilities booked a one-time gain in equity, which in theory relaxes a binding financial constraint and encourages investment. If the companies more exposed to foreign tax advantages were also the ones receiving the deferred-tax gain, then the absence of a differential real response could be two effects cancelling rather than the absence of either. Our profit-sharing results could reflect balance sheets rather than booking incentives.

[13] Geographic capital is reported by far fewer filers than the consolidated series, so these regressions run on 420 firms for expenditures and 532 for stocks.

Table 8: Pooled Difference-in-Differences Estimates of Real Activity and Profit Location

Outcome	Coefficient	Firms	Firm-years
A. Real activity			
Capital expenditures	0.274	1,909	13,578
	(0.515)		
R&D expenditures	0.326	1,015	7,006
	(0.468)		
Sales	0.609	1,899	13,508
	(0.396)		
Employment	0.253	1,922	13,693
	(0.326)		
B. Location of profits			
Pretax income	−0.055	937	6,852
	(0.556)		
Foreign pretax income	1.835***	593	3,872
	(0.710)		
Domestic pretax income	−1.544*	617	3,976
	(0.795)		

Notes: Entries report pooled difference-in-differences estimates relating post-TCJA outcomes to firms' pre-TCJA International exposure, $\bar{x}^{\text{pre}}_{\text{Intl},i}$. The pooled specification compares 2019–2022 to 2013–2016, omitting 2017–2018, and includes firm and industry-by-year fixed effects. Standard errors clustered at the firm level are reported in parentheses. All seven displayed dependent variables are logs of levels, so coefficients are in 100× log points per percentage point of exposure. Because $\bar{x}^{\text{pre}}_{\text{Intl},i}$ is more negative for firms with larger pre-TCJA International tax benefits, a negative coefficient indicates a larger post-TCJA increase in the outcome among more exposed firms, while a positive coefficient indicates a relative decrease. Samples differ across rows because the outcomes have different coverage. The profit-location rows use the positive-profit sample for which the relevant logged profit outcome is defined. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

To investigate this, we first construct a measure of the deferred-tax windfall, W_i:

$$W_i = \frac{21 - 35}{35} \left(\frac{\text{txndb}_{2016}}{\text{at}_{2015}} \right),$$

where "txndb" is the net deferred tax balance in 2016 and "at" is total assets in 2015, both from Compustat (2026b). The balance to asset ratio is multiplied by the change in corporate income taxes so that it is appropriately scaled for TCJA. W_i is positive for companies with a net deferred tax liability—these companies had lower future tax bill liabilities and an effective increase in book equity. Companies carrying a net deferred tax asset had the reverse, writing that asset down. Here, we exploit differences in W_i using the following empirical specification:

$$y_{it} = \alpha_i + \lambda_{j(i)t} + \theta\big(W_i \times 1[t \in \text{post}]\big) + \varepsilon_{it}. \tag{4}$$

Before running the regression in equation (4), we check that the one-time deferred-tax remeasurement shows up in reported accounting earnings in 2017. We estimate the year-by-year analogue of equation (4),

$$y_{it} = \alpha_i + \lambda_{j(i)t} + \sum_{s \neq 2016} \theta_s\big(W_i \times 1[t = s]\big) + \varepsilon_{it}, \tag{5}$$

with y_{it} equal to net income divided by lagged assets. The estimated 2017 coefficient is 0.485, with a 95 percent confidence band of [0.267, 0.702], and the coefficients return toward zero afterward. The pooled 2018–2022 coefficient is −0.002, with a standard error of 0.125. Thus the deferred-tax measure behaves as expected and produces a transitory earnings shock in the TCJA year, not a persistent post-TCJA difference in earnings.

Next, consider the impact of the windfall on investment. If we use the ratios of capital expenditures or R&D expenditures to lagged assets as the outcome variable y_{it}, we find that the deferred-tax windfall has no detectable effect on either. The estimated coefficient $\hat{\theta}$ in the case of capital expenditures is equal to −0.012 with a standard error of 0.030. The estimated coefficient in the case of R&D is equal to −0.056 with a standard error of 0.156. When we divide the population of firms by size, cash holdings, leverage, and intangibles with three bins for each, none of the twelve subgroups produces a positive investment response.

These results also make it unlikely that the deferred-tax windfall is masking the effects we

attribute to international exposure. We check this possibility in two simple ways. First, we compute the correlation of W_i and our measure of pre-TCJA international exposure and find it is 0.052. If anything, the more exposed companies received *smaller* windfalls, with an average W_i of 0.002 compared with 0.008 for companies with no exposure. Second, we add W_i interacted with the post-TCJA indicator to our pooled difference-in-differences regression (1) for the foreign profit share. The international-exposure coefficient is essentially unchanged: 0.760 (0.172) without the windfall control and 0.760 (0.173) with it, using the 731 companies for which W_i is available.

3.3 Case Studies

An advantage of working with company annual reports is that the numbers are typically accompanied by text. If there is a large closure of the international contribution to the tax gap, there are likely to be reasons provided in the notes. Here, we provide examples of companies with such notes for the TCJA period.

Alphabet reported that it "now license[s] intellectual property from the U.S. that was previously licensed from Bermuda." We see that its international contribution to the tax reconciliation moved from -12.9 to -3.4 percentage points and its foreign profit share from 55.5 to 27.4 percent. Microsoft reported an "impact of intangible property transfers" worth -5.9 percentage points in fiscal 2019. We see a partial move given they kept some operations in Ireland. ON Semiconductor reported an "impact of the domestication" worth -35.7 percentage points after moving its Bermuda subsidiaries to Delaware. The international contribution to the tax reconciliation closed by 12.3 points. Qualcomm reported that one of its Singapore subsidiaries "distributed certain intellectual property to a U.S. subsidiary" and later claimed a $419 million FDII deduction. We see its foreign profit share fell from 56.6 to 12.3 percent. In these cases, the filings give a concrete reason for the change in the tax reconciliation, and the reason fits the post-TCJA incentives we study.

Coca-Cola is the useful counterexample. Their international contribution closes by 13.3 percentage points—among the largest in the sample—but the 10-K filing attributes the change to a notice received from the IRS in September 2015 related to tax years 2007 through 2009. The IRS can require a company to price cross-border transactions at arm's length and to report a larger share of its profits in the United States under Section 482 of the Internal Revenue Code. Coca-Cola went through a five-year audit and a subsequent reallocation of income. The resulting changes re-

ported in the reconciliation tables look like the movements above, but the cause was enforcement of existing law rather than the change in the law we are trying to measure.

Transfer-pricing enforcement of this kind is therefore an alternative explanation for the decline in foreign tax advantages and could be driving our main estimates. To investigate this hypothsis, we collect published transfer-pricing opinions involving U.S. multinationals and match the companies to Compustat (2026b). This identifies 11 companies in our estimation sample of 1,307. Dropping these companies has little effect on the estimates. The international coefficient $\hat{\beta}_{\text{Intl}}$ changes from -0.779 (0.031) to -0.787 (0.031), the effective tax rate coefficient $\hat{\beta}_{\text{ETR}}$ changes from -0.612 (0.108) to -0.631 (0.110); and the foreign-profit-share coefficient $\hat{\beta}_{\text{Share}}$ changes from 0.750 (0.157) to 0.746 (0.158). In other words, two of the three estimates are farther from zero after dropping firms in litigation. This is only a conservative check, because published opinions do not include every company with a transfer-pricing dispute, but that limitation works against finding no effect. If dropping the litigants we can identify does not change the results, unidentified disputes are unlikely to explain them.

4 A Neoclassical Interpretation

In this section, we show that our main empirical result—that reported multinational profits relocated in response to TCJA, while production did not—is consistent with a neoclassical theory of multinational activity. A minimal structure assumes that multinationals can pay to conceal some profits from the U.S. government by shifting income in amount S to a low-tax affiliate through a transfer pricing scheme (as in Hines and Rice (1994)). We use the theory to estimate the share of the international contribution x_{Intl} attributable to shifting profits to tax havens with no substantive productive operations. Relatedly, we estimate the share of foreign profits that is shifted income S, both before and after TCJA.

4.1 Multinational Optimization

Consider the problem of a multinational with domestic (d) and foreign (f) subsidiaries that maximizes world wide cash flow discounted at rate r for its shareholders. This cash flow is net of income taxes, capital adjustment costs, and profit shifting concealment costs.

Let $X_{R\&D,t}$ be the investment in R&D that is created in the United States and used nonrivalrously at home and abroad, and let $X_{\ell,t}$ be the investment in tangible capital in location $\ell \in \{d, f\}$. For tangible capital, we assume that there are costs of adjustment given by $\Phi_\ell(X_{\ell,t}, K_{\ell,t})$, where the stock accumulates as $K_{\ell,t+1} = (1-\delta)K_{\ell,t} + X_{\ell,t}$. Firms also pay a cost of concealing shifted profits S equal to $C_i(S)$. Here, we assume that a shifting of profits is purely a rebooking that lowers taxable profits in the United States without any requirement of productive factors. In other words, profits that should be included as taxable in the United States are instead reported on the books of a subsidiary in a tax haven (h) that does not produce anything.

The multinational's problem then is to choose $\{S_{it}, X_{R\&D,it}, X_{d,it}, X_{f,it}\}$ to maximize the net present value of cash flows to shareholders, $\sum_t (1+r)^{-t}\mathcal{N}_{it}$, after paying taxes at rate $\tau_{\ell,t}$ on profits in $\ell \in \{d, f, h\}$ with

$$\begin{aligned}\mathcal{N}_{it} = \sum_{\ell \in \{d,f\}} &\{(1-\tau_{\ell,t})\pi_{\ell,it} - (1-\tau_{\ell,t}z_\ell)X_{\ell,it} - \Phi_\ell(X_{\ell,it}, K_{\ell,it})\} \\ &- (1-\tau_{d,t}z_{R\&D})X_{R\&D,it} + (\tau_{d,t} - \tau_{h,t})S_{it} - C_i(S_{it}),\end{aligned} \tag{6}$$

where depreciation allowances by tax authorities are denoted by $z_j X_{j,t}$, $j \in \{R\&D, d, f\}$.[14] The last two terms in (6) are the tax savings paid to shareholders for profit shifting and the costs of concealing this activity.

Because shifting profits requires no additional productive resources, the firm's problem can be separated into the real productive decision-making of the firm—that is, how much to invest and where to locate the capital—and the profit shifting. This is perhaps clearer if we write $\mathcal{N}_{it}$ as the sum of two payments: the "real" block that includes only cash flow from profits and the "booking" block that includes only cash flow from profit shifting—which, in this case, is the last two terms of equation (6). This is an important distinction when considering the impacts of TCJA. Analyses of investment decisions following TCJA compare outcomes of firms with different user costs of capital: in a steady state without adjustment costs, the real block implies the condition of Hall and Jorgenson (1967),

$$\frac{\partial \pi_{\ell,it}}{\partial K_{\ell,it}} = (r+\delta)\,\frac{1-\tau_{\ell,t}z_\ell}{1-\tau_{\ell,t}}, \qquad \ell \in \{d, f\}, \tag{7}$$

[14] Here, we simplify our analysis by using the same τ_f and the same τ_h for every firm, despite the fact that firms in our sample might face different effective rates abroad.

and an analogous condition for R&D, which equates the marginal product of capital to the user cost of capital. (See, for example, Chodorow-Reich et al. (2024) and Gravelle and Marples (2025), who build on this framework.) In contrast, our analysis compares outcomes of firms with different exposure to foreign tax advantages and thus is concerned with the booking decision, which in our environment is the choice S^*_{it} that satisfies $C'_i(S^*_{it}) = \tau_{d,t} - \tau_{h,t}$. Neither the domestic nor foreign user cost in (7) depends on the wedge $\tau_{d,t} - \tau_{h,t}$, and S^*_{it} depends on nothing else: this is the separation. The distinction is the average-versus-marginal one of Devereux and Griffith (2003): the booking choice responds to the *average* tax wedge on booked income, while the investment choices respond to *marginal* prices.

4.2 Mapping Theory and Empirical Design

We show next how the booking choice S^* is related to the main variable of interest in our empirical design, namely the international contribution in the reconciliation table. Assuming that this contribution were the main driver of the gap between effective and statutory rates—which we will do here—we have an exact relation:

$$\begin{aligned} x_{\text{Intl},it} &= \text{ETR}_{it} - \tau_{d,t} \\ &= \frac{\tau_{d,t}(\pi_{d,it} - S_{it}) + \tau_{h,t} S_{it} + \tau_{f,t}\pi_{f,it}}{\pi_{it}} - \tau_{d,t} \\ &= \frac{-(\tau_{d,t} - \tau_{h,t})S_{it} - (\tau_{d,t} - \tau_{f,t})\pi_{f,it}}{\pi_{it}} \end{aligned} \tag{8}$$

for firm i at time t. As we noted above, we want to estimate the extent of income shifting that is purely a rebooking of S. To do this, we need to estimate the contribution of the first term in (8)—which is the tax wedge times the share of profits shifted—to the total international contribution x_{Intl} (both in absolute value), evaluated at pre-TCJA quantities: $\psi_i \equiv (\tau_d^{\text{pre}} - \tau_h^{\text{pre}})(S_i^{\text{pre}}/\pi_i)/|x_{\text{Intl},i}^{\text{pre}}|$. We refer to ψ_i as the *profit-shifting share* of the international contribution to the tax reconciliation.

We show next that the profit-shifting share ψ_i can be inferred from our empirical estimates if we have information on statutory tax rates and any changes that occurred under TCJA. Through the lens of the model, the coefficient β in (1) is the change in an outcome per percentage point of pre-TCJA exposure $x_{\text{Intl},i}^{\text{pre}}$. Let β_{Real} denote this coefficient when the outcome is a measure of real

activity—capital expenditures or sales growth, say—and β_{Intl} and β_{Share} its model counterparts for the international contribution and the foreign profit share (in the first and third rows of Table 7). For clarity, the formulas below treat ψ as common across firms.[15] The model implies $\beta_{\text{Real}} = 0$ and

$$\beta_{\text{Intl}} = -(1-\psi)\left[1 - \frac{\tau_d^{\text{post}} - \tau_f^{\text{post}}}{\tau_d^{\text{pre}} - \tau_f^{\text{pre}}}\right] - \psi\left[1 - \left(\frac{\tau_d^{\text{post}} - \tau_h^{\text{post}}}{\tau_d^{\text{pre}} - \tau_h^{\text{pre}}}\right)^2\right] \tag{9}$$

$$\beta_{\text{Share}} = \left[\frac{\psi}{\tau_d^{\text{pre}} - \tau_h^{\text{pre}}}\right]\left[1 - \frac{\tau_d^{\text{post}} - \tau_h^{\text{post}}}{\tau_d^{\text{pre}} - \tau_h^{\text{pre}}}\right]. \tag{10}$$

We unpack each in turn.

The prediction $\beta_{\text{Real}} = 0$ has two parts. First, by the separation, the tax wedge $\tau_{d,t} - \tau_{h,t}$ relevant for the booking decision enters no real first-order condition. Second, TCJA's changes to the user costs in (7)—for example, the drop in τ_d from 35 to 21 percent—depend only on statutory parameters common to all firms in an industry-year cell, so the industry-year fixed effects absorb them. We maintain the assumption that firms' responses to these common changes are orthogonal to their exposure. The prediction is borne out in the data. Sales, capital expenditures, R&D, and employment show no significant differential response to exposure, and neither do the foreign shares of sales, the installed capital stock, or total pretax income. The balance sheets of more exposed firms do contract, but that contraction is concentrated in cash rather than in productive capital, reflecting repatriation and the transition tax. Based on these results, we hold profits from foreign operations, π_f, and total profits, π, fixed when unpacking the two coefficients in (9) and (10).

The change in the international contribution to the tax reconciliation combines two effects: a smaller tax-rate advantage on foreign operations, and less income shifted to low-tax affiliates. To derive the expression for the regression coefficient β_{Intl} in (9), note that with the quadratic concealment cost of Hines and Rice (1994), the optimal shifting rule sets S proportional to the tax gap, so $S_i^{\text{post}}/S_i^{\text{pre}} = (\tau_d^{\text{post}} - \tau_h^{\text{post}})/(\tau_d^{\text{pre}} - \tau_h^{\text{pre}})$. Using this expression and the definition of ψ_i, we can derive the expression for β_{Intl}:

$$\Delta x_{\text{Intl},i} = -\frac{(\tau_d^{\text{post}} - \tau_h^{\text{post}})S_i^{\text{post}} - (\tau_d^{\text{pre}} - \tau_h^{\text{pre}})S_i^{\text{pre}}}{\pi_i}$$

[15] If ψ differs across firms, the regression coefficients should be read as describing the firms that drive the identifying variation, not the average firm in the population.

$$- \frac{(\tau_d^{\text{post}} - \tau_f^{\text{post}} - \tau_d^{\text{pre}} + \tau_f^{\text{pre}})\pi_{f,i}}{\pi_i}$$

$$= \underbrace{-(1-\psi)\left[1 - \frac{\tau_d^{\text{post}} - \tau_f^{\text{post}}}{\tau_d^{\text{pre}} - \tau_f^{\text{pre}}}\right] - \psi\left[1 - \left(\frac{\tau_d^{\text{post}} - \tau_h^{\text{post}}}{\tau_d^{\text{pre}} - \tau_h^{\text{pre}}}\right)^2\right]}_{\beta_{\text{Intl}}} x_{\text{Intl},i}^{\text{pre}}$$

with simple algebra. This expression has a simple interpretation. The pre-TCJA international contribution contains two kinds of foreign tax benefits. One comes from foreign profits π_f taxed below the U.S. rate. The other comes from shifted income, S, booked in the tax haven. TCJA reduces both benefits, but for different reasons. For foreign operations, the underlying profits π_f are held fixed, so the tax benefit shrinks only because the U.S.-foreign tax gap narrows. For shifted income, both the tax saving per shifted dollar and the amount shifted fall with the U.S.-haven tax gap. This is why the operating part enters with the simple gap closure, while the shifted part enters with the square of the gap ratio.

The expression for β_{Share} in (10) can be written in terms of ψ and the U.S.-haven tax gap:

$$\Delta\left(\frac{\pi_{f,i} + S_i}{\pi_i}\right) = \frac{\pi_{f,i} + S_i^{post}}{\pi_i} - \frac{\pi_{f,i} + S_i^{pre}}{\pi_i}$$

$$= \underbrace{\left[\frac{\psi}{\tau_d^{\text{pre}} - \tau_h^{\text{pre}}}\right]\left[1 - \frac{\tau_d^{\text{post}} - \tau_h^{\text{post}}}{\tau_d^{\text{pre}} - \tau_h^{\text{pre}}}\right]}_{\beta_{\text{Share}}} x_{\text{Intl},i}^{\text{pre}}.$$

Unlike $x_{\text{Intl},i}$, the foreign profit share is an income share rather than a tax-rate category. Since real foreign operating profits, π_f, are held fixed, the only part of the numerator that changes is shifted income, S. The coefficient β_{Share} therefore captures how much shifted income falls relative to total profits.

We now use our estimated coefficients, together with statutory tax rates, to infer two model-implied quantities: the profit-shifting share of the international contribution to the tax reconciliation, ψ, and the tax rate on real foreign operations, τ_f, which we treat as unchanged by TCJA.[16] These quantities then allow us to compute the share of foreign booked income accounted for by shifted income, $S/(S + \pi_f)$. The statutory rates for the United States pre- and post-TCJA are

[16] Following Hartman (1985), we treat the pre-TCJA residual U.S. tax on foreign income as deferred and not paid at the margin, so the relevant pre-TCJA rates are the local rates τ_f and τ_h^{pre}.

$\tau_d^{\text{pre}} = 35$ percent and $\tau_d^{\text{post}} = 21$ percent, respectively. Most estimates for pre-TCJA tax haven rates are in the range of 0 to 10 percent, which we will investigate by considering three cases, $\tau_h^{\text{pre}} \in \{0, 5, 10\}$ percent. For the post-TCJA tax haven rate, we consider two cases. In the first, firms have enough foreign tax credits from other foreign income that low-tax haven income faces no residual GILTI tax and $\tau_h^{\text{post}} = \tau_h^{\text{pre}}$. In the second, firms pay the statutory GILTI residual on tax haven income, which we model as:

$$\tau_h^{\text{post}} = \tau_h^{\text{pre}} + \max\{0,\, 0.105 - 0.8\tau_h^{\text{pre}}\}. \tag{11}$$

This provision adds a residual tax equal to the 10.5 percent GILTI rate less a credit for 80 percent of the foreign tax already paid, or $0.105 - 0.8\tau_h^{\text{pre}}$.[17]

In Table 9, we show the main results, varying τ_h^{pre} (in columns) and the GILTI regime (in panels). In order to use a consistent sample for estimating coefficients β_{Intl} and β_{Share} we rerun the pooled difference-in-differences (shown in the first row of Table 7) with the more restricted sample used for the foreign profit share (shown in the third row). This yields a value for $\hat{\beta}_{\text{Intl}}$ of -0.722 (s.e. 0.034) on the 876 firms that report the split, against -0.779 on the full panel. We choose three values for τ_h^{pre} of 0, 5, and 10 percent. In the no-GILTI case, we use the same value for τ_h^{post} and therefore do not report it. Instead we report the implied values for the foreign tax on productive operations τ_f, the profit-shifting share ψ of the international contribution and the ratios of shifted profit S to total foreign profits $S + \pi_f$. As the table shows, the implied foreign tax rate is well above the tax haven rate—in the range of 14 to 19 percent—but in line with estimates of *effective* foreign tax rates paid by multinationals outside of tax havens.[18]

The key variable of interest ψ—which is listed next in Table 9—provides a measure of foreign tax advantages prior to the tax reform. Across the range of estimates for τ_h^{pre}, we find the share to be economically large: 33 if the tax rate is at 10 percent and 66 percent if it is zero. Using the estimate for ψ, we can infer the ratio of shifted profits to all foreign profits and compare this to Tørsløv, Wier, and Zucman (2023) who find an estimate over one-half for the United States in 2015. Our highest estimate—assuming GILTI provisions are not binding and tax haven rates are

[17] See Gravelle (2024) and Herzfeld (2021) on the GILTI rate, foreign tax credits, and the role of excess credits. We apply this adjustment to tax haven income, but not to real foreign operations.

[18] We use a firm-level bootstrap to re-estimate $\hat{\beta}_{\text{Intl}}, \hat{\beta}_{\text{Share}}$ and construct 95 percent confidence intervals of [12, 19] percent for τ_f and [28, 67] percent for ψ when $\tau_{\text{pre}}^h = 5$ percent.

Table 9: Profit-Shifting Implications, Varying Pre-TCJA Tax Haven Rates

	$\%\tau_h^{\text{pre}}$		
Outcome	0	5	10
A. No GILTI			
Tax rate on productive foreign profits (τ_f)	19.1	15.8	14.4
Profit-shifting share of $x_{\text{Intl}}^{\text{pre}}$ (ψ)	65.6	48.2	33.5
Pre-TCJA shifted share of profits ($S^{\text{pre}}/(S^{\text{pre}}+\pi_f)$)	46.5	37.4	29.3
Post-TCJA shifted share of profits ($S^{\text{post}}/(S^{\text{post}}+\pi_f)$)	34.3	24.2	15.4
B. Statutory GILTI			
Post-TCJA tax haven tax rate (τ_h^{post})	10.5	11.5	12.5
Tax rate on productive foreign profits (τ_f)	12.0	12.9	13.7
Profit-shifting share of $x_{\text{Intl}}^{\text{pre}}$ (ψ)	37.5	32.9	28.4
Pre-TCJA shifted share of profits ($S^{\text{pre}}/(S^{\text{pre}}+\pi_f)$)	28.3	26.5	25.3
Post-TCJA shifted share of profits ($S^{\text{post}}/(S^{\text{post}}+\pi_f)$)	10.6	10.3	10.3

Notes: All entries are percentages. The table reports estimates of key ratios starting from the same-sample regression estimates $\hat{\beta}_{\text{Intl}} = -0.722$ and $\hat{\beta}_{\text{Share}} = 0.750$ and a value for τ_h^{pre}. Panel A assumes no GILTI liability on shifted profits, so that $\tau_h^{\text{post}} = \tau_h^{\text{pre}}$; Panel B assumes the statutory GILTI residual, so that τ_h^{post} is given by (11). The inversion is closed form. Writing R_h and R_o for the post-to-pre ratios of the tax gaps on shifted and productive foreign profits, equation (10) gives $\psi = \hat{\beta}_{\text{Share}}(\tau_d^{\text{pre}} - \tau_h^{\text{pre}})/(1 - R_h)$, equation (9) then gives $R_o = 1 - [|\hat{\beta}_{\text{Intl}}| - (1 - R_h^2)\psi]/(1 - \psi)$, and τ_f solves $R_o = (0.21 - \tau_f)/(0.35 - \tau_f)$. The shifted shares use $S^{\text{pre}}/\pi = \psi|x_{\text{Intl}}^{\text{pre}}|/(\tau_d^{\text{pre}} - \tau_h^{\text{pre}})$ and $\pi_f/\pi = (1 - \psi)|x_{\text{Intl}}^{\text{pre}}|/(\tau_d^{\text{pre}} - \tau_f)$, so $S/(S + \pi_f)$ is free of the exposure; post-TCJA, $S^{\text{post}} = R_h S^{\text{pre}}$.

at 0 percent—is 47 percent in the period prior to TCJA. If we assume τ_h^{pre} is 10 percent, then the ratio falls to 47. The estimates differ from Tørsløv, Wier, and Zucman (2023) because ours are incentive-based, using TCJA-induced changes in tax advantages, while theirs are residual-based, classifying unexplained tax haven profitability as shifted profits. With our empirical design, we are also able to infer how this ratio changed after the tax reform. We find a significant decline, with the range of estimates given by 15 to 34 percent after-TCJA.

In the bottom panel of Table 9, we show the cases with GILTI provisions binding. Applying the formula in (11), we see that GILTI puts a relatively high tax rate floor on the tax havens. To account for the same foreign profit share and closure of the international contribution as in the no-GILTI case, we need smaller implied values for the foreign tax on profits (τ_f) and the pre-TCJA

profit-shifted share (ψ) of $\bar{x}^{\text{pre}}$. It turns out that there is also much less variation in these estimates for the different τ_h^{pre}. The foreign tax rate τ_f is roughly constant in the range of 14 to 12 percent. The share ψ is now in the range of 28 to 38.[19] Not surprisingly, the GILTI provisions are relevant when the tax haven rate is close to zero. The final estimates in the table are the pre- and post-TCJA estimates for the shifted share of foreign profits, $S/(S + \pi_f)$, when GILTI provisions are binding. As with τ_f and ψ, these provisions imply less variation in the estimates given GILTI puts an effective floor on the tax haven rates. Here we find the pre-TCJA shifted share is in the range of 25 to 11, which is roughly half of the residual-based estimate of Tørsløv, Wier, and Zucman (2023). Post-TCJA this share drops to a tight range of 10 to 11,

In either GILTI case, the model gives a simple measure of the change in shifting. Because shifted income S is proportional to the tax gap, the fraction of shifted income that returns to the United States, $(S^{\text{pre}} - S^{\text{post}})/S^{\text{pre}}$, equals the decline in the shifting incentive, $1-(\tau_d^{\text{post}} - \tau_h^{\text{post}})/(\tau_d^{\text{pre}} - \tau_h^{\text{pre}})$. This fraction ranges from 40 to 70 percent across the cells of Table 9.

5 Conclusion

The TCJA substantially reduced the foreign tax advantages reported by U.S. multinationals. Using firms' income tax reconciliations, we show that companies with larger pre-TCJA international tax benefits experienced larger post-TCJA increases in effective tax rates and larger declines in foreign profit shares. At the same time, we find little evidence that these firms differentially changed their sales, employment, investment, R&D, or the geographic location of their productive capital. The pattern points to a change in profit booking rather than a broad relocation of real activity: the reform weakened the tax incentive to book income abroad, while changes in the marginal tax on investment were largely common to firms within the same industry.

[19] When $\tau_h^{\text{pre}} = 5$ percent, the 95 percent confidence intervals for τ_f is [8, 16] percent and for ψ is [19, 46] percent. We also consider an alternative in which rebooked profits are taxed at the 13.1 percent FDII rate rather than the 21 percent corporate rate. In this case, ψ falls to 24–31 percent, while τ_f remains near 13 percent.

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A Data Construction

In this appendix, we provide additional details on our data construction. The source population is Compustat-linked annual 10-K filings. For each filing, we identify the income-tax rate reconciliation table, extract the reconciliation rows, and convert the result to a common firm-year-by-category panel. We also include specific SIC codes used for industry classification.

Every U.S.-publicly-listed company must report a reconciliation table that decomposes accounting items detailing the gap between the statutory tax rate and their effective rate. We collect the SEC filing URLs for 10K filings that can be merged with Compustat (2026b). In Table A.1, we report that the total number of URLs used in our stage 1 extraction is 125,367. Once we eliminate duplicates, the total number of unique SEC filings is 123,835. The parsing methods we use are designed for HTML formats. If we exclude non-HTML formats and the negligible number of downloads that failed, we have 103,304 usable filings to parse and classify.

Table A.2 shows the results of the classification of the 103,304 usable filings. Each one is parsed into text blocks and candidate tables. We use key words, symbols and phrases from the reconciliation tables to score each table. The score represents the likelihood that a reconciliation table will be extractable. We summarize categories in the table. Those scored high-confidence, likely but incomplete, or ambiguous account for roughly seven-tenths of the unique SEC filings. The remaining categories are filings with low scores or for which no reconciliation table was found. Tables may be missing if the information is not required under ASC 740. Every packet stage 1 produces is passed to stage 2 regardless of its bucket, and the lower-scoring categories still yield a small number of usable reconciliations. The count of packets is slightly below the count of filings that stage 1 completed: 264 filings finished without a candidate table to pass on, and a further 67 come from a later rescue pass whose packets are parsed separately.

The output of stage 1 is an audited packet containing the best candidate table or tables and nearby text. The goal of the second stage is to turn each of these packets into structured firm-year observations on a common schema. Table A.3 reports this transition: of the 102,973 packets parsed in stage 2, 82,132 yield at least one reconciliation row and 20,841 yield none. In Table A.4, we report the total count in the first row and then split the total three ways. First, we report the number of observations that pass or fail an arithmetic check, namely, that the sum of reconciliation values

equals the gap between the effective and statutory tax rates, within a tolerance of 0.2 percentage points for tables reported to a decimal and 1.0 point for those reported in whole numbers or in amounts. Most pass. Second, we report the number of observations that do or do not require LLM assistance when parsing. In other words, we deterministically parse the packet to first detect column headers that are consecutive years, then locate rows starting with the statutory rate or amount, subsequent adjustments, and the effective rate or amount, and finally to do the arithmetic check on row sums. If the parsing or arithmetic checks fail, the stage 1 packet is reassessed by GPT-5.2. Third, we report the number of reconciliations that use tax rates and the number that use tax amounts.

Output from the second stage parsing is filtered to create the final firm panel dataset used in the regressions. We keep observations in the period 1998 to 2024 that have a match in Compustat (2026b) and pass the arithmetic check. Since each 10K filing reports the tax reconciliation for the current year as well as, typically, two past years, we deduplicate the dataset by the priority rules described in Section 2: own-year before comparative, passing the arithmetic check before failing it, original filings before amendments, higher-confidence extractions before lower, and the earliest filing before later restatements. Table A.5 shows row counts as we filter the stage 2 data. After the filtering is complete, we have a total of 77,199 firm-year observations. For some results, we also apply industry filters and use SIC codes summarized in Table A.6.

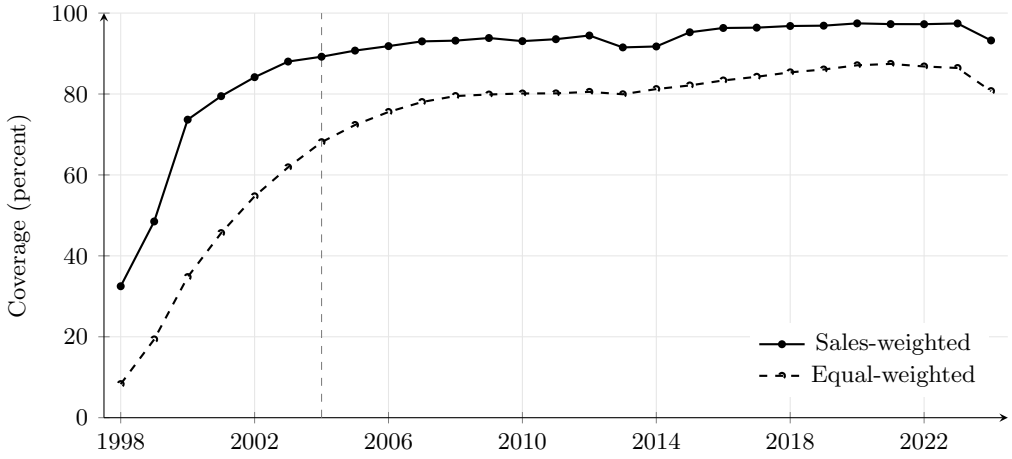
A.1 Coverage by Year

Figure A.1 reports the share of the Compustat population of Table 3 for which we recover a reconciliation, by year. Coverage rises with the spread of machine-readable filings: it is 8.3 percent in 1998, passes two-thirds in 2004—which is why the descriptive figures of Section 3 begin in that year—and reaches 79.5 percent by 2008. Sales-weighted coverage is higher throughout, because the firms we miss are small.

A.2 Assigning Reconciliation Rows to Categories

Stage 2 returns each reconciliation row with the label its filer wrote, and those labels are free text: 44,084 distinct strings appear in the panel. "Effect of foreign operations," "Jurisdictional rate differences," and "Earnings of subsidiaries taxed at other than U.S. statutory rate" are all

Figure A.1: Coverage of the Analysis Panel by Year



Notes: Share of the Compustat population defined in Table 3 for which the analysis panel contains a reconciliation. The equal-weighted series is the share of firm-years; the sales-weighted series weights by sales. The vertical line marks 2004, the first year in which equal-weighted coverage exceeds two-thirds.

the foreign rate differential, and none shares a common substring with the others. A third stage therefore maps labels to the categories of Table 2.

The mapping is a deterministic cascade of 32 ordered regular expressions applied to the lowercased label. The first rule that matches assigns the row to one of 26 fine categories, which are then folded into the seven categories of Table 2; a row matching no rule is assigned to *other*. The assignment is exhaustive and one-to-one—every row receives exactly one category, and no row is split—and it is applied after deduplication, so the retained filing determines a firm-year's categories. Because the rules are ordered, specific provisions are tested before general patterns: GILTI, FDII, BEAT, and Subpart F are matched by name before the broader foreign-rate patterns, and the transition tax and rate remeasurement before either, so that a row naming a TCJA provision is not absorbed by a generic "foreign" rule.

Two boundaries are worth stating because they are judgment calls rather than consequences of the rules. Foreign currency translation and exchange gains and losses are excluded from *international*: they are not a differential between tax rates. Withholding taxes are excluded when the label does not identify them as foreign, since unqualified "withholding taxes" is also a domestic item. Subpart F inclusions, by contrast, are assigned to *international*, since they are a current U.S. tax on foreign income and the pre-TCJA counterpart of GILTI, as is BEAT, the third of TCJA's

Table A.1: Stage 1 Sample Counts

Samples	Counts
Input URLs	125,367
Less duplicate rows	1,532
Equals unique filings	123,835
Less non-HTML links	20,529
Less download failures	2
Equals stage 1 extracts	103,304

Notes: The table reports sample counts for stage 1 extracts of SEC 10K filings. Input URLs include Compustat-linked 10Ks and manually audited links. Non-HTML links and download failures are skipped in the stage 1 parsing.

international provisions.

Two diagnostics bear on whether the mapping leaks. First, over 2013–2024 the residual *other* category carries 21.5 percent of the sales-weighted absolute rate gap, against 22.5 percent for *international*; of the rows in that residual, only 3.4 percent carry a label naming a foreign concept, and they account for 4.8 percent of its absolute contribution. The residual is large, but it is not mostly misfiled international items: it is dominated by rows the filer itself labeled "other." Second, 53.3 percent of firm-years have no international row at all. This is why a firm-year with no row in a category is treated differently in different places. The distributional tables count a category as present only when the firm-year reports a row there, so a firm reporting no international line is not a firm reporting an international contribution of zero, and the number of firm-years underlying a category is smaller than the panel and differs across categories. The regressions of Section 3 assign such a firm-year a contribution of zero, so that the treatment variable and every outcome are defined on one common sample.

B Additional Results

In this appendix, we report additional difference-in-differences results, namely, estimated contributions of all reconciliation categories and profit-location responses for different subsets of firms as

Table A.2: Stage 1 Sample Classifications

Classification	Counts
All stage 1 extracts	103,304
Reconciliation-like buckets	87,450
High-confidence extractable	39,024
Likely-extractable but incomplete	39,751
Ambiguous	8,675
Other buckets	15,854
Low-confidence extractable	13,550
No table found	442
Wrong table type	1,862

Notes: The table reports sample counts for stage 1 extracts of SEC 10-K filings classified in terms of potential for retrieving a firm-year reconciliation table in stage 2. Every stage 1 extract is passed to stage 2 regardless of its bucket, and the classification records stage 1's assessment.

Table A.3: Stage 1 to Stage 2

Sample	Counts
Packets processed by stage 2	102,973
Without reconciliation rows	20,841
With reconciliation rows	82,132
Filings entering outside the main stage 2 run	721
Filings with reconciliation rows	82,853
Total filing-year observations	224,308

Notes: The table reports counts of stage 1 packets with and without at least one reconciliation row and the number of filing-year observations derived from packets that had a reconciliation row. Filings entering outside the main stage 2 run include filings rescued from earlier runs and a targeted re-extraction of filings whose fiscal year and period of report disagree. Each filing-year observation is one filing and reconciliation year pair.

Table A.4: Stage 2 Parsing Results

Output	Counts
Total filing-year observations	224,308
Arithmetic checks:	
Successful	223,081
Unsuccessful	1,227
Parsing methods:	
No LLM assistance	119,658
LLM assisted	104,650
Reconciliation types:	
Tax rates reported	110,902
Tax amounts reported	113,406

Notes: The table reports counts of filing-year observations split by arithmetic checks, parsing methods, and reconciliation types. The arithmetic check is applied here to the raw extraction and again in Table A.5, after filing-years are deduplicated and placed on a common schema. The second application is the stricter of the two and is the one the panel uses: 2,166 filing-years pass the check at extraction and fail it on reassembly, and 81 go the other way, so the two tables report different counts of the same test.

we vary characteristics.

B.1 Contributions by Reconciliation Category

Table B.1 estimates equation (1) with each reconciliation category's contribution to the tax rate gap as the outcome, and reports the sum of those coefficients against $\hat{\beta}_{\text{ETR}}$. The effective tax rate is the statutory rate plus the sum of the category contributions, and the industry-by-year effects absorb the statutory change, so the two should agree up to the winsorization applied to each category. Section 3.2.1 reads the result.

B.2 Heterogeneity in the Profit-Location Response

Table B.2 reports the interaction coefficient $\hat{\gamma}$ from equation (3) with the foreign profit share as the outcome, one characteristic Z_i at a time. Continuous characteristics are measured over 2013–2016, winsorized at the 1st and 99th percentiles, and standardized, so $\hat{\gamma}$ is the change in the profit-

Table A.5: Stage 2 to Main Firm-level Sample

Sample	Counts
Total filing-year observations	224,308
Net change in matching to firms	−68
Equals base panel filing-years	224,240
Less: Years before 1998 or after 2024	536
Less: Outside expected filing window	77
Less: No firm-year link to Compustat	1,486
Less: Unsuccessful arithmetic checks	3,186
Less: Duplicate firm-year rows	141,756
Equals final firm-year sample	77,199

Notes: The table reports counts for the final firm-year sample. Filings are matched to Compustat (2026b) firms to form the base panel. A combined 10-K filed by several co-registrants covers more than one firm; because stage 2 recovers a single reconciliation from each document, the filing is assigned to the registrant whose reported taxes match it and the remaining registrants are dropped. Duplicate firm-year rows arise because each 10-K reports three reconciliation years, so the same firm-year appears in several filings; we keep one observation per firm and year.

Table A.6: Industry SIC Codes

Industry Category	SIC Codes
Technology	3570–3579, 3670–3679, 7370–7379
Pharmaceuticals	2830–2836, 8731
Manufacturing	2000–3999 excl. codes above
Oil & Gas	1310–1389, 2910–2999
Retail	5200–5999
Utilities	4900–4939
Other	not elsewhere categorized

Notes: For industry assignments, we use SIC codes from the Compustat (2026b) database. For our full sample, we exclude heavily regulated financial institutions, holding companies, and funds, namely, 6000–6799, except major group 61 other than 6111 and 6159, and except 6211, 6282, 6411, 6512, 6531, and 6532.

Table B.1: Pooled Difference-in-Differences Estimates by Reconciliation Category

Category	Coefficient
International	−0.779***
	(0.031)
State & local	0.020
	(0.014)
Federal credits	0.022
	(0.020)
Book v. tax	0.004
	(0.026)
Valuation	0.097***
	(0.031)
One time	0.010
	(0.013)
Other	0.060**
	(0.028)
Sum of categories	−0.566
Effective tax rate	−0.612***
Sum excluding international	0.213

Notes: Each row reports the pooled difference-in-differences estimate of equation (1) with that category's contribution to the tax rate gap as the outcome, on 1,307 firms and 9,203 firm-years. A firm-year with no row in a category is assigned a contribution of zero, so all categories are estimated on one common sample. Because the effective tax rate is the statutory rate plus the sum of the category contributions, and the industry-by-year effects absorb the statutory change, the sum of the category coefficients equals $\hat{\beta}_{\text{ETR}}$ up to the winsorization applied to each category; the two are reported together as a check. Standard errors clustered at the firm level are reported in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table B.2: Heterogeneity in the Profit-Location Response

Characteristic Z_i	$\hat{\gamma}$	Firm-years
R&D / assets	2.103**	5,855
	(0.851)	
Cash / assets	0.771***	5,855
	(0.261)	
Intangibles ex-goodwill / assets	−0.054	5,855
	(0.203)	
Foreign revenue share	0.376**	5,414
	(0.176)	
Any haven or conduit subsidiary	0.709	5,355
	(0.511)	
Any classic-haven subsidiary	−0.031	5,355
	(0.306)	
Log haven/conduit subsidiary count	−0.003	5,355
	(0.158)	
Log assets	−0.435	5,855
	(0.272)	

Notes: Each row is a separate estimate of equation (3) with the foreign profit share as the outcome and that characteristic as Z_i, including firm and industry-by-year fixed effects. Continuous characteristics are measured pre-TCJA firm averages over 2013–2016, winsorized at the 1st and 99th percentiles, and standardized. Coefficients are in percentage points of the foreign profit share. Samples differ across rows because the characteristics have different coverage. Standard errors clustered at the firm level are reported in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

location response associated with a one standard deviation higher Z. The two binary measures are indicators, so $\hat{\gamma}$ is the difference between firms that have such a subsidiary and firms that do not.