Does Parenting Matter? U.S. Parents, Non-U.S. Parents, and Global Firm Taxes

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ABSTRACT

In this paper we examine whether, under pre-2018 tax law, a global firm reported a lower income tax expense simply because its publicly traded parent was incorporated outside the United States. Our study considers loss years as well as profit years and isolates the effect of the incorporation location of the parent by considering only U.S. and non-U.S. multi-national companies (MNCs) with a significant U.S. presence. We find that, in profit years, U.S. firms show an effective tax rate that is greater by 5 percentage points compared to non-U.S. firms. Conversely, in loss years, which make up approximately 30% of our sample, U.S. firms have better tax results, which can be expressed as an effective tax rate advantage of 4 percentage points among firms that do not record a valuation allowance. Our study demonstrates that the relative tax cost of organizing as a U.S. firm is smaller than some have suggested, and reinforces the importance of considering loss year results when evaluating tax policies. The results also suggest that the reduction in the U.S. corporate income tax rate under the 2017 Tax Cuts and Jobs Act, or TCJA, will provide smaller benefits to U.S.-parented corporations when loss years are also considered.

1   Introduction

At the end of 2017 the U.S Congress passed the Tax Cuts and Jobs Act (TCJA), which lowered the U.S. federal corporate tax rate to 21%. This represented a substantial decrease from the previous U.S. federal statutory rate of 35% and moved the U.S. closer to the rates in non-U.S. tax systems. In addition to the headline rate reduction, the TCJA included some provisions that increased taxes, such as a tax on global intangible low-taxed income, or GILTI, earned by non-U.S. subsidiaries of U.S. parents. Nevertheless, lawmakers said that they intended the TCJA to offset U.S.-parented multinational corporations (MNCs') competitive disadvantage relative to their non-U.S. peers (Herzfeld, 2018).

In this paper we ask: How large was the disadvantage faced by these U.S.-parented firms relative to their non-U.S. peers prior to the TCJA? Or, to put it another way, how much higher was the tax expense of U.S. firms relative to their non-U.S. counterparts under the pre-2018 law? While prior research finds that U.S. firms generally reported higher effective tax rates compared to non-U.S. firms in that period (e.g., Markle and Shackelford, 2014), this result is not universal (Congressional Research Service, 2014).[1] Indeed, there is the perception that the U.S. tax system was sufficiently flexible to allow U.S.-parented MNCs to report profit outside of the U.S. and achieve similar tax outcomes to non-U.S. firms (Grubert, 2012; Kleinbard, 2011). As a result, there is debate as to how, and to what extent, the U.S. tax system prior to the TCJA disadvantaged U.S.-parented multinational firms. There is also uncertainty over how the TCJA changes will affect corporations' tax burdens (Clausing, 2019; Dharmapala, 2018) and book tax accruals (Hanlon *et al.*, 2018, p. 11). By examining the pre-TCJA differences between U.S. and non-U.S.-parented firms in further detail, we hope not only to shed light on the policy debate in the U.S. that led to the TCJA, but also provide a baseline for studying the effects of the TCJA on the tax burdens of U.S.-parented versus non-U.S.-parented firms starting in 2018.

Our research approach fills two gaps in prior research into the reported tax burdens of U.S. and non-U.S. MNCs. The first is a matter of identification. A good way to test how the U.S. corporate tax system burdens U.S. MNCs is to ask whether U.S.-parented MNCs have higher tax bills *only* because of their U.S. parent. But prior research generally does not address this. Rather it focuses on the tax outcomes of exclusively U.S.-incorporated MNCs (e.g., Dyreng and Lindsey, 2009), or compares tax outcomes of non-U.S. and U.S.

    [1]For example, Avi-Yonah and Lahav (2012) find that effective book tax rates were lower for certain large U.S. firms as compared to large European firms. Dyreng *et al.*, 2017 find that U.S. firms reported steadily decreasing cash tax rates over the pre-reform period.

domiciled firms regardless of whether the non-U.S. firms have material U.S. activity or how much U.S. activity they have (e.g., Markle and Shackelford (2012), 2014). In contrast, our identification strategy relies on comparing U.S.-incorporated MNCs to non-U.S. MNCs with significant U.S operations. We also control for a firm's magnitude of foreign operations, using the proxy of proportion of Non-U.S. Sales. This allows us to isolate the effect of having a non-U.S. parent corporation and avoid confounding it with having business operations outside rather than inside the U.S. Compared with prior research, our approach more narrowly focuses on a question – the effect of the U.S. corporate income tax rules on U.S.-parented firms – that the TCJA focused on.

The second gap in previous research relates to loss firms. Prior studies focus on the effects of the U.S. tax system on profitable firms, and treat losses as a transitory state that will soon reverse, or completely ignores them in the analysis. This omission excludes a frequent outcome for many firms. Moreover, a higher statutory tax rate penalizes a firm in profit years but can benefit a firm in loss years. By examining tax outcomes in both profit and loss states of the world we offer a more complete analysis.

We begin our analysis by examining the reported tax outcomes in years where the firms generated pre-tax profits. We predict that, consistent with prior research, U.S.-parented MNCs reported higher tax expense in years where they generated a profit. This prediction is driven by two key dynamics. The first is the "worldwide" application of the pre-reform U.S. corporate tax system compared to the "territorial" application of many other systems. The second is base erosion.

As to the first dynamic, the financial accounting rules based on the pre-2018 tax law generally required a U.S.-parented firm to accrue U.S. tax expense at the U.S. statutory tax rate for the profit of non-U.S. subsidiaries at the time income was earned, regardless of whether it was actually repatriated in that period. This meant that U.S.-parented firms should have reported higher total tax expense than comparable non-U.S. firms with similar amounts of non-U.S. income. However, this worldwide accrual approach was subject to an important exception. A U.S. firm could avoid accrual of U.S. tax expense to the extent it designated non-U.S. profit as indefinitely or permanently reinvested earnings, or PRE, outside the U.S. But as long as less than all of the non-U.S. profit was designated as PRE within a particular firm, the higher reported tax expense that results from worldwide accrual should still be evident.

The second dynamic driving higher tax expense for U.S.-parented firms in profit years is base erosion. A non-U.S.-parented firm could reduce its profit subject to U.S. tax through earnings stripping, where deductible payments, such as interest or royalties, are made by U.S. subsidiaries to a non-U.S. parent. In contrast, because of the operation of the U.S. "subpart F" tax rules, U.S. firms generally could not reduce their profit subject to U.S. tax through similar deductible payments made by a U.S. parent to non-U.S. subsidiaries. As a

result, the U.S. firm would have more income trapped in the high-tax U.S. jurisdiction than a comparable non-U.S. firm, which could have caused U.S. firms to report a higher tax expense.

We continue our analysis by examining the reported tax outcomes where firms reported a pre-tax loss. We predict that U.S.-parented MNCs reported a larger tax benefit, or a larger negative tax expense, in years where they generated a loss. It may seem obvious that if a firm paid higher taxes in profit years then it will generate larger refunds, or other tax benefits, in loss years. But this has yet to be empirically shown in the literature in the context of U.S. versus non-U.S. firms. Our prediction for loss years proceeds from the same two dynamics proposed to drive our profit year prediction.

The first dynamic, relating to the worldwide accrual of tax expense, should have allowed U.S. firms to record larger tax benefits at the higher U.S. rate. The second dynamic, relating to earnings stripping, could go in either direction. On one hand, the allocation of more deductions to U.S. affiliates of non-U.S. firms could have produced more U.S. losses for non-U.S. firms, and thus more negative tax expense for non-U.S. firms, due to the application of the higher U.S. statutory rate. On the other hand, if non-U.S. firms had already substantially eroded their U.S. tax base through earnings stripping and other strategies, then non-U.S. firms' lower U.S. profits could make it difficult for them to use tax losses. This would predict more negative tax expense for U.S. firms in loss years compared to non-U.S. firms.

To test our predictions we identify all MNCs with material U.S. operations that listed on a U.S. exchange between 1999 and 2014. This results in a sample of 4,886/(35,797) unique firms/(firm years). Of these firms, we identify 674/(5,451) firms/(firm years) as incorporated outside of the U.S. In approximately 30% of the firm years the MNCs report a pre-tax loss.

Our main analysis examines the contemporaneous total book effective tax rates (ETRs) experienced by U.S and non-U.S.-parented MNCs for this pre-2018 period. We first find that, consistent with our predictions, U.S. firms recorded more positive tax expense in profit years. For Profit Firm Years, having a U.S. parent was associated with an effective tax rate that is on average 5 percentage points more than having a non-U.S. parent in a comparable firm. We estimate that an average U.S.-parented firm reported an ETR of 28%, while an average non-U.S. firm reported an ETR of 23%. This is roughly consistent with the differences that others have found in prior research (e.g., Markle and Shackelford, 2014).

In loss years we find a more nuanced result. Not surprisingly, among firms that recorded a deferred tax valuation allowance,[2] we find no difference in

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[2]The valuation allowance is an account that reduces reported negative tax expense, for instance because of concerns that future profit will not be sufficient to absorb future tax deductions. For example, if the firm has a net operating loss (NOL) carryforward that represents potential future deductions worth $100 in tax savings, but managers expect that

the effective tax rates reported by U.S. and non-U.S. firms. This is because such a valuation allowance means that a firm was likely not be able to use the losses to reduce taxable profit, for instance because the firm was expected to continue in a loss position for some time.

Among loss firms that did not record a valuation allowance we find the predicted relationship. Having a non-U.S. parent was associated with a 4 percentage point higher (in other words, less negative) ETR in years when the firm reported a loss. We estimate that an average U.S.-parented firm that did not record a valuation allowance reported an ETR of −14%, compared to approximately −10% for a non-U.S. firm.

Although our main analysis controls for variables such as size and proportion of non-U.S. sales, there remains the concern that parent incorporation location captures inherent differences between U.S. and non-U.S. firms that are not related to the effect of the U.S. corporate income tax. To address this concern, we create a more balanced sample using an inverse probability treatment weighting (IPTW). The results hold. U.S. firms show ETR higher by 6 percentage points in profitable years and lower by 4 percentage points in loss years when firms did not record a valuation allowance.

We perform several additional analyses to examine how different dynamics contribute to our results. First, we partition the non-U.S. sample based on incorporation location, and find that non-U.S. firms incorporated in tax havens showed the largest differences compared to U.S. firms. Tax haven-parented firms showed an advantage of 7 percentage points in profit years, and a disadvantage of 11 percentage points in loss years with no valuation allowance. We also find no difference in the non-U.S. effect based on whether the firm achieved that parentage through an inversion transaction.

We next consider the impact of U.S. firms' decisions to designate non-U.S. profit as permanently reinvested earnings, or PRE. Since PRE designation removes the requirement to accrue tax expense at the U.S. rate on a worldwide basis, one might expect that a U.S. firm that designated PRE would see its profit year tax expense disadvantage disappear. But U.S. firms that designated PRE still showed a disadvantage in profit firm years. This suggests that base erosion (i.e., earnings stripping) by non-U.S. firms also contributes to the higher tax accruals of U.S. firms in profit years.

Our analysis shows that the question of whether the U.S. tax system disadvantaged U.S.- parented MNCs before 2018 is nuanced. For firms that frequently generated profits, there was a clear benefit to having a structure with a non-U.S. parent. This structure resulted in lower ETRs. But when we consider the effect of losses we find that there was a benefit to having a structure with a U.S. parent among firms that did not record a valuation

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the firm will only generate sufficient future taxable income to utilize half of the NOL, then the firm will record a valuation allowance, reducing the reported negative tax expense to $50.

allowance. The results suggest the importance of considering the effect of losses as well as profits in future tax research and when analyzing policy interventions.

This paper proceeds as follows. Section 2 presents related research, outlines the problem of multinational firm location and tax planning and develops our main hypotheses. Section 3 presents our study design. Section 4 discusses our sample construction and main tax rate results for profit and loss years. Section 5 provides additional analysis. Section 6 concludes.

2 Background and Hypothesis Development

In this section we discuss the tax and accounting environment faced by U.S. MNCs prior to the tax act passed in December 2017. For expositional ease, the paper is written as if the pre tax-reform U.S. rules were still in place. However, in Appendix I we provide a brief discussion, and numerical example, of how some of the changes in law might affect the reported outcomes of the firms that are the focus of our analysis.

2.1 *Organizational Structure of Non-U.S. Firms and U.S. Firms*

In a Non-U.S. Firm (defined, along with other variables, in Table 1) the publicly traded entity that serves as the parent of the firm is a non-U.S. corporation. The non-U.S. parent owns operating companies, both non-U.S. and U.S. (Treasury, 2002). In this structure, U.S. operations are typically housed in a corporate subsidiary. U.S. income tax applies to taxable income earned by the U.S. subsidiary, but not to income earned by affiliates that are not engaged in U.S. business. Prior work notes the ability of firms to choose the incorporation location of their parent entity (Shaviro, 2011).

In a U.S. Firm, a U.S. corporation serves as the publicly traded entity, and foreign operations are often held in some variation of a three-box structure. In this structure, the U.S. parent owns a non-U.S. holding company and the non-U.S. holding company owns a non-U.S. operating company. In the U.S. Firm structure, the affiliate with the lowest income tax rate is typically the intermediate non-U.S. holding company (Shay, 2004). Appendix II provides a diagram of both structures.

2.2 *Profit Year Prediction: Non-U.S. Firms Record Lower Tax Expense*

A substantial body of prior research examines the tax planning of MNCs. Some of these studies find that U.S. Firms report higher book ETRs than Non-U.S. Firms during profit years (e.g., Markle and Shackelford (2012), 2014). Other research, however, finds that U.S. Firm rates may be lower than some Non-U.S. Firm rates, at least for the largest firms (Avi-Yonah and Lahav,

2012). Research that focuses on U.S. Firms finds those with greater foreign operations report lower ETRs compared to more domestic firms (e.g., Rego, 2003), and that this effect is greater for firms with operations in tax havens (Dyreng and Lindsey, 2009).

While the firms that are the focus of our study are somewhat different than the firms considered in other papers, we expect that the general result will hold. That is to say, non-U.S. parented firms will report lower ETRs than comparable U.S.-parented firms when they report profit. We propose two dynamics driving this prediction: (1) the financial accounting rules use of the high U.S. statutory rate to accrue U.S. tax expense on at least some non-U.S. income, due to the worldwide U.S. tax system; and (2) the non-U.S.-parented structure allows for a greater ability to shift income from high tax to low tax jurisdictions through base erosion or earnings stripping.

The implementation of the financial accounting rules under the pre-2018 worldwide U.S. tax system can be explained as follows. A Non-U.S. Firm typically reports income tax expense based on the income that is allocated to each jurisdiction for tax purposes. For instance, for its U.S. affiliates, a Non-U.S. Firm reports tax expense based on the allocated U.S. taxable income multiplied by the U.S. rate. The total amount incurred across all jurisdictions is then reported as tax expense on the consolidated income statement.

A U.S. Firm also calculates total tax expense by first determining the income that is allocated to each jurisdiction for tax purposes. Just as with the Non-U.S. Firm, for the non-U.S. affiliates of the U.S. Firm, tax expense is recorded based on the income allocated to each jurisdiction multiplied by the non-U.S. rate. For U.S. affiliates, tax expense is likewise initially calculated based on the taxable income allocated to the U.S., multiplied by the U.S. rate.

But the financial accounting rules have two extra steps for U.S. Firms, due to the worldwide U.S. tax system. The first step is that a default financial accounting rule requires a U.S. Firm to recognize tax expense for any foreign income earned by non-U.S. subsidiaries. This is because of the worldwide system of U.S. income taxation, which provides that income earned by non-U.S. affiliates of a U.S. Firm will be taxed by the U.S., upon repatriation if not before. Sometimes, this tax expense is a current tax expense, for instance, if the non-U.S. income is "subpart F income." But very often, it is recorded as a deferred tax expense, because firms use tax planning to minimize subpart F income (Kleinbard, 2011; Lokken, 2005). In this case, firms defer the U.S. tax until the related non-U.S. income is repatriated as a dividend (Graham *et al.*, 2010).

The second step that relates to the worldwide U.S. tax system is that the default rule does not apply, and tax expense does not accrue, on non-subpart F U.S. income designated as indefinitely or permanently reinvested earnings (PRE). Empirical evidence shows that many U.S. Firms designate PRE, but typically not for all of their non-U.S. profit (Krull, 2004; Graham *et al.*, 2011; Blouin *et al.*, 2017). So long as a U.S. Firm designates less than all of its

non-U.S. profit as PRE, it should report a higher book tax expense than a Non-U.S. Firm because of the accrual of U.S. tax expense, typically deferred U.S. tax expense, on at least some non-U.S. income.

The second dynamic that supports our prediction that U.S. Firms will record more tax expense in profit firm years is earnings stripping. That is, the Non-U.S. Firm structure increases the ability of a firm to transfer income from high to low tax jurisdictions through base erosion. All firms have the incentive to allocate as much income as possible to lower tax jurisdictions. This can be accomplished through the use of tax planning strategies such as transfer pricing, intercompany financing, hybrid entities and instruments, and earnings stripping (e.g., Klassen *et al.*, 2017; Altshuler and Grubert, 2002; Grubert, 2012; OECD, 2015). Consistent with this, prior research shows evidence of MNCs engaging in income shifting between affiliates in an effort to lower their overall tax burden (Clausing, 2009; Dowd *et al.*, 2016; Dharmapala and Riedel, 2012; De Simone *et al.*, 2016). U.S. Firms as well as Non-U.S. Firms also base erode, and treat income as generated in lower tax jurisdictions in order to decrease their overall tax burden (Clausing, 2016; Markle, 2016; Kohlase and Pierk, 2016). Because U.S. Firms also have strong base erosion options, an advantage for Non-U.S. Firms on this point is not a foregone conclusion.

However, Non-U.S. Firms have special access to a base erosion strategy known as 'earnings stripping'. Earnings stripping means that a U.S. subsidiary makes deductible payments, such as interest, to its non-U.S. parent. U.S. rules historically have not materially constrained earnings stripping by Non-U.S. Firms (White House and Treasury, 2012). In contrast, a U.S. Firm cannot earnings strip to the same extent as a Non-U.S. Firm. This is in part because intercompany payments such as interest made by a U.S. parent to a non-U.S. subsidiary are typically treated as currently taxable subpart F income (Wells, 2010; Fleming Jr. *et al.*, 2015).

If a Non-U.S. Firm successfully strips earnings out of the U.S., this could cause Non-U.S. Firms to have less income in U.S. affiliates and to recognize smaller current tax expense compared to U.S. Firms. Since the smaller current tax expense will not be offset by a larger deferred tax expense for Non-U.S. Firms, earnings stripping produces a permanent difference (Seida and Wempe, 2004, p. 6).[3] As a result, even if the U.S. Firms designate all of their non-U.S. income as PRE, the Non-U.S. Firms might still report a lower tax expense. Therefore, our hypothesis is essentially a joint test of the two dynamics we identify: that U.S. Firms must record tax expense, typically deferred tax expense, on non-U.S. income not designated as PRE; and that Non-U.S. Firms may have greater access to earnings stripping strategies that reduce the amount of income subject to higher rates of U.S. corporate income tax.

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[3]The result of a permanent difference as a result of earnings stripping holds whether a Non-U.S. Firm reports based on IFRS or GAAP standards.

We formally state our hypothesis as follows:

> *H1: For Profit Firm Years, Non-U.S. Firms report less positive tax expense (i.e., better tax results) compared to U.S. Firms.*

We note that there are reasons why we may not find the predicted relationship. In particular, there is the possibility that even without access to earnings stripping, U.S. Firms will be able to report similar amounts of income in low-tax jurisdictions as Non-U.S. Firms through the use of transfer pricing and other base erosion strategies. If U.S. and Non-U.S. Firms are equally able to base erode, higher reported tax expense for U.S. Firms should equal tax expense reported as a result of the U.S. "worldwide" system on Non-U.S. income not designated as PRE. In other words, if profitable U.S. and Non-U.S. Firms are equally able to base erode, and a U.S. firm takes full advantage of the PRE designation, then there should be no incremental U.S. tax for the U.S. Firm.

2.3 Loss Year Prediction: Non-U.S. Firms Record Less Negative Tax Expense

We also consider the effective tax rates of U.S. and Non-U.S. Firms in loss years. The tax and financial accounting treatment for Loss Firm Years raises issues not present for Profit Firm Years. These issues have not been fully explored in previous literature, in particular not for the group of firms that are the focus of our study.[4]

Both U.S. Firms and Non-U.S. Firms may report negative tax expense on their financial statements based on the loss that is allocated to each jurisdiction for tax purposes. A negative tax expense indicates that the book loss will support lower income tax payments in the future or a tax refund. U.S. affiliates might record negative tax expense based on the loss allocated to the U.S., multiplied by the U.S. rate. Non-U.S. affiliates might record negative tax expense based on the loss allocated to non-U.S. jurisdictions, multiplied by the respective non-U.S. rates. It is possible for a firm to report negative tax expense in some jurisdictions and positive tax expense in other jurisdictions. The total tax expense incurred across all jurisdictions is then reported on the consolidated income statement.

The magnitude of a negative tax expense is related to the statutory income tax rate of the jurisdiction where the losses are recorded. For example, if the losses are recorded in the U.S., a negative tax expense would have a greater absolute value than if the losses are recorded in the Cayman Islands. This is because the U.S. has a high statutory income tax rate based on a

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[4]Some notable exceptions of research that examines tax outcomes in loss years, though not necessarily for U.S. MNCs, include: Dhaliwal *et al.* (2013), Thomas and Zhang (2014), De Simone *et al.* (2016), and Dyreng and Lindsey (2009).

35% national rate, while the Cayman Islands has a statutory income tax rate of 0%.

The current or deferred status of a negative tax expense depends on how the loss will be utilized. For instance, if the negative expense is the result of a current tax refund (e.g., as a result of a carryback rule), then it will produce a negative current tax expense. If it must await future profits before it can be used (e.g., under a carryforward rule), the firm will accrue a negative deferred tax expense. The ability to record a current or deferred negative tax expense will be in part determined by the carryback or carryforward provisions of where the loss is generated. Under pre-2018 law, the U.S., for instance, had a carryback period of 2 years and a carryforward period of 20 years. Some European jurisdictions have indefinite carryforward periods (Langenmayr and Lester, 2018). For our data set, tax rates (for instance, the zero tax rate for some tax haven jurisdictions) may be more important than the variations in carryforward provisions among jurisdictions.

Both of the dynamics considered in the profit year case can have an effect on reported tax outcomes in loss years as well. First, worldwide taxation should allow U.S. Firms to record larger negative tax expense compared to Non-U.S. Firms. When U.S. Firms realize non-U.S. losses in their non-U.S. subsidiaries, these losses might reduce the U.S. tax that will eventually be due on the repatriation of non-U.S. profit. For instance, the losses can reduce the earnings and profits of a non-U.S. subsidiary, out of which the subsidiary might in the future pay taxable dividends to the U.S. parent of the U.S. Firm. Thus, non-U.S. losses incurred by a U.S. Firm might produce negative tax expense recorded at the U.S. rate, although only to the extent supported by non-U.S. profit not designated PRE.

Second, the increased opportunity presented to Non-U.S. Firms to earnings strip could go either way. It is possible that it would allow Non-U.S. Firms to record more negative income tax expense than U.S. firms in loss years. This is because earnings stripping allows Non-U.S. Firms to allocate more deductions to their U.S. affiliates, which would cause a larger U.S. source loss than a comparable U.S. firm. In that case, assuming it generates sufficient future U.S. source income, the Non-U.S. Firm could record a larger negative tax expense than comparable U.S. Firms. Earnings stripping might thus produce a better tax outcome for non-U.S. firms in loss years as well as profit years.

On the other hand, U.S. Firms' inability to erode the U.S. tax base to the same degree as Non-U.S. Firms may cause U.S. Firms to have more profits in the U.S., which translates to more income subject to tax at a higher rate against which U.S. Firms might offset losses. This would mean that a U.S. Firm could record more negative tax expense in loss years than a comparable Non-U.S. Firm.

In summary, worldwide taxation and earnings stripping are two dynamics that should influence the effective tax rate experience of Non-U.S. Firms

compared to U.S. Firms in Loss Firm Years. Worldwide taxation suggests that U.S. Firms will record more negative tax expense than Non-U.S. Firms. Increased earnings stripping opportunities for Non-U.S. Firms might (or might not) suggest that Non-U.S. Firms will record more negative tax expense than U.S. Firms. We evaluate the importance of these offsetting factors by testing the following hypothesis:

> *H2: For Loss Firm Years, Non-U.S. Firms report less negative tax expense (i.e., worse tax results) compared to U.S. Firms.*

Regardless of the effects of worldwide taxation and earning stripping, we may not observe our predicted relationship due to choices regarding the establishment of a valuation allowance. The negative deferred tax expense recorded by a loss firm reflects the anticipated benefit to be recognized when the firm generates future profits that carried over losses can offset. Because there is inherent uncertainty regarding the generation of future income, accounting standards require that the firms determine whether it is "more likely than not" that they will realize all of the deferred tax benefits (FASB, 2009). If the firm determines that there is a greater than 50% likelihood that they will not generate sufficient future taxable income to take advantage of the deferred benefits, they have to record a valuation allowance, which reduces the deferred tax asset and associated negative tax expense to their estimated net realizable values (Allen, 2015).[5] If, in the extreme case, all firms record a valuation allowance completely eliminating the negative tax expense generated by the loss, then we will observe no difference in outcomes between the U.S. Firm and Non-U.S. Firm structures in loss years.

3 Research Design

This Part 3 sets forth our study design. All variables are defined in Table 1.

3.1 *Empirical Specification*

We test both of our hypotheses with an ordinary least squares (OLS) regression using the following empirical specification:

$$Book\ ETR_{it} = \beta_0 + \beta_1(Non-U.S.\ Firm)_{it} + \sum_k \beta_k\,(Controls)_{it}^k + \varepsilon_{it}. \quad (1)$$

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[5]We note that we are not initially concerned with what is driving the choice to record a valuation allowance (e.g., manager expectations vs. auditor conservatism). Rather we are interested in the effect an allowance has on reported ETR. That said, prior research generally finds evidence consistent with the magnitude of the allowance being tied to managers' expectations of future income and future operating performance which relates to firms' actual ability to utilize the future tax benefits (e.g., Miller and Skinner, 1998; Allen, 2015).

Table 1: Variables.

Variable Name	Proxies For	Calculated As
Advertising Expense	Value of trademark/brand	Advertising expense/total sales = XAD/SALE. If XAD is missing, then XAD = 0
Book ETR	Tax planning efficiency	If pre-tax income (PI) $\geq$ 0 = total tax expense / pre-tax income = TXT/PI. For firms with PI <0 Book ETR is multiplied by −1.
Canada Firm		Non-U.S. Firm with FIC = Canada
Current ETR	Contribution of earnings stripping to ETR difference	If pre-tax income (PI) $\geq$ 0 = current tax expense / pre-tax income = TXC/PI. If TXC is equal to missing and TXDI = TXT then TXC = 0. If TXC is equal to missing and TXT and TXDI are not equal to missing than TXC = TXT − TXDI.
Deferred ETR	Contribution of worldwide taxation to ETR difference	If pre-tax income (PI) $\geq$ 0 = deferred tax expense / pre-tax income = TXDI/PI. If TXDI is equal to missing and TXC = TXT then TXDI = 0. If TXDI is equal to missing and TXT and TXC are not equal to missing than TXDI = TXT − TXC.
Industry	Line of business	2-digit Standard Industry Classification ("SIC") code as reported by COMPUSTAT

Abbreviations in ALLCAPS refer to data field names in COMPUSTAT. Except for tax outcome variables, all continuous variables are winsorized at the 1% and 99% levels and all variables are measured at time t for main testing. Tax outcome variables are winsorized so that they fit the interval [−1,1]. For Profit Firm Years, the effective tax rates for each of the three tax outcomes are bound at 1 for approximately 2% of the observations and at −1 for approximately 1.5% of the observations. For Loss Firm Years, the tax outcome of Book ETR is bound at −1 for 2.3% of the observations and at 1 for 4.6% of the observations. We use a Double Tobit regression to provide a robustness check of our censoring approach for the tax variables and find that the regression results used to test our hypotheses are substantially the same.

Table 1: Continued.

Variable Name	Proxies For	Calculated As
Leverage		Long-Term Debt (DLTT)/Total Assets (AT)
Log of Sales	Firm size	Natural log of sales = ln(SALE)
Loss Firm Year	Year in which firm accrued loss	Year in which Pre-tax income (PI) <0
Material U.S. Presence	Material U.S. operations	One or both of (i) LOC = USA or (ii) one or more of US (or if necessary North American) sales (SALES), PP&E (PPENTS) or employment (EMPS) segments >25% total in >25% of years the firm appears in the sample
Non-Canada Non-Tax Haven Firm		Non-U.S. Firm neither Canada Firm nor Tax Haven Firm
Non-U.S. Firm	Multinational firm with corporate group parent incorporated outside U.S. and material U.S. operations	Requires (i) COMPUSTAT item FIC ≠ USA, with re-code of U.S. Firm for specific firm years if the firm reports U.S. and Non-U.S. Firm status in different years, per SEC EDGAR database and (ii) Material U.S. Presence.
Non-U.S. Sales	Magnitude of foreign operations	Total geographic sales (SALES) listed in COMPUSTAT segment reporting for all segments other than those with names including "United States" (or its variation); or, if no such segment exists, "North America" or "Americas."
Percentage of Non-U.S. Sales	Relative intensity of non-U.S. operations	Non-U.S. Sales / total sales = Non-U.S. Sales / Total Segment Sales (SALES)

Table 1: Continued.

Variable Name	Proxies For	Calculated As
Permanent Reinvested foreign earnings (PRE)		Indefinitely reinvested foreign earnings (FOR-EIGN_EARNINGS) from the Audit Analytics Tax Footnote Database divided by $1,000,000. If FOREIGN_EARNINGS equals missing then FOREIGN_EARNINGS is set equal to zero.
Pre-Tax Return on Sale	Pre-tax profitability	Pre-tax income / Total sales = PI / SALE
Profit Firm Year	Year in which firm accrued positive profit	Year in which Pre-tax income (PI) ≥ 0
R&D Expense	Value of patent/other intellectual property	R&D expense / total sales = XRD/SALE If XRD is missing, then XRD = 0
Tax Haven Firm		Non-U.S. Firm with FIC = country listed in Dharmapala and Hines (2009)
U.S. Firm	Multinational firm with material U.S. operations, not a Non-U.S. Firm	Firm not coded as a Non-U.S. Firm
Valuation Allowance		Based on the methodology developed in Dhaliwal et al. (2013). This is a binary variable equal to 1 if the firm has a pre-tax loss and deferred tax expense (TXDI) greater than or equal to zero, and 0 otherwise.

Our primary dependent variable is total contemporaneous Book ETR for firm i at time t. We use the Book ETR for several reasons. First, prior research finds that managers care about Book ETR. They focus on it when making decisions (Graham *et al.*, 2017), give significant consideration to how tax planning strategies will affect their reported tax expense (Graham *et al.*, 2011), and receive compensation for doing so (Armstrong *et al.*, 2012). Second, the choice of parent incorporation has clear implications for reported tax expense, independent of the actual cash taxes paid. Indeed, if U.S. Firms do not repatriate their foreign earnings it is possible the two different structures could result in similar cash tax payments in the current period, but different book tax outcomes depending on the designation of PRE. Third, the accrual nature of the book tax expense incorporates long-term expectations about future tax positions, which will not be apparent in alternative, cash based ETR measures. This is particularly important in our test of loss year outcomes since most firms will not have any cash tax effect in those periods and the accrued tax expense will reflect long-run firm expectations about future tax benefits. Fourth, the majority of prior research uses Book ETRs to study the effect of different tax systems.[6] Given that these results are often used to justify policy decisions, using Book ETR in our context should help inform the results from that research. Finally, focusing on Book ETRs allows us to avoid many of the issues with trying to infer actual tax return behavior inherent in use of book based cash ETR measures.[7]

Our variable of interest is Non-U.S. Firm, which is an indicator variable equal to one if the firm's parent is incorporated in a jurisdiction outside of the U.S. and zero otherwise. Hypothesis 1 predicts that β_1 is negative and significant for Profit Firm Years. Such a result would reflect better effective tax rate results for Non-U.S. Firms compared to U.S. Firms.

We further control for other variables previously found to influence effective tax rates (e.g., Desai and Hines, 2002; Dyreng and Lindsey, 2009). They include Log of Sales, Percentage of Non-U.S. Sales, Pre-Tax Return on Sales, Leverage, R&D Expense, Advertising Expense, Industry (2-digit SIC code) and Year (together, "Controls"). Finally, we address the issue of correlated firm errors by running all regressions using standard errors clustered by firm.[8]

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[6]Prior research often relies on some measure of Book ETR (e.g., Dyreng and Lindsey, 2009), a combination of Book and Cash ETRs (e.g., Markle and Shackelford, 2012). In a small number of cases, actual tax expense from corporate tax returns is measured (Grubert, 2012).

[7]However, we note that all results discussed below are generally consistent with replacing the dependent variable with contemporaneous cash ETR (profit years), as well as long-run average cash (profit years) and book ETR (profit and loss years) measures.

[8]The results are robust to clustering by year and industry. In untabulated results, we also use an alternate measure of size (natural log of ending assets), and include industry-year fixed effects. All results are consistent. We also include the following additional control variables: Intangible Assets, PP&E, the presence of an NOL, Capital Expenditures, and Special Items.

For loss years, we modify the calculation of the Book ETR to reflect the fact that if a firm in a loss year records a larger negative tax expense, the firm has a better tax result. The conventional presentation calculates book effective tax rate by dividing a negative tax expense by a firm's negative book income in a loss year, which yields a book effective tax rate that is positive. This approach suggests that if a firm has a negative tax expense that is larger in absolute value, it has higher tax rate. We prefer to show the converse, to signal that if a firm has a negative tax expense that is larger in absolute value, it has a better tax result. As a result, for Loss Firm Years Book ETR is calculated by multiplying the loss firms' book effective tax rate by negative 1 in order to show a lower (i.e., more negative) ETR if a firm has a larger negative tax expense relative to its book loss.[9]

Given this presentation, hypothesis 2 predicts that β_1 is positive and significant for Book ETR for Loss Firm Years. Such a result would reflect worse tax results (such as the recording of smaller amounts of negative tax expense) for Non-U.S. Firms compared to U.S. Firms.

3.2   *Segment Coding*

To test these predictions, our identification strategy relies on comparing U.S.-incorporated MNCs to non-U.S. MNCs with significant U.S operations. This approach isolates the effect of the MNC parent firm's incorporation jurisdiction. It differs from prior research that either focuses on the tax outcomes of exclusively U.S.-incorporated MNCs (e.g., Dyreng and Lindsey, 2009), or compares tax outcomes of non-U.S. and U.S. domiciled firms regardless of whether the non-U.S. firms have material U.S. activity (e.g., Markle and Shackelford, 2012, 2014). As a result, we are focusing on the firms that are arguably most relevant for the policy debate in the U.S. that led to the TJCA.

We rely on geographic segment data (FASB, 2008) as reported by COM-PUSTAT, in two respects. First, we require the firms in our sample to have Non-U.S. Segment Sales in at least one year that the firm appears in our sample. This approach screens for multinational activity.[10] Second, we use Non-U.S. Segment Sales to construct the variable Percentage of Non-U.S. Sales, which proxies for the relative intensity of non-U.S. operations.

While their inclusion decreases the sample size, the main results are unchanged.

[9]As an example, Cal Dive International, Inc. is a U.S. Firm that recognized a pre-tax book loss of about $93 million for the year ended December 31, 2012. It reported a U.S. loss of about $101 million and foreign income of about $8 million in that year, and recorded negative U.S. income tax expense and positive foreign income tax expense. Its overall negative tax expense was about $25 million (Cal Dive International, Inc, 2013, p. 63). The conventional presentation would show this firm's tax rate as about 27%, but we show it as about *negative* 27%.

[10]We find that of the 52,719 firm years omitted from our total sample because of missing non-U.S. sales segment data, approximately 93% are also missing foreign income tax and non-zero pre-tax foreign income.

We code a segment as U.S. if the segment name starts with the label "United States." Because of the dominant size of the United States economy, we also code a segment labeled "North America" or "Americas," as "U.S." unless there is a separate "United States" segment or the segment labeled "North America" or "Americas" also lists a geographic area not within North or South America.

A risk in our identification strategy is that we will drop firms that choose not to report geographic segments, even though these firms might otherwise fit the definition of a multinational firm with a U.S. presence. Examples include ocean shipping and satellite firms, which generally do not divide their international operations according to jurisdiction; and insurance firms that incorporate outside the United States but insure primarily U.S. risks (Allen and Morse, 2013). The choice to avoid geographic segment disclosure may be related to a Non-U.S. Firm's objective of downplaying its U.S. presence and tax reduction planning. This potentially biases our results as we would be missing the firms that should exhibit the largest treatment effects. That is, the Non-U.S. Firm advantage experienced in profit years, and disadvantage in loss years, would be even larger if additional Non-U.S. Firms that used more aggressive tax planning were included.

4   Sample Construction and Test of Main Hypotheses

4.1   Sample Construction

Table 2 documents our sample construction. We begin by identifying all publicly traded firms in the COMPUSTAT North America fundamentals annual database with fiscal years beginning on or after January 1, 1999 and ending on or before December 31, 2014. We begin the sample in 1999 because we require firms to have geographic segment data available. This results in the identification of 182,886 firm years and 24,187 unique firms. We next impose screens that exclude, inter alia, small firms, investment funds, and firms missing information needed to construct the other variables.

We require that a firm in our sample exhibit evidence of multinational activity through the reporting of Non-U.S. Sales, meaning a non-U.S. geographic segment in the COMPUSTAT database for at least one of the firm years included in the sample. We further restrict this multinational sample to include only firms with material U.S. presence. This means firms that list a U.S. headquarters location (LOC = USA) in COMPUSTAT. It also means firms that disclose more than 25% United States, North America or Americas sales; property plant and equipment; or employees in more than 25% of available firm years, each as reported by the COMPUSTAT geographic

Table 2: Sample Construction.

Panel A: Total Sample	Firm years	Unique Firms
Firms with fiscal year start on/after 1/1/99 and end on/before 12/31/14	182,886	24,187
Less firms with total assets under $10 million	(51,948)	(6,334)
Less firms missing total sales (SALE), sales <$10 million	(15,583)	(2,445)
Less firms with missing total liabilities	(291)	(14)
Less fund firms with SIC 6000-6199, 6722, 6726, 6798, 6799	(17,736)	(2,225)
Less firms with missing Non-U.S. Sales	(52,719)	(7,105)
Less Firms missing data necessary to construct Book ETR$_t$ and Valuation Allowance proxy.	(2,111)	(138)
Less firms without Material U.S. Presence (defined in Table 1)	(6,701)	(1,040)
Total Sample	35,797	4,886
Panel B: Non-U.S. Firms		
Require firm year or firm to have code "Non-U.S. Firm" (defined in Table 1)	(30,346)	(4,212)
*Total Non-U.S. Firms**	5,451	674

*Of the 681 firms in the Non-U.S. Firms group, 90/(633) of the 674/(5,451) unique firms/(firm years) were coded as such because the Compustat headquarters location (LOC) was not equal to U.S. The remaining 584/(4,818) were identified through the geographic segment screen that requires at least one of U.S. SALES, PPENTS, or EMPS to exceed 25% of the firm total in more than 25% of the years the firm appears in the sample.

segment database.[11] We choose 25% in order to maximize the Non-U.S. Firm sample, while still ensuring that the firms exhibit material U.S. activity during the sample period. After these screens, as shown in Table 2, panel A, our total sample consists of 35,797 firm years and 4,886 unique multinational firms.[12]

As shown in Table 2, panel B, our data for Non-U.S. Firms include 5,451 firm years and 674 unique firms. Most Non-U.S. Firms are coded as having material U.S. operations because they disclose more than 25% United States, North America or Americas sales; property, plant and equipment; or employees in more than 25% of available firm years. This coding yields the bulk of our Non-U.S. Firm observations: 4,818 of 5,451 firm years and 584 of 674 unique firms.[13]

4.2 Descriptive Statistics

Table 3 shows the incorporation location of 4,886 unique firms by country. About 14% of our total sample is Non-U.S. Firms. Canada Firms make up about 4% of our total sample. Non-Canada Non-Tax Haven Firms, including firms with parents incorporated in Israel or the United Kingdom, make up about 6.2% of our sample. Tax Haven Firms make up about 3.6% of our sample. In untabulated results, we find that the percentage of each geographic type as a subset of Non-U.S. Firms has changed only slightly over time.

Figure 1 plots the percentage of firms with a pre-tax loss by year. As mentioned earlier, the overall frequency of losses is substantial for both groups. For U.S. Firms, about 32% of firm years are Loss Firm Years and for Non-U.S. Firms, about 27% of firm years are Loss Firm Years. The proportions increase in periods of general economic distress (e.g., 2008 and 2009) but do not drop below 24%/(17%) for U.S./(Non-U.S.) firms. Further, in untabulated analysis,

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[11]We acknowledge that this approach will omit non-U.S.-parented firms that report geographic segments, but aggregate any U.S. (or North America or Americas) activity with other segments (e.g., Rest of the World). A firm may choose not to separately disaggregate U.S. activities because they are immaterial, in which case our identification strategy properly excludes them. Alternatively, a firm might choose not to separately report their U.S. activity for tax planning reasons. Consistent with the latter reason, prior research has found that tax planning correlates with U.S. firms' decisions not to disclose of tax haven subsidiaries (e.g., Akamah *et al.*, 2018; Dyreng *et al.*, 2018). However, similar to the discussion in Section 3.2, omitting these firms should bias against finding our predicted results.

[12]The results are generally consistent with utilizing a more restrictive threshold of 50%. However, the sample of Non-U.S. firms drops significantly. In addition, if we simply restrict the sample to the Non-U.S. Firms with LOC = USA we get directionally significant results for all partitions, but only achieve statistical significance for the profit years due to the small sample number of Non-U.S. Firms in the loss year sub-samples.

[13]In order to ensure that we are not missing any firms that have material U.S. activity but do not list on a U.S. exchange, we examine all firms listed in the COMPUSTAT Global database during sample period. We identify 240/2,629 firm/(firm years) that meet the data requirements necessary for inclusion in our sample. However, all of these firm/(firm years) are already included in the COMPUSTAT North America File, either as ADRs or as dual listed firms.

Table 3: Sample Divided by Incorporation Location.

Firm group by incorporation location of parent corporation	Number of firms	Percent of total sample
U.S. Firms	4,212	86.21%
Canada Firms	195	3.99%
Non-Canada Non-Tax Haven Firms		
Australia	10	0.20%
France	25	0.51%
Germany	17	0.35%
Israel	76	1.56%
Japan	14	0.29%
Netherlands	38	0.78%
United Kingdom	73	1.49%
Other	<u>52</u>	<u>1.06%</u>
Total Non-Canada Non-Tax Haven Firms	305	6.24%
Tax Haven Firms		
Bahamas	2	0.04%
Bermuda	45	0.92%
British Virgin Islands	11	0.23%
Cayman Islands	25	0.51%
Guernsey - Channel Islands	1	0.02%
Hong Kong	1	0.02%
Ireland	35	0.72%
Jersey - Channel Islands	9	0.18%
Liberia	2	0.04%
Luxembourg	12	0.25%
Marshall Islands	1	0.02%
Netherlands Antilles	1	0.02%
Panama	4	0.08%
Singapore	6	0.12%
Switzerland	<u>19</u>	<u>0.39%</u>
Total Tax Haven Firms	<u>174</u>	<u>3.56%</u>
Total Sample	4,886	100%

See Table 1 for variable definitions and Table 2 for sample construction.

we find that the losses are not confined to a few firms, as over 60% of them report at least one loss year during the period. Both of these results reinforce that including loss years in the analysis of tax outcomes provides a more comprehensive analysis for a significant number of firms.
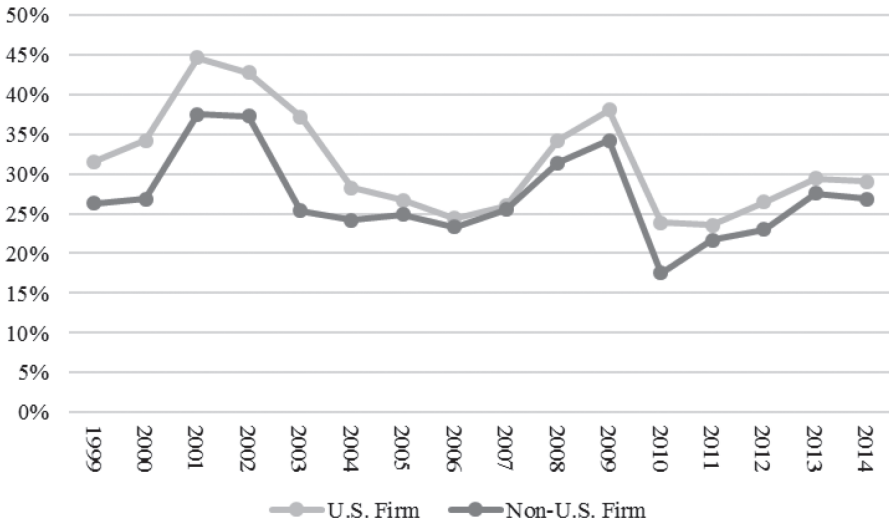
Figure 1: Percentage of Loss Firm Years by Incorporation Group and Year.

This figure documents the percentage of firms that report a pre-tax loss (PI < 0) in each year of the sample period, partitioned on the incorporation location of the parent firm. See Table 1 for variable descriptions, and Table 2 for sample construction.

Univariate descriptive statistics are presented in Table 4, with Panel A showing profit years and Panel B loss years. Non-U.S. Firms are generally larger than U.S. Firms, as proxied by Log of Sales. Non-U.S. Firms also have a greater intensity of foreign operations than U.S. Firms, as proxied by Percentage of Non-U.S. Sales.[14] For Profit Firm Years, Non-U.S. Firms show somewhat greater profitability (as measured by Pre-Tax Return on Sales) compared to U.S. Firms (0.13 vs. 0.12). For Loss Firm Years, Non-U.S. Firms show somewhat larger losses compared to U.S. Firms (-0.35 vs. -0.31).

Consistent with H1, in Profit Firm Years U.S. firms have significantly higher ETRs than non-U.S. firms (0.28 vs. 0.23). In Loss Firm Years the relationship is not as clear. U.S. Firms on average record only a slightly negative ETR (-0.01) and Non-U.S. Firms record a slightly positive average ETR (0.01). These numbers are attributable to the high prevalence of recording a Valuation Allowance by both groups with U.S. firms being somewhat more likely (0.56 vs.

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[14]Given that the Non-U.S. Firms are substantially more 'foreign' we divide our sample into quintiles based on percentage of Non-U.S. Sales and re-run our main tests. The results are substantially the same. We also restrict the U.S. sample to firms with tax haven subsidiaries as these firms have more non-U.S. activity and structures in place to engage in tax planning. The results are again substantially the same. Both tests provide some assurance that the likelihood of Non-U.S. Firms having a greater percentage of foreign operations is not driving our result.

Table 4: Comparison of Means and Standard Deviations in Profit and Loss Firm Years for U.S. Firms and Non-U.S. Firms.

Panel A: Profit Firm Years

	Firm Status	
Variable	U.S	Non-U.S.
Log of Sales	6.73	7.42***
	(1.83)	(2.09)
Percentage of Non-U.S. Sales	0.36	0.55***
	(0.25)	(0.22)
Pre-Tax Return on Sales	0.12	0.13***
	(0.10)	(0.12)
Leverage	0.17	0.16***
	(0.19)	(0.15)
R&D Expense	0.05	0.05
	(0.07)	(0.08)
Advertising Expense	0.01	0.01***
	(0.03)	(0.02)
Book ETR	0.28	0.23***
	(0.27)	(0.26)
Number of Observations	20,780	3,968

Panel B: Loss Firm Years

Log of Sales	5.28	5.55***
	(1.77)	(2.18)
Percentage of Non-U.S. Sales	0.37	0.53***
	(0.27)	(0.25)
Pre-Tax Return on Sales	−0.31	−0.35**
	(0.51)	(0.53)
Leverage	0.20	0.19*
	(0.26)	(0.23)
R&D Expense	0.15	0.16
	(0.22)	(0.24)
Advertising Expense	0.01	0.01
	(0.03)	(0.03)
Valuation Allowance	0.56	0.52*
	(0.50)	(0.50)
Book ETR	-0.01	0.01*
	(0.36)	(0.37)
Book ETR - Do Not Record Valuation Allowance	−0.14	−0.10**
	(0.37)	(0.40)
Book ETR- Record Valuation Allowance	0.10	0.12
	(0.32)	(0.30)
Number of Observations	9,566	1,483

***, **, * − Difference in means is significant at the 1%, 5%, 10% level. Standard deviations in parentheses. Table 1 defines variables. See Table 2 for sample construction.

0.52).[15] As previously discussed, recording a Valuation Allowance significantly reduces or eliminates any deferred tax benefit from a loss. There is no significant difference in recorded tax expense associated with Non-U.S. Firm versus Non-U.S. Firm status for the Valuation Allowance firms. However, when we examine tax outcomes of firms that do not record a Valuation Allowance, the U.S. Firms record more negative tax expense (-0.14 vs. -0.10).

Figure 2 plots the ETRs size-weighted by Log of Sales, over the sample period for each group. Panel A shows Profit Firm Years, Panel B shows Loss Firm Years for firms that do not record a Valuation Allowance, and Panel C shows Loss Firm Years for firms that do record a Valuation Allowance. The trend for Profit Firm Years is consistent with prior research (Dyreng *et al.*, 2017) as both groups of firms show a decline in ETR over the sample period, and Non-U.S. Firms have consistently lower Book ETRs.

The Loss Firm Year graphs show a more volatile trend, presumably due in part to the smaller sample sizes for the sub-groups in any single year, particularly for the Non-U.S. Firm sample. Still, the general relationships are still evident. For the firms that do not record a Valuation Allowance, as shown in Panel B, U.S. Firms record more negative tax expense compared to Non-U.S. Firms in all but five of the sample years.

4.3 Main Results

Our first hypothesis proposes that, for Profit Firm Years, Non-U.S. Firms have less positive tax expense and lower effective tax rates, compared to U.S. Firms. Our regression results support this. Table 5 Panel A column 1 shows that Non-U.S. Firms have lower Book ETR, by 5 percentage points. Figure 3, Panel A plots the average predicted ETR for U.S. Firms and Non-U.S. Firms. In Profit Firm Years, U.S. Firms on average have a predicted ETR of 28% and Non-U.S. Firm 23%.

The results are directionally consistent with some prior literature that finds U.S. MNCs face relatively higher tax burdens. For example, Markle and Shackelford (2014) find that U.S. multinationals face the second highest tax rate (second to Japan) with a world-wide tax rate of 21.9%, compared to 11.1% for firms located in tax havens, 17.9% for European firms, and 17.5% for Canadian firms. The results are inconsistent with Avi-Yonah and Lahav (2012) who find that large U.S. firms report a lower average effective tax rate (31%) than large European firms (35%).

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[15]We construct our measure of whether a firm recorded a valuation allowance utilizing the proxy developed in Dhaliwal *et al.* (2013). This approach is binary, and classifies a firm as a recording a valuation allowance if its deferred tax expense for the year it generates a loss was positive or equal to zero. The only modification for our sample is that our definition of a loss firm is negative pre-tax income (PI), and that paper uses negative income before extraordinary items (IB).

Panel A: Profit Firm Years (N=24,748)

Panel B: Loss Firm Years – No Valuation Allowance (N=4,937)

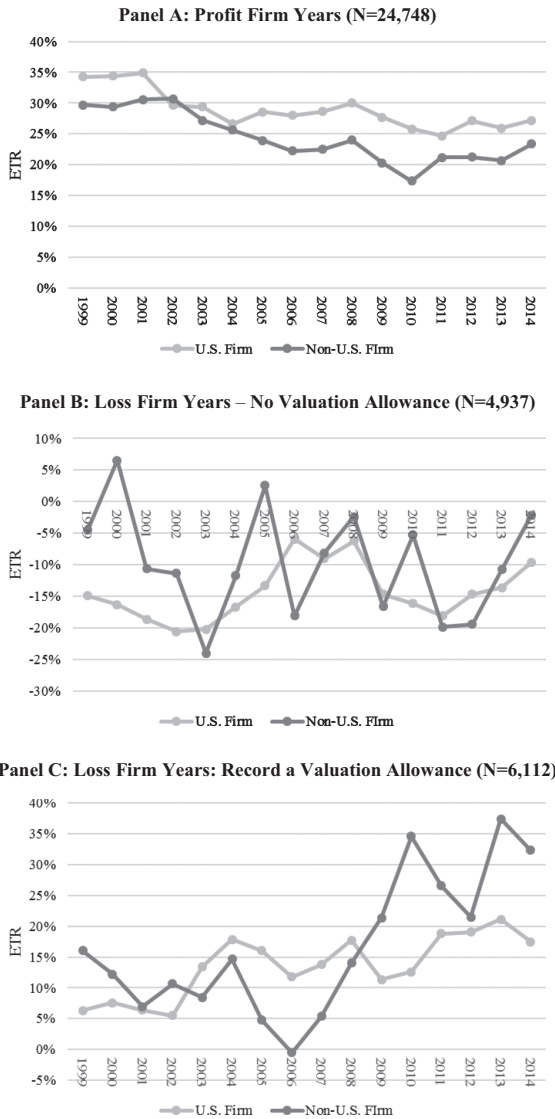**Panel C: Loss Firm Years: Record a Valuation Allowance (N=6,112)**

Figure 2: Size-Weighted Book ETR by Incorporation Group, Profit Status, and Year.

This figure plots the size-weighted Book ETR, where size is proxied by Log of Sales, for each firm year in the sample partitioned on the incorporation location of the parent firm. Panel A includes all firm years where there is a pre-tax profit. Panel B includes all firm years where there is a pre-tax loss reported and the firm does not record a Valuation Allowance. Panel C includes all firm years where there is a pre-tax loss and the firm does record a Valuation Allowance. In Panel A the average ETR is significantly different at the 1% level in 12 of the 16 years. In Panel B the average ETR is significantly different at the 5% level in 4 of the 16 years. In Panel C the average ETRs are significantly different at the 5% level in 6 of the 16 years. See Table 1 for variable descriptions, and Table 2 for sample construction.

Table 5: Non-U.S. Firm Status and Book ETR.

Panel A: Segregated on whether the firm reports a pre-tax profit or loss.

| | | | Dependent Variable = Book ETR$_{it}$ | |
| | | | Loss Firm Years | |
Independent Variable	(1) Profit Firm Years	(2) Pooled Loss	(3) No Valuation Allowance	(4) Valuation Allowance
Intercept	0.18***	0.12	−0.19***	0.02
	(0.05)	(0.10)	(0.06)	(0.12)
Non–U.S. Firm	−0.05***	0.01	0.04**	−0.01
	(0.01)	(0.01)	(0.02)	(0.01)
Log of Sales	0.01***	0.00	0.00	0.04***
	(0.00)	(0.00)	(0.00)	(0.00)
Percentage of Foreign Sales	−0.02**	0.12***	0.16***	0.09***
	(0.01)	(0.02)	(0.02)	(0.02)
Pre–Tax Return on Sales	0.00	0.03***	−0.03**	0.06***
	(0.02)	(0.01)	(0.01)	(0.01)
Other Controls	yes	yes	yes	yes
Industry Controls	yes	yes	yes	yes
Year Controls	yes	yes	yes	yes
N	24,748	11,049	4,937	6,112
Adjusted R squared	0.05	0.02	0.05	0.09

Table 5: Continued.

Panel B: Pooled Profit Firm Years and Loss Firm Years.

	Dependent Variable = Book ETR$_{it}$	
	(1) All Profit and Loss Firm Years	(2) Profit Firm Years and Loss Firm Years without Valuation Allowance
Non-U.S. Firm	-0.03^{***}	-0.04^{***}
	(0.01)	(0.01)
All other controls	yes	yes
N	35,797	29,685
Adjusted R squared	0.08	0.09

***, **, * – Significantly different from zero at the 1%, 5%, 10% level. Table 1 defines variables. See Table 2 for sample construction. This table shows the results of an OLS regression using the following empirical specification:

$$Book\ ETR_{it} = \beta_0 + \beta_1 (Non\text{-}U.S.\ Firm)_{it} + \beta_2 (Log\ of\ Sales)_{it} + \beta_3 (Percentage\ of\ Non\text{-}U.S.\ Sales)_{it} + \beta_4 (Pre\text{-}Tax\ Return\ on\ Sales)_{it}$$
$$+ \beta_5 (R\&D\ Expense)_{it} + \beta_6 (Advertising\ Expense)_{it} + \beta_7 (Leverage)_{it} + (Industry)_i + (Year)_t + \varepsilon_{it}.$$

Standard Errors (in parentheses) are clustered by firm.
Panel A: Column 1 includes all firm years with pre-tax income greater than zero. Column 2 shows includes all firm years where pre-tax income is less than or equal to zero. Column 3 shows all firm years where pre-tax income is less than zero and Valuation Allowance is equal to zero. Column 4 shows all firm years where pre-tax income is less than or equal to zero and Valuation Allowance equals 1.
Panel B: Column 1 includes all firm years regardless of whether pre-tax income is greater than or less than zero. Column 2 includes all firm years with pre-tax income greater than zero and all firm-years where pre-tax income is less than zero where Valuation Allowance equals zero.
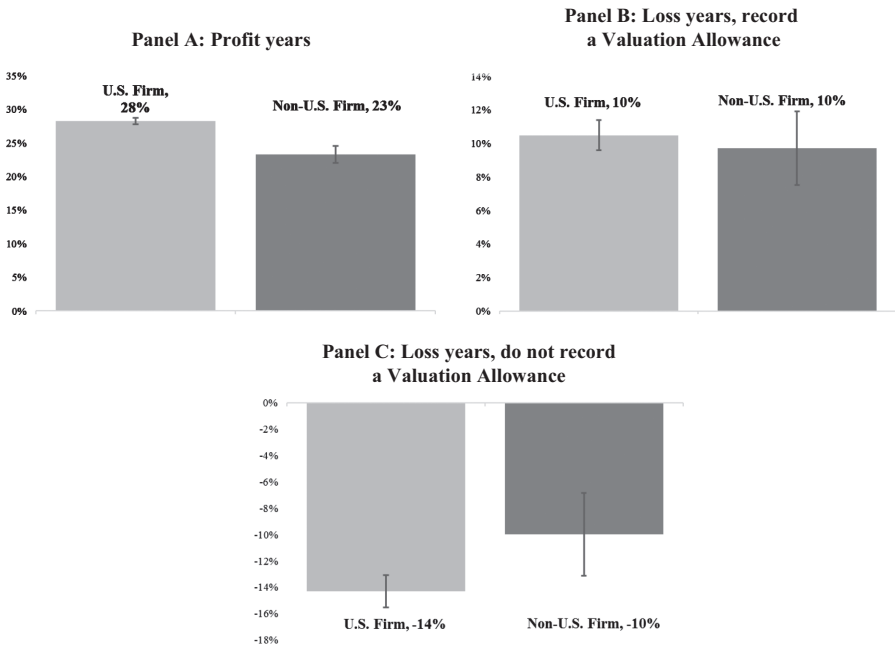
Figure 3: Predicted Book ETR Partitioned on U.S. Firm or Non-U.S. Firm Status.

See Table 2 for sample construction. This figure plots the predicted Book ETR for the sample firms using the coefficients from the following empirical specification:

$$Book\ ETR_{it} = \beta_0 + \beta_1(Non\text{-}U.S.\ Firm)_{it} + \sum_{k} \beta_k(Controls)_{it}^k + \varepsilon_{it}$$

Table 5 shows the results of the regression. All independent variables, except for Non-U.S. Firm, are assumed to be at their mean value. The figure partitions the sample based on whether the parent of the multi-national company is incorporated inside the U.S. Panel A shows the average ETR for years when the firms report a pre-tax profit. Panel B shows predicted results when the firms report a pre-tax loss and do not record a Valuation Allowance, and Panel C shows predicted results when they report a pre-tax loss and do report a Valuation Allowance.

Our second hypothesis proposes that, for Loss Firm Years, Non-U.S. Firms have less negative tax expense compared to U.S. Firms. As discussed above, we present negative tax expense as producing negative ETR results to facilitate a comparison between profit and loss years.

Table 5, Panel A column 2 shows that the correlation between Non-U.S. Firm status and Book ETR is not statistically significantly different from zero when all loss years are pooled together. We then partition the sample based on the presence of a Valuation Allowance. Table 5, Panel A column 3 shows the predicted results for the sample among firms that do not record a Valuation Allowance. Among such firms, Non-U.S. Firm status is associated with an ETR that is higher by 4 percentage points compared to U.S. Firms.

However, Table 5, Panel A column 4 compares firms that do record a Valuation Allowance and reveals no statistically significant difference between U.S. Firms and Non-U.S. Firms.

As with profit firm years we plot the average predicted ETRs for these firms in Figure 3 Panels B and C. As discussed above, we find that there is no difference in predicted ETRs for the Valuation Allowance firms (Panel B), but the U.S. Firms that do not record a Valuation Allowance (Panel C) have a significantly more negative predictive ETR (-14%) than the comparable Non-U.S. Firms (-10%).

Finally, we re-run the main analysis on a pooled basis, considering Profit Firm Years and Loss Firm Years together. The main benefit of the tax losses for our study is that they provide a deduction to firms in periods when firms have profits. By combining profit and loss years, pooling reflects the average effect of Non-U.S. Firm status for firms that have profits in some years and losses in other years during the sample period. Because the majority of firm years are profitable, we expect that Non-U.S. Firms will still have lower effective tax rates compared to the full sample when years are pooled. But we expect that the tax rate advantage will have a lower magnitude for Profit Firm Years and Loss Firm years pooled together as compared to the tax rate advantage for Profit Firm Years alone.

Table 5 Panel B shows the results. They are consistent with expectations. Column 1 shows the full sample, and the advantage for Non-U.S. Firms when years are pooled is, as expected, more muted than the profit year effect on its own. It equals 3 percentage points rather than the 5 percentage point difference for Profit Firm Years alone.

Column 2 restricts the sample to include only Profit Firm Years and Loss Firm Years when the firm does not record a Valuation Allowance. This removes loss firms that do not record a negative tax expense. Here, the advantage for Non-U.S. Firms for the pooled sample is also more muted than the profit year effect on its own. It equals 4 percentage points rather than the 5 percentage point difference for Profit Firm Years alone.

To summarize our main result: Non-U.S. Firm status correlates with lower positive tax expense when a firm generates profits, by a margin of about 5 percentage points. In contrast, Non-U.S. Firm status correlates with less negative tax expense in Loss Firm Years, but only when the firm has a high enough expected profitability in other years to actually utilize the tax benefits. For these firms, Non-U.S. Firm status correlates with lower negative tax expense, by a margin of approximately 4 percentage points.

4.4   *Results Using a Balanced Sample*

We next address the concern that our incorporation variable is simply capturing inherent differences between the two groups of firms that are unrelated to

differences in the tax environment. The descriptive statistics presented in Table 4 suggest this possibility. Non-U.S. Firms are significantly larger than U.S. Firms, whether measured by the Log of Sales proxy or (in untabulated results) by natural log of assets. Non-U.S. Firms also generate a significantly larger proportion of Non-U.S. Sales. This leads to the concern that our comparison groups are not sufficiently similar to make meaningful comparisons about the effect of Non-U.S. Firm status on tax outcomes.

To address this concern we create a more balanced sample using propensity score trimming combined with inverse probability of treatment weighting (IPTW) to achieve co-variate balance and common support. Appendix III documents the methodology used to construct the weights and trimming determination. As shown there, the procedure significantly improves balance between U.S. Firms and Non-U.S. Firms, for both Profit Firm Years and Loss Firm Years.

Table 6 Panel A shows the results of our main analysis using the re-weighted sample. The main results still hold. In Profit Firm Years Non-U.S. Firm status is associated with a lower Book ETR by 6 percentage points, a difference greater by 1 percentage point compared to the main analysis. In Loss Firm Years we find no association between Non-U.S. Firm status and Book ETR in the pooled sample. As before, for Loss Firm Years for which no Valuation Allowance is recorded, Non-U.S. Firm status is associated with a higher Book ETR by a margin of 4 percentage points. There is no statistically significant association of Non-U.S. Firm status with Book ETR for the sub-sample of Loss Firm Years for which a Valuation Allowance is recorded.

To reinforce the robustness of our result, Panel B reports the average predicted ETR by incorporation group using the coefficients from the IPTW regression. We find similar magnitudes to those reported in Figure 3. In Profit Firm Years, U.S. Firms have a predicted ETR of 27% vs. 22% for Non-U.S. Firms. As before, the advantage is reversed in Loss Firm Years with no Valuation Allowance as U.S. Firms report an ETR of -15% vs. -10% for Non-U.S. Firms.

5 Additional Analysis

5.1 *Different Non-U.S. Incorporation Locations*

In testing for our main results, we do not differentiate between Non-U.S. Firms based on their incorporation location. However, such firms may incorporate a non-U.S. parent in various non-U.S. jurisdictions. The choice of jurisdiction has non-tax as well as tax implications. A multinational with material U.S. operations might incorporate in some jurisdictions, such as Canada, more because of non-tax economic and business reasons and less because of tax

Table 6: Non-U.S. Firm Status and Book ETR Using Balanced Sample.

Panel A: Regression of Book ETR on incorporation location

			Loss Years	
	(1) Profit Years	(2) Pooled	(3) No Valuation Allowance	(4) Valuation Allowance
Independent Variable				
Intercept	0.12**	0.19*	−0.13*	0.08
	(0.06)	(0.10)	(0.07)	(0.15)
Non-U.S. Firm	−0.06***	0.01	0.04**	0.00
	(0.01)	(0.01)	(0.02)	(0.01)
Log of Sales	0.02***	0.00	0.00	0.04***
	(0.00)	(0.00)	(0.01)	(0.01)
Percentage of Foreign Sales	−0.01	0.10***	0.14***	0.06***
	(0.02)	(0.02)	(0.03)	(0.02)
Pre-Tax Return on Sales	−0.08**	0.04***	−0.05**	0.08***
	(0.04)	(0.01)	(0.02)	(0.01)
Other Controls	yes	yes	yes	yes
Industry Controls	yes	yes	yes	yes
Year Controls	yes	yes	yes	yes
N	24,345	10,601	4,777	5,824
Adjusted R squared	0.07	0.04	0.07	0.13

Panel B: Average predicted ETR by incorporation location

U.S. Firm	27%	0%	−15%	11%
Non-U.S. Firm	22%	1%	−10%	11%

***, **, * − Significantly Different from zero at the 1%, 5%, 10% level. Table 1 defines variables.
See Table 2 for sample construction.
Panel A shows the results of an OLS regression using the following empirical specification:

$$Book\ ETR_{it} = \beta_0 + \beta_1(Non\text{-}U.S.\ Firm)_{it} + \beta_2(Log\ of\ Sales)_{it}$$
$$+ \beta_3(Percentage\ of\ Non\text{-}U.S.\ Sales)_{it} + \beta_4(Pre\text{-}Tax\ Return\ on\ Sales)_{it}$$
$$+ \beta_5(R\&D\ Expense)_{it} + \beta_6(Advertising\ Expense)_{it} + \beta_7(Leverage)_{it}$$
$$+ (Industry)_i + (Year)_t + \varepsilon_{it}.$$

Standard Errors (in parentheses) are clustered by firm. All observations are weighted using their Inverse Probability of Treatment Weights after trimming the sample to common support. Appendix III documents the weighting procedure, and diagnostics insuring co-variate balance.
Column 1 includes all firm years with pre-tax income greater than zero. Column 2 shows includes all firm years where pre-tax income is less than or equal to zero. Column 3 shows all firm years where pre-tax income is less than zero and Valuation Allowance is equal to zero. Column 4 shows all firm years where pre-tax income is less than or equal to zero and Valuation Allowance is equal to 1.
Panel B shows the average predicted Book ETR for the sample firms using the regression documented in panel A.
The differences in column 1 (Profit Firm Years) and 3 (Loss Firm Years with no Valuation Allowance) are significantly different at the 5% level.

planning. Prior work has found that geographic proximity strengthens economic ties including cross-border trade (Frankel and Romer, 1999) and merger activity (Ahern *et al.*, 2015).

In contrast, a multinational might choose a parent incorporated in a tax haven for predominantly tax planning reasons. Prior work has found that certain countries are attractive "tax havens" because of a combination of factors including strong rule of law commitments (Dharmapala and Hines, 2009) as well as low tax rates (Dyreng and Lindsey, 2009; Markle and Shackelford, 2014).

Because of these different considerations for firms incorporated in different locations, we test if our main results vary across specific non-U.S. jurisdictions. We use three subgroups of Non-U.S. Firms. Canada Firms have parents incorporated in Canada. Non-Canada Non-Tax Haven Firms have parents incorporated in a non-U.S. jurisdiction that is neither Canada nor a tax haven, such as in the United Kingdom or in Israel. Tax Haven Firms have parents incorporated in tax havens.

We hypothesize that for Profit Firm Years, each geographic subgroup of Non-U.S. Firms shows lower effective tax rates (i.e., better tax results) than U.S. Firms. We hypothesize that for Loss Firm Years, each geographic subgroup of Non-U.S. Firms shows higher effective tax rates (i.e., worse tax results) than U.S. Firms. We also expect that the results in both cases will be strongest for the group of firms where the structure is most likely to reflect a direct effort to reduce taxes – those with parents incorporated in tax havens.

We test these hypotheses by comparing firms in each geographic subgroup with U.S. Firms using the following empirical specification:

$$
\begin{aligned}
Book\ ETR_{it} = \beta_0 &+ \beta_1 (Canada\ Firm)_{it} \\
&+ \beta_2 (Non\text{-}Canada,\ Non\text{-}Tax\ Haven\ Firm)_{it} \\
&+ \beta_2 (Tax\ Haven\ Firm)_{it} + \sum_k \beta_k (Controls)_{it}^k + \varepsilon_{it}. \quad (2)
\end{aligned}
$$

In untabulated descriptive statistics we find that, on a univariate basis, the Canada Firms are not significantly different from the U.S. Firms on most of the non-tax dimensions. However, Non-Canada Non-Tax Haven Firms and Tax Haven Firms are generally larger than U.S. Firms. Non-U.S. Firms have greater intensity of foreign operations and greater profitability in Profit Firm Years in each geographic subgroup.

Table 7, Panels A and B provides univariate statistics for Book ETR across the different groups. In Profit Firm Years, we see the expected relationship. All non-U.S.-parented MNCs have a lower average ETR than the U.S. firms' average ETR of 28%. Tax Haven Firms report the lowest average ETR of 21%.

In loss firm years, Canada Firms report average ETRs significantly lower than U.S. loss firms, and Non-Canada Non-Tax Haven Firms and Tax Haven Firms report significantly higher ETRs. As before, we find that these differences are driven by firms that do not record a Valuation Allowance.

Panel C reports the results of our multivariate testing. The results are consistent with our expectations. For Profit Firm Years, our strongest result

for all effective tax rate measures is for Tax Haven Firms, which show lower
Book ETR by 7 percentage points. This is consistent with but a bit smaller
than the Markle and Shackelford (2014) result, which showed a U.S. versus
tax haven difference of about 10 percentage points. Canada Firms have lower
Book ETR by 5 percentage points, and Non-Canada, Non-Tax Haven Firms

Table 7: Canada, Non-Canada Non-Tax Haven, Tax Haven Firm Status and Book ETR.

Panel A: Profit Firm Years and Book ETR

| | | Comparison of geographic subgroups of Non-U.S. Firms to U.S. Firms | | |
Variable	U.S	Canada	Non-Canadian Non-Tax Haven	Tax Haven
Book ETR	0.28	0.23***	0.24***	0.21***
	(0.27)	(0.32)	(0.24)	(0.24)
Number of Observations	20,780	1,009	1,897	1,062

Panel B: Loss Firm Years and Book ETR

Book ETR - Full sample	−0.01	−0.06**	0.03**	0.08***
	(0.36)	(0.38)	(0.33)	(0.40)
Book ETR - No Valuation Allowance	−0.14	−0.19	−0.06***	−0.02***
	(0.37)	(0.38)	(0.39)	(0.42)
Book ETR - Valuation Allowance	0.10	0.09	0.10	0.19***
	(0.32)	(0.32)	(0.26)	(0.34)
Record a Valuation Allowance	0.56	0.47***	0.58	0.49**
	(0.50)	(0.50)	(0.49)	(0.50)
Number of Observations	9,566	482	652	349

***, **, * − Difference is significant at the 1%, 5%, 10% level. Standard errors in parentheses.
Panels A & B show test of differences in mean Book ETR of the Non-U.S. groups from the U.S.
Panel C tests whether the regression coefficients are significantly difference from zero. Table 1
defines variables. See Table 2 for sample construction.
Panel C shows the result of the OLS regression using the following empirical specification:

$$
\begin{aligned}
Book\ ETR_{it} = {} & \beta_0 + \beta_1(Canada\ Firm)_{it} + \beta_2(Non\text{-}Canada\ Non\text{-}Tax\ Haven\ Firm)_{it} \\
& + \beta_3(Tax\ Haven\ Firm)_{it} + \beta_4(Log\ of\ Sales)_{it} \\
& + \beta_5(Percentage\ of\ Non\text{-}U.S.\ Sales)_{it} + \beta_6(Pre\text{-}Tax\ Return\ on\ Sales)_{it} \\
& + \beta_7(R\&D\ Expense)_{it} + \beta_8(Advertising\ Expense)_{it} \\
& + \beta_9(Leverage)_{it} + (Industry)_i + (Year)_t + \varepsilon_{it}.
\end{aligned}
$$

Standard Errors are clustered by firm. Column 1 includes all firm years with pre-tax income
greater than zero. Column 2 shows includes all firm years where pre-tax income is less than or
equal to zero. Column 3 shows all firm years where pre-tax income is less than or equal to zero
and Valuation Allowance is equal to zero. Column 4 shows all firm years where pre-tax income
is less than or equal to zero and Valuation Allowance is equal to 1.

Table 7: Continued.

Panel C – Regression of Book ETR on geographic subgroup

| | | Dependent Variable = Book ETR$_t$ | | |
| | | | Loss Firm Years | |
	(1) Profit Firm Years	(2) Pooled	(3) No Valuation Allowance	(4) Valuation Allowance
Independent Variable				
Intercept	0.18***	0.12	−0.19***	0.02
	(0.05)	(0.10)	(0.06)	(0.12)
Canada Firm	−0.05***	−0.05**	−0.03	−0.02
	(0.02)	(0.02)	(0.03)	(0.02)
Non-Canada, Non-Tax Haven Firm	−0.04***	0.02	0.06**	−0.02
	(0.01)	(0.02)	(0.03)	(0.02)
Tax Haven Firm	−0.07***	0.08***	0.11***	0.03
	(0.01)	(0.02)	(0.04)	(0.03)
All other controls	yes	yes	yes	yes
N	24,748	11,049	4,937	6,112
Adjusted R squared	0.05	0.03	0.05	0.09
F Statistic from Test of Equality of Coefficients				
Canada =Non-Canada, Non-Tax Haven	0.47	6.85***	6.77***	0.03
Canada =Tax Haven	0.96	17.63***	10.10***	2.49
Non-Canada, Non-Tax Haven = Tax Haven	4.71**	5.54**	1.08	2.71*

have lower Book ETR by 4 percentage points. This is also generally consistent with the Markle and Shackelford (2014) results.

For Loss Firm Years, Non-U.S. Firms other than Canada Firms drive our main result that U.S. Firms record more negative tax expense in loss years when no Valuation Allowance is recorded. Our strongest result is again for Tax Haven Firms, for which Book ETR is higher (i.e., reflects less negative tax expense) by a measure of 11 percentage points compared to Non-U.S. Firms. For Non-Canada, Non-Tax Haven Firms, Book ETR is higher by 6 percentage points.

5.2 *U.S. Firms That Designate PRE Still Show a Higher Book ETR in Profit Firm Years*

Above, we reported that in Profit Firm Years, Non-U.S. Firms have better tax results compared to U.S. Firms. In this section we consider how this result interacts with the designation of PRE, or lack thereof, by U.S. Firms. Doing so can help inform how much each of our two proposed dynamics, worldwide taxation and earnings stripping, drive the profit year results.

To isolate the effect of PRE designation or non-designation, we focus on the current and deferred components of total Book ETR. To the extent that U.S. Firms do not designate PRE with respect to non-U.S. income, then we would expect these U.S. Firms to record higher Deferred ETR (as well as higher Current ETR due to less earnings stripping) compared to Non-U.S. Firms. This is because such U.S. Firms should accrue deferred tax expense, at U.S. rates, on non-U.S. profit.

Conversely, to the extent that U.S. firms designate PRE with respect to non-U.S. income, they should not accrue deferred tax expense with respect to the non-U.S. profit. In this case, we should see no difference in the deferred ETR between U.S. and Non-U.S. Firms. Instead, we would expect that if U.S. Firms that designate PRE record more tax expense in Profit Firm Years, the higher tax expense of U.S. Firms (compared to Non-U.S. Firms) should be driven by the current component, which is affected by the earnings stripping and base erosion strategies that we hypothesize are more available to Non-U.S. Firms.

For this test we identify a sub-sample of U.S. Firms where we know their choice of whether or not to designate foreign earnings as PRE. We construct this sub-sample by using the Audit Analytics tax footnote database. Of our U.S. Profit Firm Years sample, 9,076 are included in this database.[16] Of these firms 64% are shown to have designated some portion of their foreign earnings as PRE.

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[16]We focus on the profit firm years as only a minority of the loss firm years appear in the sub-sample. When we re-run our analysis of loss results on this sub-sample the results are consistent. The U.S. Firm disadvantage is largest for firms that do not designate PRE, though the power of the tests is substantially reduced.

Table 8: PRE Designation and Book ETR.

Panel A: Means and standard deviations partitioned on geographic subgroup

| | Comparison of geographic subgroups of Non-U.S. Firms to U.S. Firms | | | | |
Variable	U.S	Non-U.S	Canada	Non-Canada Non-Tax Haven	Tax Haven
Book ETR	0.26	0.23***	0.23**	0.24**	0.21***
	(0.28)	(0.26)	(0.32)	(0.24)	(0.24)
Current ETR	0.28	0.25***	0.26**	0.26**	0.23***
	(0.25)	(0.24)	(0.27)	(0.23)	(0.25)
Deferred ETR	−0.01	−0.02	−0.02	−0.02	−0.02
	(0.28)	(0.26)	(0.32)	(0.23)	(0.22)
Percentage of Firms with PRE	0.64				
PRE/Ending Total Assets	0.09				
	(0.13)				
Number of Observations	9,076	3,968	1,009	1,897	1,062

***, **, * − Difference is significant at the 1%, 5%, 10% level. Standard errors/deviations in parentheses. Panel A show test of differences in means of the Non-U.S. groups from the U.S. Panels B & C tests whether the regression coefficients are significantly difference from zero. Table 1 defines variables. See Table 2 for sample construction.
This table reflects the results of our investigation in the effect of the PRE designation on our profit year results. We restrict the sample of U.S. firms to those that have positive pre-tax income and appear the Audit Analytics tax footnote database. The Non-U.S. Firm sample is unchanged. **Panel A** shows the mean values of the contemporaneous total, current and deferred ETRs for each of the incorporation groups. It also shows the percentage of U.S. firms are shown as having designated PRE and magnitude of the PRE divided by foreign assets. **Panels B and C** show the coefficients from on incorporation location from the following empirical specifications:

$ETR\ Measure_{it} = \beta_0 + \beta_1(Non\text{-}U.S.\ Firm)_{it} + \beta_2(Log\ of\ Sales)_{it} + \beta_3(Percentage\ of\ Non\text{-}U.S.\ Sales)_{it} + \beta_4(Pre\text{-}Tax\ Return\ on\ Sales)_{it}$
$\qquad + \beta_5(R\&D\ Expense)_{it} + \beta_6(Advertising\ Expense)_{it} + \beta_7(Leverage)_{it} + 2\text{-}Digit\ Industry\ Indicator + Year\ Indicator + \varepsilon_{it}.$

$ETR\ Measure_{it} = \beta_0 + \beta_1(CanadaFirm)_{it} + \beta_2(Non\text{-}Canada\ Non\text{-}Tax\ Haven\ Firm)_{it} + \beta_3(Tax\ Haven\ Firm)_{it} + \beta_4(Log\ of\ Sales)_{it}$
$\qquad + \beta_5(Percentage\ of\ Non\text{-}U.S.\ Sales)_{it} + \beta_6(Pre\text{-}Tax\ Return\ on\ Sales)_{it} + \beta_7(R\&D\ Expense)_{it}$
$\qquad + \beta_8(Advertising\ Expense)_{it} + \beta_9(Leverage)_{it} + (Industry)_i + (Year)_t + \varepsilon_{it}.$

The difference in the panels is which U.S. firms are included. Panel B only includes U.S. firm that do not designate PRE. Panel C includes only U.S. firms that do designate PRE.

Table 8: Continued.

Panel B: Book ETR, Current ETR and Deferred ETR for Profit Firm Years where U.S. Firms do not designate PRE

Dependent variable	(1) All Non-U.S.			(2) Geographic Subgroups				
	Non-US	N	R2	Canada	Non-Canadian, Non–Tax Haven	Tax Haven	N	R2
Book ETR	−0.09***	7,262	0.05	−0.08***	−0.08***	−0.10***	7,262	0.05
	(0.01)			(0.02)	(0.01)	(0.02)		
Current ETR	−0.06***	7,262	0.08	−0.04**	−0.06***	−0.07***	7,262	0.08
	(0.01)			(0.02)	(0.01)	(0.02)		
Deferred ETR	−0.03**	7,262	0.03	−0.04**	−0.02*	−0.03**	7,262	0.03
	(0.01)			(0.02)	(0.01)	(0.01)		

Panel C: Book ETR, Current ETR and Deferred ETR for Profit Firm Years where U.S. Firms do designate PRE

Book ETR	−0.06***	9,750	0.06	−0.06***	−0.05***	−0.07***	9,750	0.06
	(0.01)			(0.02)	(0.01)	(0.01)		
Current ETR	−0.04***	9,750	0.08	−0.03**	−0.04***	−0.06***	9,750	0.08
	(0.01)			(0.01)	(0.01)	(0.01)		
Deferred ETR	−0.01*	9,750	0.05	−0.03*	−0.01	−0.02	9,750	0.05
	(0.01)			(0.02)	(0.01)	(0.01)		

Table 8 shows the descriptive statistics and results of our main tests. We first see that U.S. Firms that do not designate PRE report larger tax expense compared to Non-U.S. Firms (Panel B). The Non-U.S. structure is associated with lower Book ETRs, by 9 percentage points for this sub-sample. The Book ETR advantage for Non-U.S. Firms is smaller, equal to a difference of 6 percentage points, when Non-U.S. Firms are compared to U.S. Firms that designate PRE (Panel C). This shows that the designation of PRE does help reduce the book tax disadvantage faced by U.S Firms. It also shows that the application of the "worldwide" U.S. tax system to unremitted foreign earnings of U.S. Firms cannot fully explain our main results.

We see this further when we examine the current and deferred components of ETR. The non-U.S. structure is associated with statistically significant lower Current ETR (by 6 percentage points) and Deferred ETR (by 3 percentage points) when compared to U.S. Firms that do not designate PRE (Panel B). There are smaller differences when Non-U.S. Firms are compared to U.S. Firms that designate PRE (Panel C). In this case, there is a 4 percentage point difference for Current ETR and a 1 percentage point difference for Deferred ETR. The geographic sub-group results show that when a U.S. Firm designates PRE, the Tax Haven and Non-Canada Non-Tax Haven firm advantage is driven entirely by the Current ETR, and that there is no significant difference for Deferred ETR. In summary, the results suggest that when a U.S. Firm designates PRE, it reduces its deferred tax expense, but a U.S. Firm with a PRE designation still records greater tax expense, particularly greater current tax expense, as compared to Non-U.S. Firms.

5.3 Inversion Firms Compared to Other Non-U.S. Firms

In the testing for our main results, we do not differentiate among Non-U.S. Firms based on how they came to have a non-U.S. parent. However, firms' histories differ. In particular, a non-U.S. parent may replace a U.S. parent in a corporate structure at a later point in the corporation's life, for example in connection with a stand-alone inversion transaction, or a buyout or merger transaction.

Income tax savings are often said to be an important reason why a firm would accept the expense of such an "inversion" or "redomiciliation" transaction (Mider and Drucker, 2016; Marples and Gravelle, 2014). Perhaps a firm that undertakes the expense of an inversion transaction is more aggressive, or otherwise well suited to take advantage of available tax savings strategies (Rao, 2015; Slemrod, 2004).

We address this possibility by gathering a subsample of Inversion Firms, or Non-U.S. Firms that have been publicly reported to have undergone an inversion transaction.[17] We divide our full sample of Non-U.S. Firms into

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[17]To identify Inversion Firms, we use lists of inversions available from a frequently updated

Inversion Firms, on one hand; and Other Non-U.S. Firms, on the other hand. We then investigate whether the effective tax rates of Inversion Firms are different than that of Other Non-U.S. Firms.

We expect that for both Profit and Loss Firm Years, Inversion Firms have lower effective tax rates (i.e., better tax results) than Other Non-U.S. Firms. This would be consistent with the idea that Inversion Firms are particularly tax savvy or tax motivated. However, contrary to our expectation, our untabulated results show no statistically significant difference in any ETR result for Inversion Firms compared to Non-U.S. Firms. This suggests that Non-U.S. Firms have better tax results in profit years and worse in loss years whether or not they are Inversion Firms with a particular propensity for tax planning.[18]

5.4   Does Parent Location Predict Tax Valuation Allowances?

To this point, we have assumed that the incorporation location of the parent has no impact on the relative likelihood that a firm will record a valuation allowance. But if Non-U.S. Firms are more likely to record a valuation allowance when they generate a loss, this would provide evidence that Non-U.S. Firms are less likely to utilize any loss carryforwards. In that case, our Loss Firm Year results may reflect not only the incremental accrual of negative tax expense for U.S. Firms at the higher U.S. rate on non-U.S. losses, but also Non-U.S. Firms' greater tendency to record a valuation allowance.

Non-U.S. Firms might be more likely to record valuation allowances because of these firms' earnings stripping opportunities. Earnings stripping results in the allocation of more deductions to U.S. affiliates. This not only makes it more likely that the U.S. affiliates of Non-U.S. Firms will show larger losses in loss years, but also reduces the likelihood that the firm will generate sufficient taxable income in the U.S. affiliate to utilize losses to reduce taxes in the future. If a Non-U.S. Firm is more likely to record a valuation allowance, it is

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media report (Mider and Drucker, 2016) and a government report (Marples and Gravelle, 2014). 50 to firms in our final sample are matched to this list. In untabulated results, we identify reasons why some firms that have undergone an inversion are not included in our data set. The three largest contributors are: (1) firms that do not appear in the starting sample shown in the first line of Table 3, Panel A (21 firms), (2) firms that have not inverted before the end of our sample period (13 firms), (3) firms that do not show non-U.S. sales in segment disclosure (11 firms).

[18]We perform two tests. First, we add an indicator variable to empirical specification (1) if the firm became incorporated outside of the U.S. through an inversion transaction at any point in the sample period. Second, we interact an indicator for inversion firm status starting in the year the inversion occurred with Non-U.S. Firm status. In both cases, the Inversion Firms do not have significantly different tax outcomes than the other Non-U.S. Firms. We also exploit the presence of these inversion firms to re-run our main analysis with firm fixed effects. Since these firms are the only ones where the incorporation location changes during the sample period, the effect of incorporation location will reflect only variation in their outcomes. We find directionally consistent results with this specification. Given the small number of inversion firm-years, particularly in the loss sample, the power of these results is lower than in the main analysis.

more likely that the negative tax expense in a loss year for a U.S. affiliate of a Non-U.S. Firm will be reduced or eliminated.

We test, in untabulated results, whether there is any evidence of non-U.S. firms being more likely to record a Valuation Allowance.[19] Surprisingly, we find no evidence that incorporation location of the parent predicts establishment of a Valuation Allowance after controlling for all other variables. Indeed, we find that Canada Firms are less likely to record one in certain narrow specifications. While this suggests that differences in valuation allowance practice cannot explain our loss year results, we believe this question merits further research. Our Valuation Allowance proxy is broad, and based on the overall loss status of the firm. It will not capture more subtle differences such as partial, jurisdiction-specific Valuation Allowances where we might be expected to find a difference. The nature of the measure also means that we are most likely only capturing firms that are recording large, close to full, valuation allowances that will generally reflect that a firm has a significant history of losses as opposed to any partial valuation allowances generated by differences in tax planning opportunities.

6   Conclusion

A popular perception is that, prior to 2018, the U.S. tax system damaged the competitiveness of multinational U.S. Firms by imposing a high tax rate on their worldwide earnings. We expand the understanding of the pre-2018 effective tax rates experienced by global firms by considering whether the incorporation location of the parent entity had an effect on the reported tax expense of MNCs with significant U.S. activity. We find that there was a disadvantage for U.S. Firms in profit years. Overall, we estimate average U.S. Firm ETR at 28%, versus 23% for Non-U.S. Firms.

However, U.S. Firms had an advantage in loss years. Among firms that did not record a Valuation Allowance, U.S. Firms overall recorded larger tax

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[19]Specifically we use the following empirical specification (all independent variables as defined in Dhaliwal *et al.* (2013)):

$$VALALLOW_{it} = \beta_0 + \beta_1 Non\text{-}U.S.\ Firm_{it} + \beta_2 EARNINGS_{it} + \beta_3 CASHFLOW_{it}$$
$$+ \beta_4 |\Delta EARNINGS|_{it} + \beta_5 NEGSPIW_{it} + \beta_6 NEGNOP_{it}$$
$$+ \beta_7 NEGGLIS_{it} + \beta_8 NEGGLCF_{it} + \beta_9 SALESGROWTH_{it}$$
$$+ \beta_{10} AGE_{it} + \beta_{11} R\&D_{it} + \beta_{12} FIRSTLOSS_{it} + \beta_{13} LOSSEQ_{it}$$
$$+ \beta_{14} BIGLOSS_{it} + \beta_{15} SIZE_{it} + \beta_{16} DIVDUM_{it}$$
$$+ \beta_{17} DIVSTOP_{it} + \beta_k YEAR_t + \mu_{it}$$

For inclusion in our sample we require than the firms have data available to calculate all variables included in the regression. The sub sample includes 8,308 U.S., 435 Canada, 590 Non-Canada Non-Tax Haven, and 287 Tax Haven firm years. We also re-run with different geographic subgroup variables. VALALLOW = 1 if the firm reports a pre-tax loss in the period and a zero or positive deferred tax expense and zero otherwise.

benefits, which we show as negative 14% ETR versus negative 10% ETR for Non-U.S. Firms, in years where they incurred a loss. This is a result that has not been previously shown and suggests the burden of the pre-2018 U.S. tax law on U.S. Firms is more nuanced than previously thought.

These results help provide a baseline for researchers considering the effects of the recently enacted law which changes rules that help determine the book tax rates of U.S. and non-U.S. multinationals. The results emphasize the importance of considering loss years when evaluating tax outcomes. They also illustrate how the financial accounting choices regarding tax accruals, including PRE designation and valuation allowances, affect ETR results.

For policy makers, the results suggest that while reducing the corporate tax rate will reduce the effective tax rate disadvantage for U.S. Firms in years when they generate profits, the relative benefit may not be as large as has been proposed. In loss years the rate reduction will reduce the tax advantage that these U.S. Firms currently enjoy. The expected effects from the corporate rate reduction may be different, and more muted, than anticipated by some of the tax reform's proponents.

7   Data Availability

Data used in this study are available from public sources identified in the paper.

Appendix I: Numerical Illustration of 2017 Act Changes

In this section we illustrate the possible impact of the TCJA on the reported Book ETRs of U.S. Firms and Non-U.S. Firms. We seek to show how the changes to the tax law could change the relative advantage/(disadvantage) experienced by Non-U.S. Firms in profit/(loss) years. We model the Book ETR in both 2017 (pre-change in tax law) and 2018 (post-change in tax law).

Assumptions

In our illustration we make the following assumptions:

1. Both firms report the same income/(loss) in 2017 and 2018.

2. Both the U.S. Firm and Non-U.S. Firm report the same amount of U.S. and non-U.S. income and loss. This implicitly assumes that there is no difference in base erosion strategies between the two firms.

3. The Non-U.S. Firm has a parent firm incorporated in a Tax Haven jurisdiction with a 0% tax rate.

4. Any non-U.S. income/(loss) is generated in a jurisdiction with a 0% tax rate. This means any reported tax expense/(benefit) will be generated by the U.S. tax system. This also means that we do not take into account any foreign tax credits.

5. The U.S. Firm designates half of the non-U.S. income/(loss) as PRE in 2017, and none in 2018. This is because after the Act, PRE designation will not reduce required U.S. income tax accruals, since U.S. tax arises in the year the earnings accrue rather than waiting for later dividend repatriation. However, we acknowledge that PRE designation may still be advantageous if, for instance, non-U.S. withholding taxes are deferred until later dividend repatriation.

6. In loss years, neither firm records a valuation allowance.

7. The worldwide ETRs faced by the firms in 2017 equal 28% for U.S. Firms and 21% for Tax Haven Firms, which are the average ETRs for profit years from our main analysis (see Table 7). For ease of comparison, we use the same rates in our loss year example.

Changes to the Tax Law

The TCJA introduced several major changes to the international corporate tax system, many of which are still subject to significant uncertainty.

First, the Act reduced the top U.S. statutory rate to 21% from 35%. This is the most obvious change from the new law, and should reduce the positive tax expense associated with U.S. income in profit years, as well as negative tax expense in any loss years.

Second, the Act's international provisions introduced three main changes. The Act provided a lower rate (effectively 13.125% until 2026) on so-called foreign-derived intangible income, or FDII, which is export-related income earned by U.S. corporate taxpayers (I.R.C. §250). The Act includes the base erosion and anti-abuse tax, or BEAT, which imposes an excise tax on certain excess expenses incurred by a U.S. corporation and owed to a non-U.S. affiliate (I.R.C. §59A). Finally, the Act imposes a minimum tax on controlled foreign corporations' (CFC's) global low-taxed intangible income, or GILTI (IRC §951A). The Act provides a 50% deduction for GILTI (until 2026, when the deduction decreases to 37.5%) (I.R.C. §250(a)) so that the GILTI minimum tax is, in effect, imposed at 10.5% on certain non-U.S. profit of a controlled foreign corporation. GILTI does not include a CFC's subpart F income or a 10% return deemed to be earned on the basis of tangible non-U.S. property held by the CFC (I.R.C. §951A). Finally, tax on GILTI may be reduced by a foreign tax credit equal to 80% of the foreign income taxes accrued with respect to GILTI (§960(d)).

In order to keep our illustration tractable we focus on two changes that we think will have a large impact on the reported ETRs on the firms in our sample. These changes are the reduction in the U.S. statutory rate to 21% and the enactment of the GILTI provisions. We disregard the possibility that provisions in the TCJA will cause changes in base erosion tax planning or increase the incentive for U.S. Firms to acquire tangible assets in foreign countries, as Dharmapala (2018) has considered. We mean this only as an illustration. As Hanlon *et al.* (2018) have observed, multinational firms have been reluctant to take actions in reliance on the anticipated results to them of the TCJA, which demonstrates the uncertainty of the impact of the Act on multinational operations and financial accounting results.

In our illustration, we assume that all non-U.S. profit earned by the U.S. Firm's non-U.S. subsidiaries after the Act is GILTI. We assume that non-U.S. subsidiaries of the U.S. Firm are located in tax havens and that the Non-U.S. Firm is a Tax Haven Firm with a zero tax rate. In other words, we assume no foreign taxes in this illustration. Our profit year illustration is consistent with the tax haven portion of the analysis of Clausing (2019) who predicts that GILTI might decrease the incentive to shift profits to havens while increasing the incentive to shift profits to other countries, for instance if the firm is in an excess foreign tax credit limitation position.

For loss years, the TCJA allows one CFC's GILTI tested losses to offset other CFC GILTI tested income. But the law does not provide for tested loss carryforwards to reduce tax on GILTI. For instance, if U.S. shareholders have unused GILTI tested losses in Year 1, the Act does not allow those losses to reduce tax on GILTI in Year 2 (NYSBA, 2018). The lack of loss carryforwards under the GILTI rules introduces another asymmetry into the treatment of profits and losses by the tax system, and reinforces our point about the importance of considering loss year outcomes when evaluating the effects of a particular tax policy.

Profit Years

Table A.1 shows the effects of the changes for Profit-Firm Years. It suggests that the gap in effective tax rate between a U.S. Firm and a Tax Haven Firm will narrow as a result of the Act, but not by as much as might be expected from the reduction in the top rate from 35% to 21%. The gap in the illustration narrows by 2.8 percentage points, from 7 percentage points to 4.2 percentage points.

The gap is less than the top tax rate reduction of 14 percentage points. This is due to two factors. First, PRE designation reduces the U.S. Firm's tax expense on non-U.S. income (relative to the top statutory rate) in 2017. Second, the GILTI minimum tax increases the U.S. Firm's tax expense on non-U.S. income (relative to exempting all non-U.S. income from tax) in 2018.

Table A.1: Predicted Book Tax Expense for Profit Years, U.S. Firm and Tax Haven Firm, 2017 and 2018.

|	U.S. Firm, 2017	Tax Haven Firm, 2017	U.S. Firm, 2018	Tax Haven Firm, 2018
Total Taxable Income	100	100	100	100
U.S. Income	60	60	60	60
Non-U.S. Income	40	40	40	40
Non-U.S. Income Designated PRE	20	0	0	0
U.S. Statutory Tax Rate	35%	35%	21%	21%
U.S. Minimum Tax Rate on Non-U.S. GILTI	–	–	10.5%	0%
Tax Haven Tax Rate	0%	0%	0%	0%
U.S. Tax Expense Accrued on U.S. Income	21	21	12.6	12.6
U.S. Tax Expense Accrued on Non-U.S. Income	7	0	4.2	0
Total Tax Expense Accrued	28	21	16.8	12.6
Effective Tax Rate	28%	21%	16.8%	12.6%
Percentage Point Difference	2017: U.S. Firm tax expense exceeds Tax Haven Firm by 7 percentage points		2018: U.S. Firm tax expense exceeds Tax Haven Firm by 4.2 percentage points	

Table A.2: Predicted Book Tax Expense for Loss Years, U.S. Firm and Tax Haven Firm, 2017 and 2018.

	U.S. Firm, 2017	Tax Haven Firm, 2017	U.S. Firm, 2018	Tax Haven Firm, 2018
Total Taxable Loss	(100)	(100)	(100)	(100)
U.S. Loss	(60)	(60)	(60)	(60)
Non-U.S. Loss	(40)	(40)	(40)	(40)
Non-U.S. Loss Allocated Against PRE	(20)	0	0	0
U.S. Statutory Tax Rate	35%	35%	21%	21%
U.S. Minimum Tax Rate on Non-U.S. GILTI	0%	0%	10.5%	0%
Tax Haven Tax Rate	0%	0%	0%	0%
U.S. Tax Expense Accrued on U.S. Loss	(21)	(21)	(12.6)	(12.6)
U.S. Tax Expense Accrued on Non-U.S. Loss	(7)	0	0	0
Total Tax Expense Accrued	(28)	(21)	(12.6)	(12.6)
Effective Tax Rate	(28%)	(21%)	(12.6%)	(12.6%)
Percentage Point Difference	2017: U.S. Firm tax expense more negative than Tax Haven Firm by 7 percentage points.		2018: U.S. Firm tax expense equal to Tax Haven Firm	

Loss Years

The loss year illustration, Table A.2, shows that because carryforward of unused GILTI tested losses is not allowed, the tax accrual position of a U.S. Firm is no different from that of a Tax Haven Firm under the 2017 Act. Both firms record the same negative U.S. tax expense with respect to U.S. allocated losses, shown here as (12.6%). Under our assumed hypothetical facts, the U.S. Firm does not get any additional negative U.S. tax expense benefit as a result of the non-U.S. losses unless it can reduce GILTI in other years.

Appendix II: Representative Non-U.S. Firm and U.S. Firm Structures
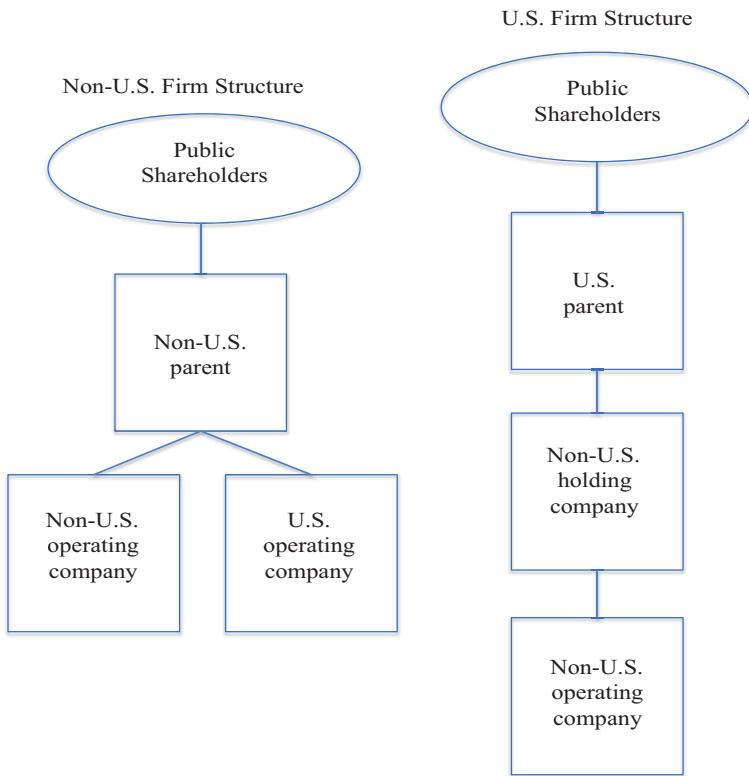
Appendix III: Creation of Balanced Sample

In this appendix we document our procedure for constructing the balanced sample discussed in Section 4.4. Table A.3 shows the means and normalized

Table A.3: Means and Normalized Differences Before and After Adjusting for Inverse Probability of Treatment Weights.

Panel A: Profit Firm Years

Variable	Unadjusted Mean U.S.	Non-U.S.	Normalized Difference	Trim and IPTW Mean U.S.	Non-U.S.	Normalized Difference
ln(Sales)	6.73	7.42	0.35	6.86	6.50	(0.18)
Percentage of Non-U.S. Sales	0.36	0.55	0.81	0.39	0.41	0.07
Pre-Tax Return on Sales	0.12	0.13	0.18	0.12	0.12	0.03
R&D Expense	0.05	0.05	0.01	0.05	0.05	0.09
Advertising Expense	0.01	0.01	(0.11)	0.01	0.01	0.07
Leverage	0.17	0.16	(0.08)	0.17	0.16	(0.05)
N	20,780	3,968		20,377	3,968	

Panel B: Loss Firm Years

Variable	Unadjusted Mean U.S.	Non-U.S.	Normalized Difference	Trim and IPTW Mean U.S.	Non-U.S.	Normalized Difference
ln(Sales)	5.28	5.55	0.14	5.36	5.18	(0.09)
Percentage of Non-U.S. Sales	0.37	0.53	0.62	0.41	0.42	0.06
Pre-Tax Return on Sales	(0.31)	(0.35)	(0.08)	(0.30)	(0.32)	(0.04)
R&D Expense	0.15	0.16	0.05	0.15	0.16	0.04
Advertising Expense	0.01	0.01	(0.05)	0.01	0.01	(0.03)
Leverage	0.20	0.19	(0.07)	0.19	0.19	(0.01)
N	9,566	1,483		9,118	1,483	

See Table 1 for variable descriptions and Table 2 for sample construction. This table presents the means and normalized differences for the sample before and after the trimming of observations with propensity scores outside the region of common support and re-weighting based inverse probability of treatment (IPTW). See Appendix III for a description of the methodology.

differences for the covariates in our main analysis portioned on profit (Panel A) and loss (Panel B) years. Consistent with the previously reported descriptive statistics, the sample is unbalanced. U.S. Firms are smaller than Non-U.S. Firms and have smaller proportions of Non-U.S. Sales. For example, the Log of Sales variable and the Percentage of Non-U.S. Sales variable have normalized differences of 0.35 and 0.81 respectively in Profit Firm Years, and 0.14 and 0.62 in Loss Firm Years.[20]

In order to address this lack of balance we begin by calculating the propensity scores for each firm year using the following empirical specification:

$$Non - U.S.Firm_i = \alpha_1 + \beta_1 \ln(Sales)_i + \beta_2 Percentage \ of \ Non\text{-}US \ Sales_i$$
$$+ \beta_3 Pre\text{-}Tax \ Return \ on \ Sales_i$$
$$+ \beta_4 Advertising \ Expense_i + \beta_5 Leverage_i + \varepsilon_i$$

We run this logit regression for each calendar year in the sample, and calculate a firm year propensity score for each of the profit and loss groups. This specification omits R&D expense because doing so results in the best balance of covariates, although including R&D expense does not prevent us from achieving balance, or change the main results.

After calculating the propensity scores, we next determine whether there is common support between the two groups (Atanasov and Black, 2017). To assess this, we plot the distribution of propensity scores for the Non-U.S. Firm (treated) and U.S. Firm (untreated sample) in Figure A.1. Visual inspection indicates overlap across the distribution of scores between the two groups. Because the U.S. Firm group includes more firms of smaller size and/or lower proportion of Non-U.S. Sales, there is a higher density of U.S. observations in the left tail and relatively more Non-U.S. Firms in the right. To ensure common support we trim any U.S. firm years with a propensity score of less than the minimum or maximum non-U.S. propensity score for that year and then recalculate the propensity scores (Crump *et al.*, 2009; Imbens, 2014). This results in the removal of 403/(448) Profit/(Loss) Firm Years.

We next turn to improving covariate balance between the two groups. Because of our observations include fewer Non U.S. Firms than U.S. Firms, using a standard 1:1 matching would significantly reduce the sample size, and power of our tests. Rather we opt to reweight the sample using Inverse Probability Treatment Weighting (IPTW). This allows us to preserve the size of our control sample, while still allowing achieving the desired covariate balance. We calculate the IPTWs using the propensity scores calculated above, and normalize them to 1 each year (Imbens, 2004). Table A.3 shows the

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[20]As is common in the literature we use the normalized difference as our measure of balance between the U.S. and Non-U.S. Firms as opposed to traditional t-statistics (e.g. Imbens, 2014). As shown in Table 3 the means are significantly different for the two groups using the t-test.

Panel A: Profit Firm Years
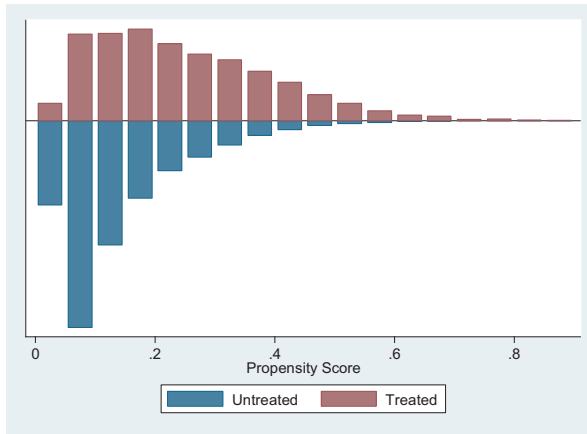
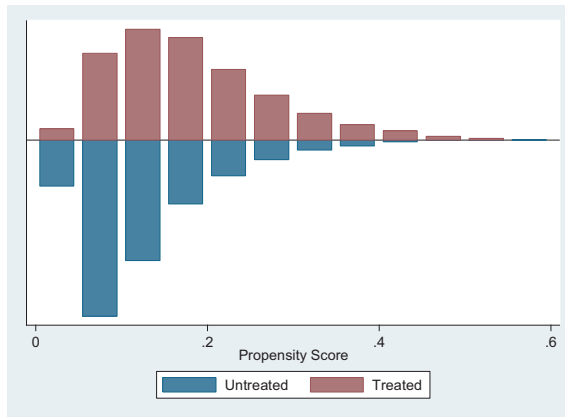
Panel B: Loss Firm Years

Figure A.1: Distribution of Propensity Scores between the Non-U.S. Firm (Treated) and U.S. Firm (Untreated) Sample.

This table reports the distribution of propensity scores for the sample described in Table 2. Panel A shows the distribution for all firm years were reported pre-tax income is greater than zero, and Panel B shows all firm years where pre-tax income is less than zero. The propensity score for each observation is calculated using the following logit regression in each calendar year in the sample period:

$$Non\text{-}U.S.\ Firm_i = \alpha_1 + \beta_1 \ln(Sales)_i + \beta_2 Percentage\ of\ Non\text{-}US\ Sales_i$$
$$+ \beta_3 Pre\text{-}Tax\ Return\ on\ Sales_i + \beta_4 Advertising\ Expense_i$$
$$+ \beta_5 Leverage_i + \varepsilon_i$$

See Table 1 for variable descriptions.

means and normalized differences before and after re-weighting. Re-weighting significantly improves the balance of the sample. All normalized differences are below 0.20. We then use this sample and weights to perform the analysis discussed in Section 4.4.[21]

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[21]We also re-run the analysis using the following alternate approaches: (i) no trimming of propensity scores, (ii) trimming all observations with propensity scores below 0.1 and above 0.9 (Crump *et al.*, 2009), (iii) calculating propensity scores using the pooled sample instead of within each year, (iv) trimming based on the inverse probability weight (v) winsorizing the inverse probability weights at the 1% and 5% levels and (vi) stabilized inverse probability weighting. We find that the relationship between Non-U.S. Firm status and ETR in the multi-variate analysis is substantially the same across all approaches. However, we settled on the approach used in this analysis because it resulted in the best balance for the variables we are most concerned with, which are ln(Sales) and Percentage of Non-U.S. Sales.

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