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Taxes, Profit Shifting, and the Real Activities of MNEs: Evidence from Corporate Tax Notches

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Taxes, Profit Shifting, and the Real Activities of MNEs: Evidence from Corporate Tax Notches *

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Abstract

We exploit exogenous variation in tax notches to better understand the profit-shifting behavior of MNEs and its consequences for real activity. Using new data on CFC rules and information on direct parent-affiliate ownership links, we estimate an unbiased profit-shifting semi-elasticity of about 0.22. Removing incentives to shift profits to particular low-tax locations leads to profit relocation to 'next-best' low-tax countries. We do not find any significant effects on parent shareholders' reported profits or real economic activity. Other entities within the MNE to which profits are relocated experience a significant increase in several measures of real activity.

Keywords: corporate taxation; profit shifting; anti-tax-avoidance rules; multinational enterprise; firm organization

JEL classification: F23; H25

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1 Introduction

International tax issues have become a major policy concern as many high-tax countries see their corporate tax revenue under pressure. The question of how to tax the highly mobile profits of multinational enterprises (MNEs) in an increasingly globalized world has dominated the international policy agenda over the last decades and led to major reforms in international tax law. Following the OECD and G20's Base Erosion and Profit Shifting (BEPS) recommendations, many countries have introduced anti-tax-avoidance rules in their tax codes.

By now there is ample empirical evidence showing that MNEs' reported profits are highly sensitive to corporate taxation, and profit-shifting behavior of firms seems to be fairly well understood. Still, as pointed out by Beer et al. (2020), many blind spots remain to be addressed. In particular, most studies concerned with profit shifting or the effectiveness of anti-tax-avoidance rules are silent on the effect of tax incentives on the (re)allocation of real activity within MNEs. To the extent that limiting tax avoidance reintroduces the distortive effect of taxes on investment decisions, anti-tax avoidance measures may have consequences for real economic activity in all locations of the MNE. Learning about the interaction between profit shifting and investment activities of MNEs as well as having an accurate measure of the sensitivity of profits to tax incentives is crucial for policy design.

This paper contributes to the literature by analyzing the reallocation of profits and real activity within MNEs after discrete changes in profit-shifting incentives. For this, we exploit exogenous variation in tax notches created by controlled foreign corporation (CFC) rules. These rules aim at taxing foreign income generated in low-tax locations that would otherwise be exempt from taxation in the parent firm's country. To be specific, if CFC legislation at the parent location applies to low-tax affiliates abroad, the (passive) income of the foreign entities is attributed to the shareholder's (the parent's) tax base. The specific design of CFC rules creates a discontinuous jump – *a notch* – in tax incentives determining the tax avoidance behavior of MNEs. Once a foreign affiliate is affected by a CFC rule, the relevant corporate tax rate determining profit-shifting incentives is no longer the one in the

foreign country, but that in the parent's country. Associated notches can arise from (i) the introduction or changes to CFC legislation in the home country, (ii) changes in the home country's corporate tax rate, or (iii) changes in the host country's corporate tax rate.

To learn about MNE responses, we collect new data on CFC rules (for 214 countries) and combine it with parent-affiliate level firm data. In our sample, we count 202 tax notches, whereof 54 are related to new or adjusted CFC legislation, 94 are triggered by changes in the tax rate of the home country, 82 by changes in the tax rate of the host country. These 202 discrete changes in tax incentives substantially affect the attractiveness of about 20,000 foreign affiliates to be used as low-tax entities for profit shifting (the average tax notch upon treatment in our sample equals 15 percentage points).

We exploit this substantial exogenous variation in corporate tax notches to address fundamental questions of international tax avoidance and tax policy. First, discrete changes in the attractiveness of a foreign affiliate as a recipient of profits allow us to identify an unbiased profit-shifting elasticity. This key parameter of interest is estimated based on a large dataset on direct ownership links at the parent-affiliate level. The parent-affiliate structure of the data is necessary to identify the notches in tax incentives. In our preferred specification, we find a profit-shifting semi-elasticity of about 0.22, which is substantially smaller compared to previous findings.[1] We argue that the variation over time in tax notches correctly captures changes in profit-shifting incentives and enables us to consistently identify a true profit-shifting elasticity. Second, we analyze how changes in profit-shifting incentives affect the allocation of both profits and real outcomes within multinational groups. We show that profits are relocated to the 'next-best' alternative within the MNE, i.e. the best affiliate from a tax-optimizing point of view, which is just not affected by the CFC rule. Consistent with the latter, we find no evidence for the relocation of profits to the parent. Third, examining real outcomes, we find a negative effect on employment in treated affiliates that are no longer attractive for profit shifting.

[1]The profit-shifting semi-elasticity refers to the elasticity of pre-tax profits with respect to the corporate income tax rate. Alternatively, we provide estimates using the financial profits, for which we find a tax semi-elasticity close to 1.

Our results suggest that employment is partly relocated to untreated low-tax affiliates that become relatively more attractive as a profit destination. At the same time, these unaffected affiliates experience a significant increase in the stock of their tangible assets and total factor productivity (TFP).

Outcomes measured at the parent level have largely been neglected in previous studies, but are highly relevant, especially for the regulating countries.[2] We do not find any evidence that parent outcomes (tax base and real outcomes) are generally affected. This finding is consistent with the avoidance and relocation behavior described before. To the best of our knowledge, there are no previous studies that directly identify the impact of profit-shifting restrictions on shareholder outcomes in a multi-country parent-affiliate setting.

A general implication of our findings is that unilateral tax regulation leads to further avoidance activities, consistent with MNEs' tax-minimizing behavior. The absence of evidence that CFC rules lead to a repatriation of profits (the coefficients we estimate are close to zero and highly insignificant in all specifications) suggests that parent countries bear the full monitoring and enforcement costs of CFC legislation without benefiting from increased corporate tax revenue. At the same time, however, we do not find evidence that parent firms are negatively affected in any real outcome (real investment, productivity, and employment). The latter may also be explained by the result that firms are able to relocate profits to their next-best alternatives. Our findings are highly relevant for the design of tax reforms. They imply that closing particular tax havens is not effective as long as tax differentials to next-best alternatives are still substantial. This implication is also interesting in light of the recent initiative to implement a global minimum tax (GMT) (see e.g. Hugger et al., 2024; Devereux, 2023). In fact, as of January 2024, the European Union has introduced a GMT of 15% that applies to MNCs active in EU member states. The incentive effects of the GMT are comparable to the ones of CFC rules as top-up taxes in the home countries of the MNCs apply to foreign low-lax profits (see e.g. Johannesen, 2022). The next-best alternative in a GMT setting is thus a

[2]The regulating or home country of the parent firm is the country of the controlling shareholder or majority owner of a foreign affiliate.

jurisdiction where the 15% GMT is effectively just not binding.[3]

Our paper is related to a small literature on the effects of CFC rules and tax regulation and to a large literature on the tax-motivated profit shifting of MNEs. Ruf and Weichenrieder (2012) show that CFC rules affect the global allocation of passive assets within German MNE groups. Using the same data, Egger and Wamser (2015) examine the effects of CFC rules on foreign affiliates' assets. More closely related to our analysis, Clifford (2019) examines the impact of CFC rules taking into account the relocation of financial profits within the MNE group. She finds a significant reduction in financial profits in affected affiliates and an increase in financial profits in unaffected affiliates within MNE groups with high exposure to CFC rules. Our paper differs in a number of ways. We focus on the relocation of profits and real activity after a change in relative profit-shifting incentives within the group. Our direct-shareholder-affiliate-level data allow us to unambiguously identify the relevant notch in profit-shifting incentives, which is what we need to identify a tax semi-elasticity of pre-tax profit. We provide additional results regarding the relocation of profits after CFC treatment. Furthermore, we examine real responses to changes in profit-shifting incentives across the MNE group and in particular at the shareholder location.

The second strand of literature we contribute to is the work quantifying international corporate tax avoidance (see the meta studies by Beer et al., 2020; Riedel, 2018; Heckemeyer and Overesch, 2017). Recent studies based on macro data suggest that profit shifting leads to substantial tax revenue losses of high-tax countries (see Tørsløv et al., 2022; Ferrari et al., 2023). Earlier papers, based on micro data, estimate the tax-sensitivity of MNEs' profits to tax incentives (see e.g. Huizinga and Laeven, 2008; Dischinger et al., 2014; Dharmapala and Riedel, 2013). While all studies find evidence for tax-motivated profit reallocation, the estimated tax-elasticity of reported pre-tax profits varies largely across studies. Meta-analyses by Heckemeyer and Overesch (2017) and Beer et al. (2020) find typical semi-elasticities of 0.8 and

[3]One difference to the CFC rules is that foreign profits are not taxed at the residence-country rate. Another one is that principally all income is subject to the GMT, although substance-based income exclusions apply (see e.g. Schjelderup and Stähler, 2023), similar to active-income exemptions in CFC rules.

1 respectively, implying that a 10 percentage point increase in the host country's corporate tax rate reduces reported pre-tax profits by 8% or 10%. Studies using aggregate data usually find even larger elasticities. But also across studies using firm-level data, there is considerable variation across estimated elasticities. This is partly due to the fact that estimating a pure profit-shifting elasticity is inherently difficult since corporate tax rates determine not only profit-shifting incentives but affect the cost of capital and induce changes in real activity. Moreover, most studies rely on marginal changes in corporate tax rates or tax rate differentials between home and host countries (see e.g. Hines and Rice 1994, Huizinga and Laeven 2008, Weichenrieder 2009). By exploiting discrete changes in tax differentials that apply only to income that is most probably related to shifting activities, we expect to better capture profit-shifting incentives. We find a semi-elasticity for pre-tax profits of 0.22 and argue that this is a more realistic estimate of the profit-shifting elasticity. In our setting, only foreign affiliates without substantial real activity actually face a change in tax incentives. In contrast, the effect of marginal changes in tax rates on pre-tax profits may simply reflect distortions in production that affect profits and may thus confound the profit-shifting estimate we are after.

We finally contribute to a very small but growing literature addressing the link between profit-shifting activities, the regulation thereof, and their effect on real outcomes. Suárez Serrato (2018) is one of the first studies to focus on the effect of anti-tax avoidance policy on real outcomes at the shareholder level. Examining the abolishment of tax exemptions for US multinationals in Puerto Rico, Suárez Serrato (2018) finds large negative effects on wages and investment.[4] Similarly, Bilicka (2021) examines the effects of the UK's regulation of internal debt on the internal labor market of British MNEs and finds strong reallocation effects. In a related study, Bilicka et al. (2022) show that the same reform has led to a decrease in debt held domestically and increased debt in foreign locations of UK MNEs. What all these studies suggest is that taxation and anti-tax avoidance policies potentially

[4] A few papers focus on the effects of anti-tax-avoidance rules on real outcomes of foreign affiliates (rather than parent outcomes), for example, Buettner et al. (2018), Merlo et al. (2020) and de Mooij and Liu (2021). Bilicka (2019) uses real outcomes as indicators of the relevant profit-shifting channel. This literature is clearly related to the mechanism we have in mind – suggesting that restrictions on profit shifting might negatively affect real outcomes.

have strong implications for the real activities of MNEs. In our setting, the partial removal of profit-shifting incentives does not lead to any significant effect on parent firms' profits, tangible assets, or TFP. However, by showing that profits are real-located to next-best affiliates, this is to the best of our knowledge the first paper providing evidence on why this null result is consistent with MNE behavior. We do find a positive effect on a parent's employment for groups that lose particularly attractive low-tax locations after CFC-rule treatment, implying a partial relocation of employment from affiliates that are no longer attractive for profit shifting to the parent.

Our paper is organized as follows. Section 2 describes the fundamental features of countries' CFC rules and illustrates how they affect profit-shifting incentives within MNEs in our data. Section 3 summarizes the findings of our causal analysis, including a number of robustness tests. Section 4 presents the central findings on the redistribution of profits within the group. Section 5 focuses on the effects on real outcomes, both at the level of the parent shareholder as well as the unaffected affiliates within the group. Finally, Section 6 concludes.

2 Institutional setting, tax incentives, and identifying variation

Controlled Foreign Company (CFC) rules are typically implemented by high-tax countries to prevent MNEs from shifting profits to affiliates located in countries with low or even zero taxes. Under CFC legislation, income of affiliates in locations where the corporate tax rate falls below a predefined tax threshold may be attributed to their parents' tax base. CFC rules, thus, eliminate incentives to shift profits associated with tax differentials between parents and their foreign affiliates. We demonstrate how we exploit the variation created by CFC legislation for empirical identification below.

We first illustrate how CFC rules affect profit-shifting incentives with a specific example. Consider a French multinational group. The parent firm and domestic affiliates in France face the French corporate income tax (CIT) rate of 34%. Assume

the parent is the majority owner (shareholder) of three foreign affiliates A, B, and C, facing CIT rates of 30%, 20%, and 10%, respectively. The French CFC rule stipulates that any country with a CIT rate lower than 40% of the French rate (i.e. 13.6%) is to be considered a 'low-tax' country. Foreign affiliates located in such countries are deemed 'controlled foreign companies', and their passive income is to be attributed to the parent shareholder in France.[5] In our example, affiliate C falls under the French CFC rule. Assume, for this example, that the host country of affiliate A cuts its tax rate to 13%. Affiliate A is now also subject to CFC *treatment* as it falls underneath the relevant CFC threshold (40% of 34% = 13.6%). Despite the substantial tax cut and even though France has not changed its CFC legislation, the French CFC rule renders affiliate A unattractive from a profit shifting point of view. The tax treatment of its tainted income brings the average tax over the three foreign affiliates closer to the French tax rate, just as in a system of worldwide taxation. Affiliate B (CIT of 20%) has now become the *lowest-tax affiliate* in the group and is thus the most attractive location to which profits can be shifted to save taxes.[6] In this setting, if the cost of profit shifting is sufficiently low, the MNE may relocate some profits to affiliate B to save taxes, instead of repatriating income to the parent (even though the tax differential between parent and affiliate B is small). Hence, given the tax planning of large MNEs and the fact that these firms typically operate many affiliates around the globe (perhaps with a corporation tax just above the 13.6% threshold), we expect that tax-minimizing MNEs relocate profits to the *next-best alternative* in terms of the tax burden (in our example affiliate B), suggesting that the effect of a binding CFC rule on France's tax base and tax revenue remains small or zero.

The relevant tax threshold determining 'low-tax' locations is set either in relative terms to the home country's CIT as in the example above, or as an absolute value. In Germany, for example, foreign subsidiaries can only be treated as CFCs if they

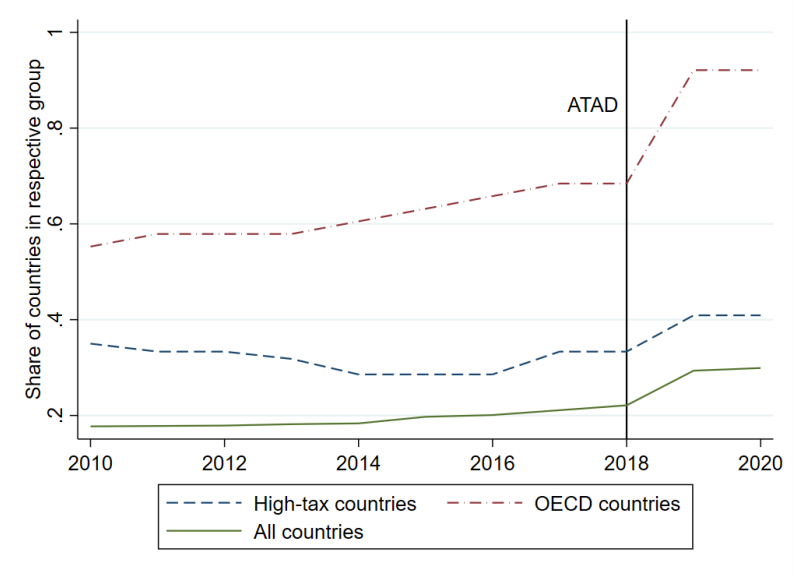
[5] The usual exemption of foreign source income is no longer granted by the French tax authorities and foreign passive income is to be taxed immediately in France and not only upon repatriation as in a tax credit system. Note that the focus on passive income is also called the 'tainted income' approach, as the objective is to remove the privilege of tax exemption if income is associated with profit shifting (see Weichenrieder 1996)

[6] A large literature acknowledges that the tax saving from profit shifting needs to be sufficiently large to account for the cost of these activities (see, e.g. Davies et al., 2018).

are located in low-tax jurisdictions that are defined as countries with a corporate income tax rate lower than 25%. Other criteria of CFC regulations include the degree of control of the resident shareholder. Most countries target foreign affiliates in which resident shareholders own 50% or more of the total voting shares.[7]

Our analysis is based on new CFC rules and tax data compiled by the research school of international taxation (RSIT). We document that CFC rules have become one of the main instruments to address the tax challenges raised by the activities of MNEs.[8] While only 32 countries had CFC rules in the year 2000, this number increased to 66 in 2020. All OECD member countries except for Switzerland and Costa Rica have implemented some form of CFC legislation.[9]

Figure 1: *Global implementation of CFC rules*



Notes: "High-tax countries" refers to the 25% of countries with the highest tax rates in 2020; "OECD countries" comprises the 38 OECD countries and the total number of countries is 214; data sources: Global panel on CFC legislation from the ITI database.

[7]In many cases, CFC regulations also include a substance escape clause. If the foreign affiliate carries out significant business activities and the ratio of passive to active income is below some threshold, then it does not fall under CFC regulation.

[8]The RSIT's International Tax Institutions (ITI) database provides information on a large number of statutory tax measures for over 200 countries and territories, including CFC rules and their application. For more information, see www.rsit-uni-tuebingen.de/data.

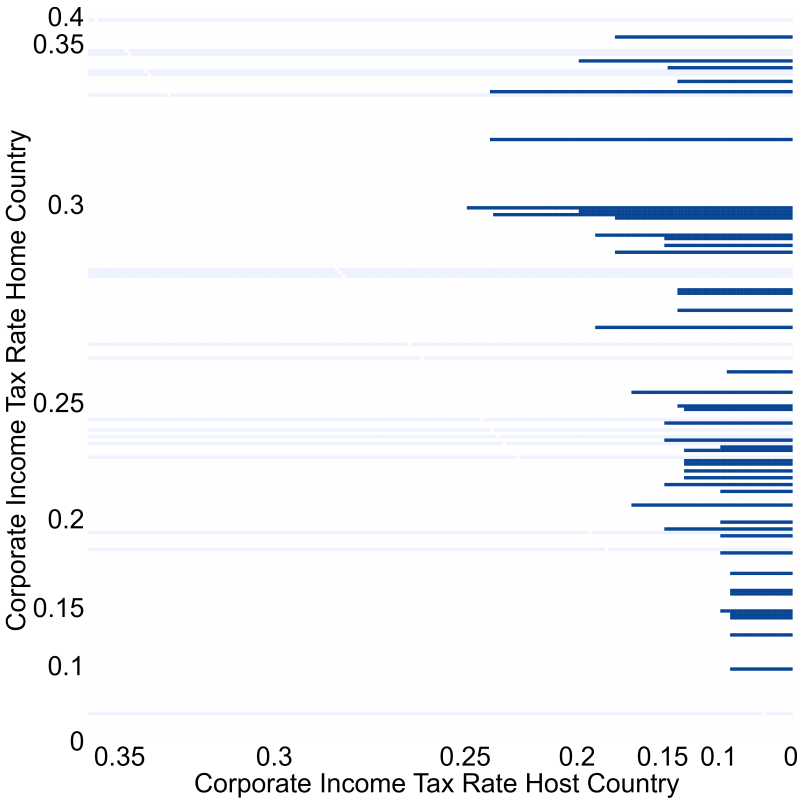
[9]This is not surprising given that the OECD expressed in its 1998 report on harmful tax practices "that countries that do not have such rules [should] consider adopting them and that countries that have such rules [should] ensure that they apply in a fashion consistent with the desirability of curbing harmful tax practices." (OECD, 1998). With its BEPS action plan, the OECD (2013) spells out this point in Action 3: Strengthen CFC Rules.

Figure 1 shows that an increasing number of countries have implemented CFC rules over the last two decades, especially after the EU's Anti-Tax Avoidance Directive (ATAD) came into force. The figure also suggests that this increase is predominantly driven by high-tax and OECD countries.[10] These countries are particularly interested in protecting their domestic tax base and in limiting profit-shifting opportunities.

Figure 2 displays a *treatment matrix*. The horizontal and vertical axes list all countries and territories ordered by their statutory corporate income tax rates in 2020. The vertical axis represents home countries and the horizontal axis represents host countries that are potentially affected by the home country's CFC legislation. The fields of the heatmap are colored in light or dark blue if there is a binding CFC rule in place. The light blue lines indicate home countries that have implemented CFC rules without a low-tax threshold (i.e., that apply to all host countries irrespective of their CIT rate). The dark blue lines correspond to countries that use a relative or absolute low-tax threshold to treat only *some* potential host countries as CFC locations. This matrix highlights the variation created by the CFC thresholds. Higher-tax countries (top-end of the vertical axis) tend to have higher thresholds and therefore treat more of their potential host locations. The lower the tax rate in a given host location (right-end of the horizontal axis), the more likely it is that local subsidiaries are treated by MNEs' home countries as CFC cases.

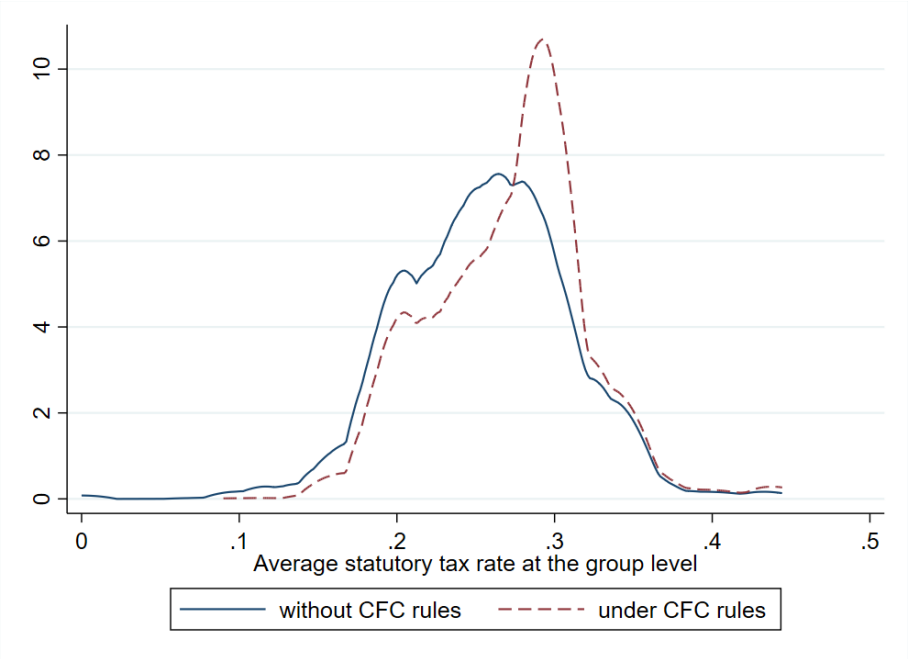
[10] In Figure 1, "high-tax" refers to countries in the upper quartile of tax-rate distribution in the year 2020.

Figure 2: *CFC treatment matrix*



The average tax notch arising upon CFC treatment (i.e., the difference between host and home CIT), is 15 percentage points for the set of affiliates (in our micro-level data, see below) moving below the respective low-tax threshold stipulated by CFC legislation. In our example above, the tax differential of affiliate A changes from 14% (34%-20%) before treatment to 0% (34%-34%) after treatment. For a respective country pair, the rules become binding in the sense that the tax incentives to use foreign affiliates in these host countries for the only purpose of profit shifting are fully taken away.

Figure 3: *Distribution of average host tax rates*



Notes: Comparison between the actual distribution of group-level average host tax rates (red dashed line) and the hypothetical distribution in our sample if all CFC rules were eliminated.

Figure 3 plots the distribution of average host tax rates across all foreign affiliates of an MNE group (based on our micro-level data, see below). The red dashed line plots the distribution of effective tax rates under the actual CFC regime. As outlined above, if the CFC rule applies to an affiliate-parent pair, then the low-tax affiliate's (passive) income is attributed to the shareholder's tax base. This way, CFC treatment implies that the relevant tax rate for the affiliate is no longer its lower host-country tax rate but the higher domestic rate. The blue solid line indicates the counterfactual tax distribution, i.e. if no CFC rule had been in place. This counterfactual distribution lies clearly to the left of the actual tax rate distribution after taking binding CFCs into account. This suggests that tax incentives within the MNE change quite substantially once a CFC rule becomes binding. We exploit this change in incentives to investigate profit reallocation within MNE groups. In our data, binding CFC rules increase the average foreign affiliate tax rate by 8 percentage points, from 20.7% to 28.7%.

Our empirical investigation makes use of the different tax thresholds defined in countries' CFC legislation. We define a CFC indicator variable CFC_{ijt} that equals one if the corporate tax rate of affiliate i's host country is below the threshold

stipulated by parent j's home country at time t, i.e.,

$$CFC_{ijt} = \begin{cases} 1 \text{ if } CIT_{it} < \overline{T}_{ijt} \\ 0 \text{ otherwise,} \end{cases}$$

where $\overline{T}_{ijt}$ denotes the respective threshold, and CIT_{it} the corporate income tax rate that applies to affiliate i at time t. Thus, affiliates located in low-tax host countries are treated if the parent j's CFC rules are binding. Note that treatment depends on the ijt-specific threshold. The empirical variation we are ultimately exploiting may thus comes from changes in $\overline{T}_{ijt}$ (including cases where new rules are implemented) or from changes in corporate tax rates in the home or host countries, shifting affiliates above or below a given threshold.

Our identification approach relies on variation over time t in the host-home-country-specific CFC indicator switching from $CFC_{ijt} = 0$ to $CFC_{ijt+1} = 1$, and vice versa. Switching triggers a tax notch $(CIT_{jt} - CIT_{it})$, which fundamentally changes profit-shifting incentives. Note that most countries allow foreign affiliates to escape from CFC treatment if a sufficient amount of active business is documented. This is, however, irrelevant to our identification approach: once $CFC_{ijt} = 1$, a foreign affiliate cannot be used as a pure profit-shifting entity anymore, and this is the variation we are after.[11]

We can distinguish the variation in our data based on the sources of change in treatment. Changes in treatment – both into treatment and out of treatment – can be caused by the implementation of new CFC rules or changes in the tax rate of either the home country or the host country. Sometimes, both countries change their tax rates in the same year so that a shift falls into both categories.

Our analysis relies on firm-level information provided by Bureau van Dijk's ORBIS database. ORBIS is a firm-level dataset that comprises information on firms' financial statements and their ownership relationships. The specific shareholder-affiliate ownership relation is crucial in the context of CFC legislation and CFC

[11]Note that this is a main difference to the paper by Egger and Wamser (2015), who focus on the German CFC rule and fixed assets abroad. In this case, it is really important to account for the passive income threshold as well (i.e., to learn about real treatment and its consequences for firms' cost of capital).

treatment.[12] For our analysis, we exclude any affiliates that are classified as banks as they are generally subject to different regulations.

Table 1: *Changes in CFC_{ijt} over time (country-pair level)*

Type of change	*Number of changes*	*Average tax notch*	*Affected affiliates*
Into treatment	106	15.0pp	22,195
Change in host CIT_{it}	52	13.8pp	18,484
Change in home CIT_{jt}	24	25.0pp	9,438
Change in T_{jt}	0		
New CFC rule	43	15.2pp	1,283
Out of treatment	96	10.7pp	19,175
Change in host CIT_{it}	30	0.5pp	2,245
Change in home CIT_{jt}	70	11.1pp	16,590
Change in T_{jt}	11	10.4pp	1,430
Repeal of CFC rule	0		

Notes: A change in T_{jt} refers to a change in the threshold stipulated in the existing CFC legislation in the home country. Changes are counted at the country-pair level only including changes for which we observe affected affiliates in our sample. The average tax notch is an unweighted average for all affected affiliates.

Table 1 summarizes the different types of treatment changes in our sample. These numbers reflect the country-pair level changes observed in our sample together with the average (unweighted) tax notch associated with these changes. The average tax notch from *moving into treatment* is larger than the notch when *moving out of treatment*. This is intuitive as CFC treatment typically applies to pairs with a large tax differential between home and host country. Moving out of treatment means that both tax rates are becoming more similar and thus the tax notch becomes smaller. Note that each type of change at the country-pair level affects thousands of firms when analyzing micro-level data.

[12] We exploit detailed ownership information in ORBIS to identify the direct majority shareholder of an affiliate. Although most countries include direct and indirect shareholders in their definition of a parent company, complex ownership structures within MNE networks can create conflicts in the applicability of CFC rules. For instance, if a Czech affiliate is directly held by a Japanese shareholder it can be subject to Japanese CFC legislation. However, if this Czech affiliate is ultimately owned by a German holding, it would be exempt from CFC ruling from the holding's perspective since Germany exempts EU countries from its legislation. For this reason, and from our point of view, it is always preferable to base the analysis and CFC application on the controlling direct shareholders rather than ORBIS' ultimate owners.

Table 2: *Summary statistics*

	Observations	Mean	S.D.	Median
Treated affiliates				
Pre-tax profits$_{it}$	92,955	3.18	44.67	0.21
Fixed assets$_{it}$	92,955	42.32	1628.12	0.29
Tangible fixed assets$_{it}$	92,732	7.12	87.27	0.17
Employees$_{it}$	92,955	126.92	593.50	22.00
Sales$_{it}$	76,488	25.13	159.35	2.50
Cost of employees$_{it}$	76,969	3.26	21.48	0.54
TFP_{it}	65,356	3.45	1.06	3.37
CIT_{it}	92,955	0.16	0.06	0.16
Distance to cut-off$_{it}$	92,955	-0.06	0.04	-0.06
Group exposure$_{it}$	92,955	0.73	0.32	1.00
GDP_{it}	92,955	704.82	1046.27	356.89
GDP p.c.$_{it}$	92,955	30.28	12.05	27.14
GDP growth$_{it}$	92,955	2.81	2.80	2.82
Inflation$_{it}$	92,955	2.36	3.29	1.81
Unemployment$_{it}$	92,955	8.28	4.46	6.95
Corruption$_{it}$	92,955	0.35	0.82	0.24
Untreated affiliates				
Pre-tax profits$_{it}$	941,130	8.66	127.24	0.41
Fixed assets$_{it}$	941,130	62.75	1025.05	0.70
Tangible fixed assets$_{it}$	939,864	20.36	456.34	0.26
Employees$_{it}$	941,130	195.68	1951.64	26.00
Sales$_{it}$	764,859	89.25	1182.78	6.50
Cost of employees$_{it}$	749,925	8.12	134.11	1.20
TFP_{it}	660,865	3.93	1.05	3.98
CIT_{it}	941,130	0.24	0.07	0.25
Distance to cut-off$_{it}$	475,566	0.09	0.06	0.09
Group exposure$_{it}$	941,130	0.02	0.09	0.00
GDP p.c.$_{it}$	941,130	36.55	12.66	39.53
GDP growth$_{it}$	941,130	1.91	2.33	1.91
Inflation$_{it}$	941,130	2.22	3.88	1.47
Unemployment$_{it}$	941,130	9.15	5.32	7.80
Corruption$_{it}$	941,130	0.72	0.96	0.65
Parent shareholders				
Pre-tax profits$_{jt}$	206,673	49.51	452.57	2.14
Fixed assets$_{jt}$	206,673	577.27	6035.81	10.99
Tangible fixed assets$_{jt}$	206,396	116.94	2005.09	1.87
Employees$_{jt}$	206,673	655.75	8155.99	75.00
Sales$_{jt}$	173,275	403.90	3294.57	28.43
Cost of employees$_{jt}$	176,565	29.32	353.31	3.93
TFP_{jt}	159,713	4.11	0.98	4.05
CIT_{jt}	206,673	0.26	0.07	0.28
Av. tax notch$_{jt}$	206,673	0.01	0.04	0.00
Max. tax notch$_{jt}$	206,673	0.02	0.06	0.00
Group exposure$_{jt}$	206,673	0.09	0.24	0.00

Notes: Firm-level variables measured in million USD, GDP measured in billion USD.

Descriptive statistics on the firm-level data, tax variables, as well as additional country-level data (taken from the World Bank's *World Development Indicators* database) are presented in Table 2.[13] The table distinguishes between CFC-rule treated affiliates, untreated affiliates, and parent entities. Let us only point at the difference in the average statutory tax rate (CIT) across these three groups. As expected, the mean CIT that applies to treated affiliates is lowest, with $CIT = 0.16$, while it is 8 percentage points higher for the untreated ones, and even 10 percentage points higher for the parents.

The summary statistics highlight the important advantages of our dataset, including parent- as well as affiliate-level information with complete financial statements for both parties. This allows us to analyze the impact of CFC treatment on *(i)* directly affected affiliates, *(ii)* their direct shareholders, as well as *(iii)* indirectly affected affiliates in the same group.

3 Profit-shifting elasticity

3.1 Benchmark results

We first assess the effect of a change in profit-shifting incentives on profits reported by foreign affiliates affected by CFC rules. The variable CFC_{ijt} indicates whether a CFC rule is actually binding in a bilateral parent-affiliate relationship. Our empirical specification follows earlier literature (see, e.g., Merlo and Wamser, 2023):

$$log(PTP_{it}) = \beta_0 + \beta_1 CIT_{it} + \beta_2 CFC_{ijt} + \beta_3 (CIT_{it} \times CFC_{ijt}) + \mathbf{X_{it}}\beta + \gamma_\mathbf{i} + \gamma_\mathbf{t} + \epsilon_\mathbf{it}. \quad (1)$$

The dependent variable, $log(PTP_{it})$, denotes profits before taxes of affiliate i in year t. We measure profitability in terms of pre-tax profits which comprises both

[13] See Table *A*.2 for a detailed description of all variables and their respective sources. In Section 5, we use total factor productivity (TFP) and investment as additional outcome variables to obtain a better understanding of the driving factors behind the observed effects. TFP is estimated following the methodology proposed by Levinsohn and Petrin (2003), using material inputs as a proxy for unobserved productivity shocks.

operating and financial profits.[14] Although CFC rules generally aim at taxing passive income, we expect CFC rule treatment to reduce the overall attractiveness of an affiliate as a profit-shifting entity.[15] While many profit-shifting channels such as debt shifting or licensing will reflect in financial profits, transfer price manipulation affects operating profits. Therefore, we expect the overall profitability of affiliates to be the most suitable measure.[16]

Previous literature interprets the estimate on CIT_{it} – the statutory corporate income tax rate at the host location – as a profit-shifting semi-elasticity. We argue, however, that the coefficient on β_2, which captures the effect of the tax notch created by the CFC rule, reflects the response to profit-shifting incentives more adequately. We also include an interaction term between the host-country tax rate CIT_{it} and the CFC indicator to further analyze firms' tax sensitivity. We would expect that firms under CFC treatment are no longer sensitive to their host country tax rate – if treated, tainted income would now be taxed at the parent location.

Furthermore, we include firm and country-specific control variables, captured by $\mathbf{X_{it}}$. Following Huizinga and Laeven (2008), we condition on the log of the number of employees and log of fixed assets reported by affiliate i to control for firm size effects. At the country level, we control for the inflation rate, unemployment, and corruption as well as the host country's GDP level, GDP per capita, and GDP growth. In this way, we capture time-varying economic trends that are not absorbed by the fixed effects. All specifications include year and affiliate fixed effects, denoted by γ_i and γ_t, respectively.

We start by including only CIT_{it} in column (1), Table 3. Column (2) augments the estimation by including the CFC indicator. As expected, the coefficient is significant and negative, suggesting that CFC treatment reduces pre-tax profits by approx. 3.3%. Column (3) explores the interaction between CFC rules and the local

[14] See Heckemeyer and Overesch (2017) for a discussion on the tax-sensitivity of pre-tax profits versus earnings before interest and taxation. The first study based on micro-level data and a cross section of European subsidiaries is the one by Huizinga and Laeven (2008).

[15] When a foreign affiliate is identified as a potential CFC (according to the tax threshold), the home country's tax authority starts a review process to determine whether a shareholder has significant influence over the foreign affiliate, and whether or not the foreign affiliate is eligible for CFC exemption. This involves an in-depth review of their business activities and assets. We expect this review process to discourage any kind of profit-shifting activity.

[16] Section B provides evidence that CFC treatment has an even larger effect on financial profits.

Table 3: *Benchmark results*

Dep. variable: $log(PTP_{it})$	(1)	(2)	(3)
CFC_{ijt}		-0.033**	-0.047***
		(0.014)	(0.016)
CIT_{it}	-0.593***	-0.637***	
	(0.083)	(0.085)	
$CFC_{ijt} \times \overline{CIT_{it}}$			-0.013
			(0.263)
$(1 - CFC_{ijt}) \times \overline{CIT_{it}}$			-0.659***
			(0.086)
CIT_{jt}	0.0832	0.126	0.133*
	(0.076)	(0.078)	(0.078)
$log(FA_{it})$	0.102***	0.102***	0.102***
	(0.002)	(0.002)	(0.002)
$log(EMP_{it})$	0.266***	0.266***	0.266***
	(0.004)	(0.004)	(0.004)
$log(GDP_{it})$	-0.388***	-0.372***	-0.378***
	(0.133)	(0.133)	(0.133)
$log(GDP\ p.c._{it})$	0.839***	0.823***	0.834***
	(0.136)	(0.136)	(0.136)
$GDP\ growth_{it}$	0.0124***	0.0124***	0.0124***
	(0.001)	(0.001)	(0.001)
$Inflation_{it}$	-0.005***	-0.005***	-0.005***
	(0.001)	(0.001)	(0.001)
$Unemployment_{it}$	-0.007***	-0.007***	-0.007***
	(0.001)	(0.001)	(0.001)
$Corruption_{it}$	-0.130***	-0.130***	-0.131***
	(0.016)	(0.016)	(0.016)
N	1,034,085	1,034,085	1,034,085
R^2	0.883	0.883	0.883
Firm & Year FE	YES	YES	YES

Notes: CFC_{ijt} is an indicator variable that takes the value 1 if the respective affiliate is in a host country with a corporate income tax below the specified threshold. The host CIT is centered around the mean tax rate for all treated affiliates in column (3). Standard errors are clustered at the firm-group level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

tax rate. In this specification, the host country tax rate is centered around 15.6%, which is the mean tax rate among all treated affiliates. Therefore, the main effect for the CFC dummy denotes the average treatment effect for affiliates facing the average tax rate. The interaction term is insignificant for firms where $CFC_{ijt} = 1$. This supports our initial hypothesis that treated firms become insensitive to their host country's tax rate as their income becomes subject to domestic taxation. The coefficient on $(1 - CFC_{ijt}) \times \overline{CIT_{it}}$ suggests a slightly increased tax responsiveness, compared to column (1), for those affiliates that are not restricted by CFC rules. The

estimates also suggest that the parent tax rate is positively related to $log(PTP_{it})$, as expected.

Our findings are broadly in line with previous estimates. Both $log(FA_{it})$ and $log(EMP_{it})$ are positively related to $log(PTP_{it})$, which is in line with previous empirical studies (see Huizinga and Laeven 2008). The coefficient on $log(GDP_{it})$ is significant and negative, while it is positive and (weakly) significant for $GDP\ growth$ and $log(GDP\ p.c._{it})$. The three remaining control variables $Inflation$, $Unemployment$ and $Corruption$ capture (macroeconomic) trends at the country level that are not absorbed by our year fixed effects. The coefficients on all three variables are significant and negative, suggesting that unfavorable economic and institutional conditions negatively impact firm profitability.

On average, a treated affiliate (CFC_{ijt} switching from 0 to 1 or from 1 to 0) faces a tax notch of 15 percentage points, which is computed as the difference between the host country's and the home country's tax rates. Using the average tax notch and the CFC treatment effect, we obtain a semi-elasticity for pre-tax profits of 0.22. A 10 percentage point increase in the relevant tax rate would thus be associated with a 2.2% reduction in reported profits. We argue that this is an unbiased estimate of the profit-shifting elasticity as we identify it from discrete changes in tax incentives affecting only foreign affiliates that are very likely used for profit shifting. Those affiliates with substantial real activity that do escape CFC regulation do not face a change in tax incentives. In contrast, the effect of marginal changes in CIT_{it} (or CIT_{jt}-CIT_{it}) on pre-tax profits may simply reflect distortions in production (causing a negative effect on profits) and may thus confound the profit-shifting effect we are ultimately interested in.[17]

Table B.1 in the appendix provides estimates for the effects of CFC treatment

[17] Johannesen (2022) assesses the welfare consequences of the GMT, and finds that a GMT of 15% is welfare improving only if the semi-elasticity of profit shifting is very high (at least 4). He emphasizes that an estimate of the sensitivity of shifted profits to potential tax savings is still missing, as the estimates provided by the literature so far focus on the sensitivity of profits reported in *non-havens* to tax differentials. While our empirical approach focuses on profits in low-tax countries, our findings imply a relatively low semi-elasticity, which is well below 4. Johannesen (2022) assumes that the GMT puts an end to profit shifting to tax havens. This is clearly not the case when single countries introduce CFC rules. The associated total tax-responsiveness of profits in tax havens to the GMT may therefore be well above the implied semi-elasticity suggested by our results.

on financial profits. CFC_{ijt} has a significant negative effect on financial profits across all specifications. In our preferred specification, CFC treatment is associated with a 13.6% reduction in financial profits, suggesting a semi-elasticity close to one. Furthermore, Table B.2 provides evidence on the robustness of the estimates in Table 3 to different sets of fixed effects. In particular, we show that our results are robust to the specification using affiliate, host-year and home-year fixed effects as in Clifford (2019).

3.2 Heterogeneous, asymmetric and dynamic responses

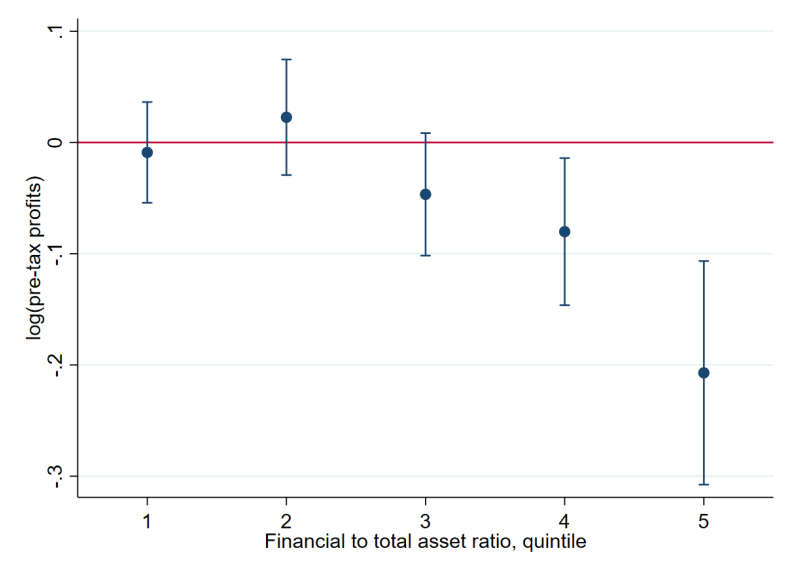
CFC rules explicitly aim at limiting profit shifting and preventing MNEs from using shell companies to reduce their tax liability. In most countries there are exemptions available for "active businesses", that is, if the shareholder can demonstrate that an affiliate is mostly engaged in real economic activity. The latter affiliates are then exempt from CFC rule treatment. The CFC legislation of countries often stipulates additional thresholds for affiliates' "passive income" (see Egger and Wamser 2015). Passive income comprises profits from interest, royalties, or other financial income sources. That way, the legislation aims at regulating affiliates installed for the purpose of tax avoidance, without affecting real foreign activity by resident shareholders. From our data, we are not able to test whether individual affiliates fulfill the specific criteria for passive income. Note also that we are not concerned about this as neglecting passive income thresholds should not be a source of bias in our context: We argue that once a foreign affiliate is below the tax threshold and the CFC rule binding according to the definition of CFC_{ijt}, it will no longer be used as a pure profit-shifting entity (after treatment, we expect that this leads to a relocation of profits). This argument is valid, irrespective of whether a passive income threshold applies or not.

We can proxy, however, for the degree of passive income of an affiliate by computing the share of financial in total assets.[18] For each firm, we compute the share of financial assets in total assets and for each firm group and year, we define the

[18]Note that accounting standards on financial assets vary across countries and that Orbis reporting on "Other or financial assets" is therefore only an approximation of the financial asset structure.

quintiles of the asset ratio. This allows us to estimate a heterogeneous treatment effect on CFC_{ijt}.

Figure 4: *Heterogeneous treatment effects*



Notes: Depicted are the coefficients for the interaction between the CFC dummy and within-firm quintile of the financial-to-total-asset ratio. The estimation includes affiliate and year fixed effects; affiliate controls include log(Fix.Assets), log(EMP); country controls include home and host CIT, inflation, corruption, unemployment, GDP level, growth, and GDP per capita. Standard errors are clustered at the firm-group level.

The results in Figure 4 show that the treatment effect varies considerably with the relative level of financial assets. It appears that CFC legislation is effectively targeting affiliates that engage in financial activities. Compared to Table 3, the estimates become considerably larger when we look at firms in the highest quintile. Here, the reduction in profits exceeds 20% of reported profits. We take that as evidence that the affiliates with the highest levels of financial assets are very likely the ones that are used as profit-shifting entities and thus react very intensely to changes in tax regulations. This finding is also consistent with our estimates on the financial profits (results provided in the appendix).

We also test for asymmetries in the response to CFC treatment. We define the dummy variables Out_{it} and $Into_{it}$ that indicate if a firm ever switches out of or into treatment, excluding those that switch multiple times. The panel structure of our data thus allows us to distinguish between affiliates switching from $CFC_{ijt} = 1$ to $CFC_{ijt} = 0$ (out) and affiliates switching from $CFC_{ijt} = 0$ to $CFC_{ijt} = 1$.

Table 4 presents the results of this estimation. Column (1) replicates the bench-

mark specification from Table 3 as a point of reference. In column (2), we estimate that firms falling into treatment face a decrease in profits by 3.33%, on average. Column (3) focuses on the treatment effect specifically for firms that come *out* of CFC treatment. Here, the interaction term $Out_i \times (1 - CFC_{ijt})$ measures the effect of no longer being affected by the CFC rule. Firms coming out of CFC treatment thus report on average 3.24% more profits after their change in treatment status. From this estimation, it seems that the profit response is very symmetric for firms moving into or out of treatment.

Table 4: *Asymmetric responses*

Dep. variable: $log(PTP_{it})$	(1)	(2)	(3)
CFC_{ijt}	-0.0329**		
	(0.014)		
$Into_{it} \times CFC_{ijt}$		-0.0324*	
		(0.017)	
$Out_{it} \times (1 - CFC_{ijt})$			0.0333*
			(0.018)
CIT_{it}	-0.637***	-0.619***	-0.620***
	(0.085)	(0.084)	(0.084)
CIT_{jt}	0.126	0.111	0.116
	(0.078)	(0.078)	(0.078)
N	1,034,085	1,034,085	1,034,085
R^2	0.883	0.883	0.883
Firm & Year FE	YES	YES	YES
CONTROLS	YES	YES	YES

Notes: Includes affiliate and year fixed effects; affiliate controls include $log(FA)$ and $log(EMP)$; country controls include home and host CIT, inflation, corruption, unemployment, GDP level, growth, and GDP per capita. Standard errors are clustered at the firm group level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The response to CFC treatment could also be heterogeneous over time as firms adapt their profit allocation to the changing tax incentives. To analyze the dynamic adjustment process, we implement an event-study estimation for directly affected affiliates. Following the recent contributions to the literature on event study estimation, we focus on affiliates that have changed their treatment status exactly once during the sample period. We further split our sample into two groups, those that were initially not treated and have shifted into treatment and those that have shifted out of treatment to capture the asymmetry documented in Table 4. Note that the latter is necessary in such an approach and also the main reason why we

ultimately prefer the estimation approach implemented above. The fact that we lose observations as we remove all multiple switchers and also observations at the beginning and the end of our sample (where particularly many new CFC rules have been implemented) additionally suggests that a lot of statistical variation in treatments cannot be exploited, which in Table 3 contributes to identification. Anyway, the findings below are helpful for illustration purposes and support our main results.

There is a growing econometric literature on the potential pitfalls of using conventional two-way fixed effects (TWFE) estimators in event study settings (see e.g. Baker et al., 2022; Callaway and Sant'Anna, 2021; de Chaisemartin and D'Haultfœuille, 2020; Sun and Abraham, 2021; Goodman-Bacon, 2021). This literature highlights how heterogeneous treatment effects can lead to biased estimates for the time-specific treatment effects in TWFE and proposes several alternative estimators that address this shortcoming.

In our analysis, we use the estimator developed by Sun and Abraham (2021) that allows for heterogeneous treatment effects over groups and time. Implementing this estimator, we can either use the firms that were never treated or the last treated cohort in our sample as the control group. We test both approaches and contrast the results to the estimates obtained from TWFE to assess the importance of heterogeneous effects. We estimate the following event study specification:

$$y_{it} = \gamma_i + \gamma_t + \sum_{l=-3}^{-2} \mu_l D_{it}^l + \sum_{l=0}^{5} \mu_l D_{it}^l + \mathbf{X_{it}}\beta + \epsilon_{\mathbf{it}} \tag{2}$$

In equation 2, the dependent variable is either the log of pre-tax profits or financial profits of firm i at time t. $\sum_{l=-3}^{-2} \mu_l$ and $\sum_{l=0}^{5} \mu_l$ denote indicator variables for the relative time periods before and after the change in CFC treatment, while D^l measures the respective treatment effect for period l. The vector $\mathbf{X_{it}}$ includes the same control variables as Table 3: home and host country corporate tax rate, the log of fixed assets and employees, the log of GDP and GDP per capita, GDP growth, the inflation and unemployment rate and the perception of corruption index.

Figure 5 illustrates the event study results. Note that all effects are normalized relative to the period $t-1$. We report TWFE estimates (blue dots) and the estimator

proposed by Sun and Abraham (2021) using the never-treated as a control group (red diamond) and using the last treated cohort as the control group (green triangle). The three estimators yield very comparable coefficients across all outcomes.

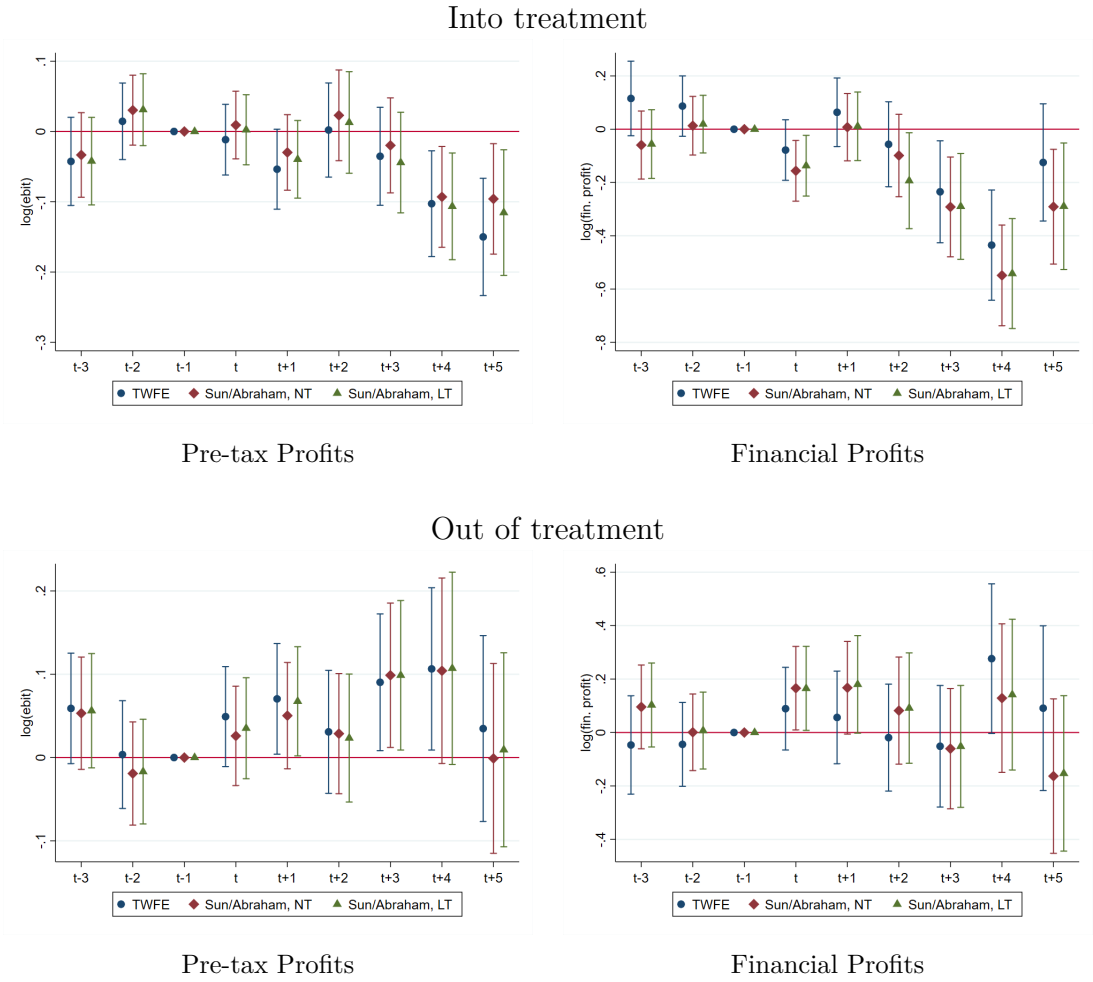
The upper panel of Figure 5 shows the effects of biding CFC rules on pre-tax profits (left plot) and financial profits (right plot). We find significant negative effects on profits only some years after a CFC binds. Financial profits react immediately and continue to fall over the following 5 years. The lower panel shows the effects of moving out of CFC treatment. We observe a similar time lag but larger standard errors for the estimates. There is a significant positive effect on pre-tax profits in year $t + 3$ that has a similar magnitude as the negative effects reported in the first panel. The estimates for financial profits are noisier but the general pattern is consistent. Intuitively, moving out of treatment could be a less significant change in the tax incentives of the firm group. It opens an additional opportunity for profit shifting whereas a shift into treatment forces the group to reallocate profits to avoid a substantial increase in the tax burden. Let us finally mention, however, that we strictly prefer the estimates from above for the reasons mentioned before.

4 Profit reallocation after treatment

The objective of policymakers when implementing CFC rules is to incentivize MNEs to stop shifting profits from their home location. The alternative choice a large MNE can make, however, is to reallocate profits to other low-tax affiliates unaffected by CFC rules. The following part of the analysis, thus, aims at identifying the effect of CFC rules on both parent shareholders and other unaffected affiliates, while controlling for firm and group characteristics. While this clearly seems of interest, to the best of our knowledge, no previous study has looked at such effects.

For this analysis, we cannot capture CFC treatment in a dummy variable as in the estimation above – because there may be multiple potential treatments impacting a firm group in a given year. Instead, we define a *group exposure* variable, EXP_{jt},

Figure 5: *Event study estimates*



that captures the fraction of treated affiliates in a group.[19]

4.1 Parent shareholder

Since the main objective of CFC rules is to limit profit shifting from domestic shareholders to their foreign affiliates, we first turn to the parents' profits to learn about domestic tax base effects. We estimate

$$log(y_{jt}) = \beta_0 + \beta_1 EXP_{jt} + \mathbf{X_{jt}}\beta + \gamma_{\mathbf{j}} + \gamma_{\mathbf{ht}} + \epsilon_{\mathbf{jt}}, \tag{3}$$

[19] A similar indicator has been used in the literature before (see Clifford 2019)

where EXP_{jt} is the exposure to CFC treatment of shareholder j in time t. $\mathbf{X_{jt}}$ is a set of shareholder-level control variables, and γ_j and γ_{ht} represent shareholder-j and home-country-h-year-t fixed effects, respectively. It seems to be critical (and possible, given our data) to control for home-country-time effects to ensure that aggregate country-year shocks do not lead to a bias in β_1. Thus, we condition on a home country's tax policy and all other types of variables which are $h-t-$specific.[20] In other words, by controlling for γ_{ht}, β_1 captures only variation that is directly driven by changes in CFC exposure of shareholder j. To measure exposure, we use the (unweighted) continuous share of treated affiliates and a dummy variable CFC_{jt} that is equal to 1 if shareholder j holds at least one affiliate which is affected by $h's$ CFC rule at time t.

Table 5: *Parent profits*

Dep. variable: $log(PTP_{it})$	(1)	(2)	(3)	(4)
EXP_{jt}	0.022	0.013	-0.006	-0.003
	(0.028)	(0.076)	(0.059)	(0.058)
$AV.NOTCH_{jt}$			-0.169	
			(0.608)	
$EXP_{jt} \times AV.NOTCH_{jt}$			0.427	
			(0.538)	
$MAX.NOTCH_{jt}$				-0.127
				(0.140)
$EXP_{jt} \times MAX.NOTCH_{jt}$				0.338
				(0.422)
$log(FA_{jt})$	0.128***	0.075***	0.128***	0.128***
	(0.007)	(0.015)	(0.007)	(0.007)
$log(Empl_{jt})$	0.219***	0.291***	0.219***	0.219***
	(0.010)	(0.030)	(0.010)	(0.010)
N	206,673	31,854	206,673	206,673
R^2	0.886	0.859	0.886	0.886
Firm & Country-year FE	YES	YES	YES	YES
Sample	Full	Single Af.	Full	Full

Notes: EXP measures the share of affiliates directly affected by CFC rules in a given group and year; $AV.NOTCH_{jt}$ is the group's average tax notch associated with CFC treatment, and $MAX.NOTCH_{jt}$ refers to the maximum tax notch experienced by the group in a given year. Standard errors are clustered at the firm-group level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5 summarizes the regression results for the pre-tax profits of shareholders. In all of our specifications, the coefficient for group exposure remains small and clearly insignificant (and also close to zero). Even when restricting the sample

[20] Note, though, that our results are robust if we include just aggregate time effects.

to parents that hold only a single affiliate in column (2), the coefficient on group exposure remains insignificant. As discussed above, even though CFC exposure makes profit shifting less attractive from the perspective of the parent, it does not necessarily increase the domestic tax base.

Note that this result is fully consistent with the findings below that profits are shifted to third locations (best alternatives), rather than to the parent. In column (3), we additionally interact the CFC exposure measure with the shift in the group's average corporate tax rate, and the maximum tax notch in a given year in column (4).[21] All coefficients for the interaction effects remain insignificant.

4.2 Untreated affiliates

Within the group unaffected affiliates, we expect those just above the respective low-tax threshold to benefit the most from CFC treatment at other locations in their firm group. As indicated above, we may denote these affiliates as the *next-best alternative*. To test this hypothesis, we implement the following analysis, based on differences in tax incentives. We construct dummy variables for 2 percentage point bins of the normalized tax rate[22] and indicator variables that measure a group's exposure to CFC treatment. To be specific, we estimate

$$log(PTP_{it}) = \sum_{b=1}^{B} \alpha_b \times \mathbb{1}[tax_{it} \in tax_b] \times EXP_{jt} + \mathbf{X_{it}}\beta + \gamma_\mathbf{i} + \gamma_\mathbf{t} + \epsilon_\mathbf{it}, \qquad (4)$$

where $log(PTP_{it})$ denotes the log of an affiliate's pre-tax profits. The first part of equation (4) is an interaction term, where $\mathbb{1}[tax_{it} \in tax_b]$ is a dummy variable that is equal to 1 if the affiliate's host country tax rate in time t falls into bin b.[23] Therefore, α_b measures the effect of EXP_{it} on firms in bin b.[24] Equation (4) also conditions on $\mathbf{X_{it}}$, which includes firm-level and host-country control variables; γ_i

[21] The table notes explain how we have defined these variables.

[22] The normalized tax rate is the distance between an affiliate's host country CIT and its relevant CFC threshold.

[23] To give an example, in 2017, an Albanian affiliate of an Italian shareholder falls into *bin 1*, because the Italian CFC threshold is at 13.9% and Albania had a statutory tax rate of 15% – so the affiliate is *just not* treated.

[24] Table B.3 in the Appendix provides summary statistics for the individual bins of unaffected affiliates.

Figure 6: *Group exposure*

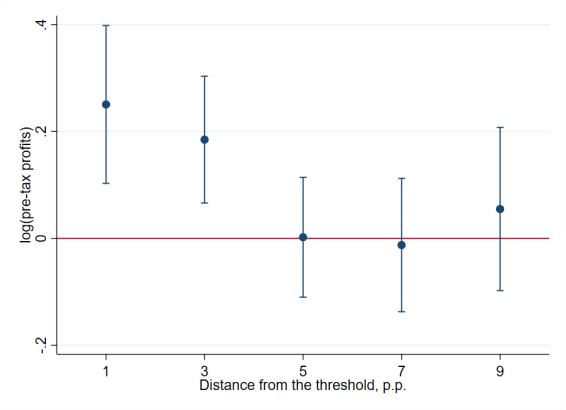
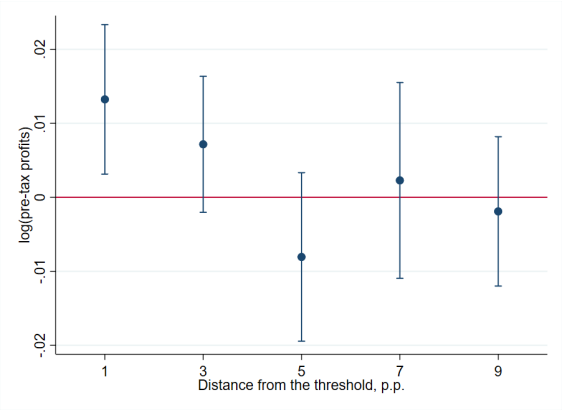


Figure 7: *Number of treatments*



Dependent variable $log(PTP_{it})$ of the affiliate. Estimations include controls for fixed assets, employees, GDP level, growth and GDP per capita, inflation, unemployment, and corruption. Affiliate and year fixed effects included, standard errors clustered at the firm-group level. Vertical lines represent 95% confidence intervals. For more precision, these estimations include only the first five bins, that is affiliates 0 to 10 percentage points above their threshold. Extending the analysis to all affiliates above the threshold leaves the results virtually unchanged, see Figure B.1.

and γ_t denote affiliate and time fixed-effects, as above. As an alternative measure of exposure to CFC treatment, we use the total number of treated affiliates in the group. This second indicator ignores the size of an MNE.

Figures 6 and 7 present the estimation results graphically. The pattern impressively confirms our initial hypothesis that affiliates just above the threshold are most likely to benefit from increased CFC exposure. For both measures, the estimated coefficients on the interaction terms are significant and positive for firms with $CITs$ between 0 and 2 percentage points above the relevant thresholds. For affiliates further away from the threshold, the effect turns insignificant. This finding is novel and highlights that MNEs seek second-best solutions whenever they are treated at some location.

Concerning the magnitude of the effects, the median group size in this sample is nine affiliates. If one of them is treated by a CFC rule, group exposure increases from 0 to 11%. For untreated affiliates just above the threshold, this would be associated with an average increase in pre-tax profits of about 3%. However, none of the firms within a window of zero to two percentage points above the threshold are domestic.[25] In the second bin, two to four percentage points above the threshold,

[25] See Table B.3 for detailed summary statistics.

the effect becomes slightly weaker. The ratio of domestic to foreign firms in this bin is roughly 1:36.

The significant effect for firms in the second bin above the threshold might be driven by firm groups where the untreated affiliate with the lowest tax rate in the group is further away from the cut-off. We exploit the group structure provided by the data to rank affiliates according to their tax rate, from lowest to highest, within their firm group. Similar to equation (4), we interact group exposure with the rank of the unaffected affiliate. Here, we estimate

$$log(PTP_{it}) = \sum_{n=1}^{N} \alpha_n \times \mathbb{1}[rank_{it}] \times EXP_{it} + \mathbf{X_{it}}\beta + \gamma_\mathbf{i} + \gamma_\mathbf{t} + \epsilon_\mathbf{it}, \tag{5}$$

where $\mathbb{1}[rank_{it}]$ is a categorical variable that indicates the low-tax rank of a given affiliate. For example, a value of 1 would denote the affiliate with the lowest tax rate that is just not CFC treated within the group.[26] Foreign affiliates with $rank = 1$ have on average a still substantial tax differential of 7 percentage points to their shareholder.

Table 6 presents the results. It clearly shows that only the nearest 'tax-neighbor', i.e., the affiliates with the lowest tax rate in the group just not affected by the CFC rule, see a significant effect from increased group exposure. The point estimates for all other ranks are (mostly) positive but insignificant. The coefficient is smaller compared to the estimates in Figure 6, which may relate to the fact that a low rank may not necessarily suggest that we are close to the respective threshold. The regression in Table 6, to be specific, also includes groups whose next best alternative might be a domestic affiliate or even a foreign affiliate with a higher tax rate. In these cases, the incentive to redirect profits away from the CFC location to a third country is reduced or eliminated. Moreover, some groups have affiliates in different locations that share the same rank when the statutory tax rates are identical.

We may summarize: If a CFC rule is implemented, the tax advantage is taken away and profits are shifted to less-optimal locations (but still the best alternatives). Consistent with this, we show above that it is not the parent's location that benefits – in terms of relocation of profits to the parent firm – after a CFC rule becomes

[26] Note, however, that there can be affiliates in different locations sharing a rank if these locations have the same CIT.

Table 6: *Ranked affiliates*

Dep. variable:	$log(PTP_{it})$	
$\mathbb{1}[Rank = 1] \times EXP$	0.091**	(0.037)
$\mathbb{1}[Rank = 2] \times EXP$	0.058	(0.051)
$\mathbb{1}[Rank = 3] \times EXP$	0.057	(0.062)
$\mathbb{1}[Rank = 4] \times EXP$	0.078	(0.072)
$\mathbb{1}[Rank = 5] \times EXP$	0.018	(0.080)
$\mathbb{1}[Rank = 6] \times EXP$	-0.088	(0.102)
$\mathbb{1}[Rank = 7] \times EXP$	-0.121	(0.114)
$\mathbb{1}[Rank = 8] \times EXP$	0.132	(0.138)
$\mathbb{1}[Rank = 9] \times EXP$	-0.010	(0.171)
$\mathbb{1}[Rank = 10] \times EXP$	-0.005	(0.177)
$\mathbb{1}[Rank = 11] \times EXP$	0.221	(0.242)
$\mathbb{1}[Rank = 12] \times EXP$	0.294	(0.215)
$\mathbb{1}[Rank = 13] \times EXP$	0.219	(0.240)
$\mathbb{1}[Rank = 14] \times EXP$	0.314	(0.282)
$\mathbb{1}[Rank = 15] \times EXP$	0.189	(0.297)
$\mathbb{1}[Rank = 16] \times EXP$	-0.115	(0.390)
$\mathbb{1}[Rank = 17] \times EXP$	0.0885	(0.426)
$\mathbb{1}[Rank = 18] \times EXP$	-0.203	(0.460)
$\mathbb{1}[Rank = 19] \times EXP$	-0.361	(0.375)
N	932,377	
R^2	0.884	
Firm & Year FE	YES	
CONTROLS	YES	

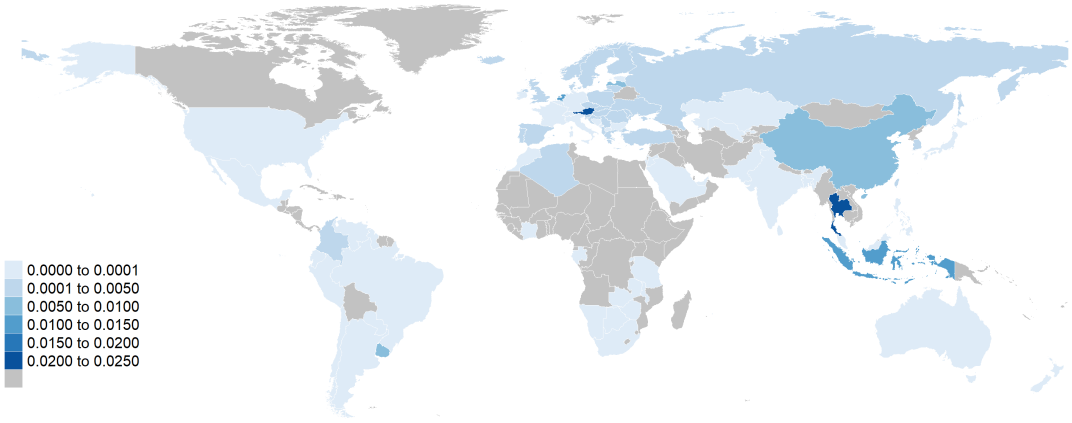
Notes: Includes only unaffected affiliates ranked 1st to 19th lowest tax neighbors (which includes 99% of all affiliates that are unaffected by CFC rules in our ample). Includes affiliate and year fixed effects, affiliate controls include the log of fixed assets and employment, country controls include home CIT, inflation, corruption, unemployment, GDP level, growth, and GDP per capita. Standard errors are clustered at the firm-group level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

binding.

The specifics of CFC regulation allow us to implement a simple robustness check of our results by leveraging the domestic affiliates of affected groups. If an MNE becomes exposed to CFC treatment in its low-tax locations, we expect that some share of these profits will be reallocated to other, unaffected locations. However, there is no incentive for the MNE to redirect profits to domestic affiliates as they face the same tax rate as the treated low-tax affiliates. Reallocation of profits is only beneficial to the group if at least one unaffected third location is available – whose corporate tax rate is lower than the domestic rate. Table B.4 in the Appendix reports the results of this test. We interact the group's exposure level with a dummy variable for domestic affiliates. In this specification, group exposure only has a significant

effect on foreign unaffected affiliates but none on domestic ones.

Figure 8: *Who gains from the current CFC regime? – Back of the envelop calculation*



Notes: Estimated effects of CFC legislation on untreated affiliates by country. Back-of-the-envelop calculation: Coefficient on bin 1 from Table 6 multiplied by the group exposure of affiliates in this bin, average effect per country over the sample period. The effect thus refers to the estimated gain in profits driven by affiliates located just above the threshold.

Let us further provide some back-of-the-envelope calculations to better understand which countries benefit the most from redirected profits after CFC treatment. The countries that benefit most will typically host many affiliates that are located just above their relevant threshold and that are in groups with high exposure to CFC treatment in other countries. Using our benchmark estimation in Table 6, we can approximate the gains for host countries falling into the first bin above the threshold. To do so, we multiply the average exposure level of every affiliate in *bin 1* by the coefficient estimates in Table 6. At the country level, the exposure level measures how many affiliates in *other countries* are directly affected by CFC treatment which would make the *local* affiliates in bin 1 attractive profit-shifting alternatives. We interpret this effect as the gain in profits associated with CFC treatment of other firms in the same group. Figure 8 illustrates the results of this

exercise.[27] Some countries that benefit strongly from being nearest-tax neighbors under the current CFC regime are the Netherlands, Austria, and Thailand. With a statutory tax rate of 25%, the Netherlands and Austria are exactly at the German low-tax cut-off, while Thailand is at the Japanese cut-off at 20% for most years in our sample.

Some countries such as Lithuania can be their own best alternative to low-tax locations. Lithuania is a lower-tax country with a corporate tax rate of 15% and a CFC rule. To be precise, the Lithuanian CFC rule stipulates a relative threshold of 75% so that every host country with a tax rate below 11.25% would fall under CFC treatment. This leaves a very small window between the threshold and the domestic tax rate and makes it difficult for Lithuanian multinationals to find alternative locations and redirect their shifted profits. Hence, in case of treatment,relocation to Lithuania is very likely.

A concern about the estimates presented above may be that there is systematic incorporation after CFC treatment. Such behavior may bias our estimates if the decision to incorporate is correlated with unobservable firm characteristics. We provide a simple but powerful test of whether this dynamic influences our results. We replicate the estimations in equations (4) and (5), excluding all affiliates incorporated within the time frame of our sample. This way, the estimation sample does not include any affiliates that were potentially incorporated because of the changes in CFC treatment documented in our sample period. Tables B.6 and B.5 in the Appendix present the results of this exercise. They clearly show that the coefficients of interest are very close to the results presented above. The pattern of profit redistribution to the nearest tax neighbor is persistent. We are thus confident that endogenous changes in the firm structure do not create substantial biases in our estimation.

As an additional robustness test for the estimation in Figure 6, we implement a simple, non-parametric permutation test. For each iteration, we randomly reassign

[27]Note that this calculation focuses on the countries benefiting from being just narrowly above a relevant CFC cut-off. We lack information to exactly quantify the redirection of profits associated with the current CFC regime. Instead, the goal of Figure 8 is to give an intuition about which countries are most likely to be beneficiaries of the current regimes.

the tax bins of all affiliates in the estimation sample, estimate equation (4) on the resulting sample, and collect the coefficient for *bin 1*. By replicating this procedure 5,000 times, we obtain a distribution of placebo estimates that we can compare to the coefficient estimated from the real data with the true tax bins. Figure B.2 illustrates the distribution and the critical values of the associated normal distribution. The vertical line shows that the true estimate from Figure 6 is placed far to the right of the upper critical value.

5 Real consequences of CFC treatment

Beyond the allocation of profits, changes in the shareholder's scope for tax planning might influence real business activities for all parts of the firm group. The purpose of this section is to better understand the relationship between profit-shifting restrictions (here, CFC rules) and parent activity. To the extent that firms cannot avoid taxation, the resulting increase in the cost of capital may have negative implications for real investment activity (see e.g. Egger et al., 2014; Egger and Wamser, 2015; de Mooij and Liu, 2021; Suárez Serrato, 2018).[28] On the other hand, the increase in cash flow in the "new" profit shifting destinations may lead to more investment (for similar arguments and findings, see Egger et al., 2015; Matray, 2022).

To capture a variety of potential real effects, we examine four outcome variables: (1) the log of tangible fixed assets (2) the log of the total number of employees, and (3) the log of total factor productivity (TFP). We include the one-period lag of the log of turnover (denoted as *Sales*) and of the cost for employees to control for size effects. As in the previous specification, we include country-by-year fixed effects. In the following, we analyze the real consequences of CFC legislation for the directly treated affiliates, the remaining group, and the parent shareholder.

Table 7 presents the results for those affiliates that are directly affected by CFC treatment. We are not able to identify any significant effects on the change in tangible assets of firms that fall under CFC legislation. The same holds true for the productivity of these affiliates, the effect on TFP is insignificant and close to

[28]Two recent papers provide evidence consistent with this reasoning (see Altshuler et al., 2023; Garrett et al., 2023).

zero. However, we are able to identify a significant negative effect on the number of employees which is estimated to decrease by about 1.3% following CFC treatment.

Table 7: *Real outcomes – treated affiliates*

	(1) $log(TFAS)$	(2) $log(EMP)$	(3) $log(TFP)$
CFC_{ijt}	0.020	-0.013**	0.001
	(0.014)	(0.006)	(0.003)
$log(Sales_{it-1})$	0.127***	0.084***	0.035***
	(0.003)	(0.002)	(0.001)
$log(Empl.Cost_{it-1})$	0.182***	0.267***	-0.024***
	(0.004)	(0.003)	(0.001)
Firm & Country-year FE	YES	YES	YES
N	1,103,626	1,032,495	778,128
R^2	0.939	0.967	0.776

Notes: EXP measures the share of affiliates directly affected by CFC rules in a given group and year; $AV.NOTCH_{jt}$ is the group's average tax notch associated with CFC treatment, and $MAX.NOTCH_{jt}$ refers to the maximum tax notch experienced by the group in a given year. Standard errors clustered at the firm group level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

To analyze the real consequences of a shift in profit-shifting incentives for the rest of the group, we use the exposure measure EXP as defined in the previous section. Table 8 presents the estimation results for the parent shareholder. We find that increased exposure to CFC rules has no effect on shareholders' tangible assets or TFP. We find a positive effect on shareholder employment, though. The last column of Table 8 shows that this positive effect is driven by those shareholders for which CFC regulation shuts down especially attractive low-tax locations. The variable $MAX.NOTCH_{jt}$ is the maximum tax notch experienced by the group in a given year. Including this variable and interaction thereof with our exposure measure reveals that it is the size of the tax penalty suffered that drives the effect.

A potential concern here might be related to our definition of the firm group. The direct majority shareholder of an affiliate could be a holding company or some other form of financial intermediary company. Typically, these firms do not carry out any real activity, which might also explain our finding in Table 8. However, looking at the industry composition of parent shareholders in our sample (see Table B.7 in the appendix), we see that the majority of firms are either in manufacturing (NACE sector C) or wholesales (NACE sector G), whereas only 6% of all parents is active in the financial services industry (NACE sector K). This industry composition makes

Table 8: *Real outcomes – parent shareholders*

	(1) $log(TFAS)$	(2) $log(EMP)$	(3) $log(TFP)$	(4) $log(EMP)$	(5) $log(EMP)$
EXP_{jt}	0.015	0.026**	0.003	-0.027	-0.032
	(0.028)	(0.012)	(0.004)	(0.051)	(0.025)
$EXP_{jt} \times CIT_{jt}$				0.174	
				(0.160)	
$MAX.NOTCH_{jt}$					0.186**
					(0.081)
$EXP_{jt} \times MAX.NOTCH_{jt}$					0.182
					(0.183)
$log(Sales_{it-1})$	0.164***	0.0905***	0.0288***	0.0905***	0.0904***
	(0.009)	(0.005)	(0.003)	(0.005)	(0.005)
$log(Empl.Cost_{it-1})$	0.225***	0.351***	-0.0354***	0.351***	0.351***
	(0.011)	(0.009)	(0.003)	(0.009)	(0.009)
Firm & country-year FE	YES	YES	YES	YES	YES
N	192,948	179,352	153,389	179,352	179,352
R^2	0.950	0.975	0.761	0.975	0.975

Notes: EXP measures the share of affiliates directly affected by CFC rules in a given group and year; $AV.NOTCH_{jt}$ is the group's average tax notch associated with CFC treatment, and $MAX.NOTCH_{jt}$ refers to the maximum tax notch experienced by the group in a given year. Standard errors clustered at the firm group level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

it unlikely that our findings are driven by economically inactive holding companies.

Table 9 presents the results for those affiliates of MNEs that are not affected (not treated) by CFC rules. Columns 1-3 show that increased group exposure to CFC rules is associated with a significant positive effect on tangible assets, employment, and TFP for untreated affiliates in the group. Columns 4-7 reveal that the positive effect is particularly large for affiliates with the best tax position in the group. Interacting the group exposure with the local tax rate CIT_{it} we find that the positive effect on assets and employment vanishes in locations with higher tax rates and even turns negative if the corporate tax rate is high enough (columns 4 and 5). We also include an interaction with the individual distance to the CFC cut-off. The variable $CITDIST_{ijt} = CIT_{it} - \overline{T}_{ijt}$ measures the *tax-distance* to the relevant CFC threshold. Again, the results show that those affiliates closest to the cut-off – and hence more attractive as profit-shifting destinations – experience the largest increase in investment and employment. Consequently, given the findings from above, we observe that the same affiliates that experience an increase in profits as group exposure to CFC rules increases also increase their investment activities. This

finding is consistent with Egger et al. (2015), and Matray (2022), showing that a tax-induced increase in liquidity may lead to a larger accumulation of capital and labor. What we cannot say from these estimates is whether this behavior is efficient or not.

Table 9: *Real outcomes – untreated affiliates*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$log(TFAS)$	$log(EMP)$	$log(TFP)$	$log(TFAS)$	$log(EMP)$	$log(TFAS)$	$log(EMP)$
EXP_{jt}	0.125***	0.051***	0.016***	0.317***	0.242***	0.191***	0.085***
	(0.031)	(0.013)	(0.005)	(0.119)	(0.053)	(0.049)	(0.020)
$EXP_{jt} \times CIT_{it}$				-0.642*	-0.651***		
				(0.374)	(0.172)		
$CITDIST_{ijt}$						-0.204	0.013
						(0.209)	(0.087)
$EXPit \times CITDIST_{ijt}$						-0.783*	-0.452**
						(0.400)	(0.182)
$log(Sales_{it-1})$	0.126***	0.084***	0.034***	0.126***	0.084***	0.130***	0.0880***
	(0.003)	(0.002)	(0.001)	(0.003)	(0.002)	(0.005)	(0.003)
$log(Empl.Cost_{it-1})$	0.182***	0.265***	-0.023***	0.182***	0.265***	0.184***	0.260***
	(0.004)	(0.003)	(0.001)	(0.004)	(0.003)	(0.006)	(0.004)
Firm & country-year FE	YES	YES	YES	YES	YES	YES	YES
N	1,003,700	934,425	707,574	1,003,700	934,425	524,283	484,852
R^2	0.940	0.967	0.776	0.940	0.967	0.942	0.970

Notes: EXP measures the share of affiliates directly affected by CFC rules in a given group and year; $CITDIST_{ijt} = CIT_{it} - \overline{T}_{ijt}$ measures the tax-distance to the relevant CFC threshold. Standard errors clustered at the firm group level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

To sum up, we find that shutting down incentives to shift profits to particular low-tax affiliates leads to a relocation of both profits and real activity. Employment in affected low-tax affiliates that are no longer attractive for profit shifting is negatively affected. Our findings suggest that employment is partly relocated to other low-tax affiliates that remain relatively attractive as profit-shifting destinations. These affiliates also experience an increase in tangible assets and TFP.

We find further evidence for some relocation of employment to the parent shareholder, but only for groups that lose particularly attractive profit-shifting opportunities. We find no evidence of an increase in shareholders' tangible assets or TFP.

Taken together with the evidence from Section 4 – suggesting that profits are reallocated to third countries to avoid CFC rules and domestic taxation – this implies that governments fail in their goal of reclaiming tax revenue.[29] Even if governments expected small revenue gains, these should be weighed against the considerable

[29]Our findings are also consistent with the results in Wamser (2014). This paper shows that thin-capitalization rules on internal debt are easily avoided by substituting external for internal debt. The reason is that external debt is often not subject to thin-capitalization regulation.

administrative cost associated with the monitoring and enforcement of anti-tax-avoidance rules.

6 Conclusion

We analyze the reallocation of profits and real activity within multinational firms after an exogenous change in incentives to shift profit to low-tax locations. Our results illustrate that unilateral measures to prevent profit shifting – such as CFC rules – are effective in restricting profit shifting to particular locations, but have unintended consequences. While affected foreign affiliates are no longer used as entities to which profits are shifted, we do not find evidence that the domestic tax base increases. This highlights that mobile firms can easily avoid unilateral tax policies by reorganizing their tax-planning activities.

A central contribution of our paper is that we examine the specific reallocation behavior within MNEs. We provide conclusive evidence that MNEs reoptimize their profit-shifting strategies if governments change their scope for tax planning. Our evidence suggests that removing incentives to shift profits to particular low-tax locations still allows firms to circumvent domestic taxation if the remaining tax differentials within the MNE group are large enough. In the particular case of CFC regulation, home countries seem to benefit little in terms of tax revenue. We do not find any significant effect of these rules on pre-tax profits of the parent shareholder, or other domestic affiliates. Pre-tax profits in foreign subsidiaries that are just not treated by CFC rules increase significantly, suggesting that, if anything, third countries benefit from such rules.

We also find that profit reallocation goes together with the reallocation of real activity. Employment declines in affected low-tax affiliates that are no longer attractive for profit shifting. Affiliates that become attractive as profit-shifting destinations experience an increase not only in profits but also in real outcomes. In contrast, parent firms do not seem to be affected. We only find positive employment effects for parents that lose particularly attractive low-tax locations.

Let us note that our findings do not imply that CFC rules should be abolished

altogether. The findings in previous literature as well as the results above suggest that CFC rules do have effects on MNEs' profit allocation. Without these policies in place, multinationals would have even more scope to exploit tax havens and avoid corporate taxation. CFC rules can also be a helpful measure to create a more level playing field for fully domestic firms that cannot engage in international tax planning.

Our findings provide additional support for initiatives of international tax coordination (closing tax loopholes) or the G20/OECD's Pillar 2 global minimum tax. The costs of unilateral measures – more avoidance behavior, administrative and monitoring cost – may well exceed their benefits.

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Appendix For Online Publication

Taxes, Profit Shifting, and the Real Activities of MNEs: Evidence from Corporate Tax Notches

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A Data

Table A.1: *CFC legislation 2020*

	Country	ISO3	Ownership	Tax Threshold
1	Australia	AUS	50%	-
2	Argentina	ARG	50%	$CIT_{it} < 75\%\ CIT_{jt}$
3	Austria	AUT	50%	$CIT_{it} < 12.5\%$
4	Azerbaijan	AZE	20%	$CIT_{it} < 50\%\ CIT_{jt}$
5	Belgium	BEL	50%	$CIT_{it} < 50\%\ CIT_{jt}$
6	Brazil	BRA	50%	-
7	Bulgaria	BGR	5%	$CIT_{it} < 50\%\ CIT_{jt}$
8	Cabo Verde	CPV	25%	-
9	Canada	CAN	10%	-
10	Chile	CHL	50%	$CIT_{it} < 17.5\%$
11	China	CHN	50%	$CIT_{it} < 50\%\ CIT_{jt}$
12	Colombia	COL	50%	-
13	Croatia	HRV	50%	$CIT_{it} < 50\%\ CIT_{jt}$
14	Cyprus	CYP	50%	$CIT_{it} < 50\%\ CIT_{jt}$
15	Czech Republic	CZE	50%	$CIT_{it} < 50\%\ CIT_{jt}$
16	Denmark	DNK	50%	-
17	Estonia	EST	50%	-
18	Finland	FIN	25%	$CIT_{it} < 60\%\ CIT_{jt}$
19	France	FRA	50%	$CIT_{it} < 40\%\ CIT_{jt}$
20	Germany	DEU	50%	$CIT_{it} < 25\%$
21	Greece	GRC	50%	$CIT_{it} < 50\%\ CIT_{jt}$
22	Hungary	HUN	50%	$CIT_{it} < 50\%\ CIT_{jt}$
23	Iceland	ISL	50%	$CIT_{it} < 66.6\%\ CIT_{jt}$
24	Indonesia	IDN	50%	-
25	Ireland	IRE	50%	$CIT_{it} < 50\%\ CIT_{jt}$
26	Israel	ISR	50%	$CIT_{it} < 15\%$
27	Italy	ITA	50%	$CIT_{it} < 50\%\ CIT_{jt}$
28	Japan	JPN	50%	$CIT_{it} < 20\%$
29	Kazakhstan	KAZ	25%	$CIT_{it} < 10\%$
30	Korea, Rep.	KOR	10%	$CIT_{it} < 15\%$
31	Latvia	LVA	50%	-

32	Lithuania	LTU	50%	$CIT_{it} < 50\%\ CIT_{jt}$
33	Luxembourg	LUX	50%	$CIT_{it} < 50\%\ CIT_{jt}$
34	Malta	MLT	50%	$CIT_{it} < 50\%\ CIT_{jt}$
35	Mauritius	MUS	25%	$CIT_{it} < 50\%\ CIT_{jt}$
36	Mexico	MEX	0	$CIT_{it} < 75\%\ CIT_{jt}$
37	Mozambique	MOZ	25%	$CIT_{it} < 60\%\ CIT_{jt}$
38	Netherlands	NLD	50%	$CIT_{it} < 9\%$
39	New Zealand	NZL	50%	-
40	Norway	NOR	50%	$CIT_{it} < 67\%\ CIT_{jt}$
41	Pakistan	PAK	50%	$CIT_{it} < 60\%\ CIT_{jt}$
42	Peru	PER	50%	$CIT_{it} < 75\%\ CIT_{jt}$
43	Poland	POL	50%	$CIT_{it} < 50\%\ CIT_{jt}$
44	Portugal	PRT	25%	$CIT_{it} < 50\%\ CIT_{jt}$
45	Romania	ROU	50%	$CIT_{it} < 50\%\ CIT_{jt}$
46	Russian Federation	RUS	15%	$CIT_{it} < 75\%\ CIT_{jt}$
47	Sao Tome and Principe	STP	25%	$CIT_{it} < 60\%\ CIT_{jt}$
48	Slovak Republic	SVK	50%	$CIT_{it} < 50\%\ CIT_{jt}$
49	Slovenia	SVN	50%	$CIT_{it} < 50\%\ CIT_{jt}$
50	South Africa	ZAF	50%	$CIT_{it} < 67.5\%\ CIT_{jt}$
51	Spain	ESP	50%	$CIT_{it} < 75\%\ CIT_{jt}$
52	Sweden	SWE	25%	$CIT_{it} < 55\%\ CIT_{jt}$
53	Tajikistan	TJK	10%	$CIT_{it} < 70\%\ CIT_{jt}$
54	Turkey	TUR	50%	$CIT_{it} < 10\%$
55	United Kingdom	GBR	50%	$CIT_{it} < 75\%\ CIT_{jt}$
56	United States	USA	50%	-
57	Venezuela	VEN	0	$CIT_{it} < 20\%\ CIT_{jt}$

Notes: CFC rules of all host countries in our sample. CIT_{it} denotes the affiliate-country tax rate and CIT_{jt} denotes the parent-country tax rate. For example, $CIT_{it} < 75\%\ CIT_{jt}$ thus implies that country j regards all host locations i with a tax rate lower then 75% of its own as a potential CFC location at time t.

Table A.2: *Variable definitions and sources*

Variable	Definition and Source
$log(PTP_{it})$	Log of reported pre-tax profits of affiliate i at time t *Source: Orbis database*
$log(FA_{it})$	Log of fixed assets of affiliate i at time t *Source: Orbis database*
$log(TFAS_{it})$	Log of tangible fixed assets of affiliate i at time t *Source: Orbis database*
$log(EMP_{it})$	Log of number of employees of affiliate i at time t *Source: Orbis database*
$log(Sales_{it})$	Log of turnover of affiliate i at time t *Source: Orbis database*
$log(Empl.Cost_{it})$	Log of the cost of employees i at time t *Source: Orbis database*
$log(TFP_{it})$	Log of total factor productivity of affiliate i at time t *Source: Orbis database, own calculation*
CFC_{jit}	Dummy variable equal to one if country i is affected by country $j's$ CFC rule at time t *Source: RSIT ITI database*
CIT_{it}	Statutory corporate income tax rate of country i at time t *Source: RSIT ITI database*
EXP_{it}	Share of affiliates affected by CFC treatment in the firm group of affiliate i at time t *Source: Orbis database and RSIT ITI database*
$CITDIST_{it}$	Difference between the local CIT and the relevant CFC cut-off for affiliate i at time t *Source: Orbis database and RSIT ITI database*
$AV.NOTCH_{jt}$	Average tax notch at the affiliate level experienced by shareholder j at time t *Source: Orbis database and RSIT ITI database*
$MAX.NOTCH_{jt}$	Maximum tax notch at the affiliate level experienced by shareholder j at time t *Source: Orbis database and RSIT ITI database*
$log(GDP_{it})$	GDP at PPP in constant 2017 prices in country i at time t *Source: World Bank, World Development Indicators*
$log(GDP\ p.c._{it})$	GDP per capita in country i at time t *Source: World Bank, World Development Indicators*
$GDP\ growth_{it}$	GDP growth (annual %) in country i at time t *Source: World Bank, World Development Indicators*
$Inflation_{it}$	Inflation rate (annual %) in country i at time t *Source: World Bank, World Development Indicators*
$Unemployment_{it}$	Unemployment (% of total labor force) in country i at time t *Source: International Labour Organization, ILOSTAT*
$Corruption_{it}$	Control of Corruption index [-2.5; 2.5] in country i at time t *Source: World Bank, World Governance Indicators*

B Additional results

Table B.1: *CFC rules and financial profits*

Dep. variable: $log(Financial\ profits_{it})$	(1)	(2)	(3)	(4)
CFC_{ijt}	-0.134***	-0.160***	-0.111***	-0.136***
	(0.037)	(0.037)	(0.037)	(0.037)
CIT_{jt}	-0.00658	-0.0915	-0.0918	-0.150
	(0.201)	(0.203)	(0.207)	(0.209)
CIT_{it}	-0.377*	-0.212		
	(0.219)	(0.221)		
$log(FA_{it})$	0.184***		0.179***	
	(0.006)		(0.005)	
$log(Empl_{it})$	0.156***	0.110***	0.167***	0.117***
	(0.008)	(0.008)	(0.009)	(0.009)
$log(Sales_{it})$		0.221***		0.222***
		(0.007)		(0.007)
$log(GDP_{it})$	0.0176	-0.144		
	(0.582)	(0.568)		
$log(GDP\ p.c._{it})$	0.772	0.954		
	(0.601)	(0.585)		
$GDP\ growth_{it}$	-0.0293***	-0.0292***		
	(0.003)	(0.003)		
$Inflation_{it}$	-0.0139***	-0.0131***		
	(0.002)	(0.002)		
$Unemployment_{it}$	0.0157***	0.0167***		
	(0.003)	(0.003)		
$Corruption_{it}$	0.351***	0.369***		
	(0.047)	(0.048)		
Affiliate FE	YES	YES	YES	YES
Year FE	YES	YES		
Host-Year FE			YES	YES
N	404,621	397,991	404,680	398,052
R^2	0.872	0.876	0.874	0.878

Notes: CFC_{ijt} *is an indicator variable that takes the value 1 if the respective affiliate is in a host country with a corporate income tax below the specified threshold.* $\overline{CIT_{it}}$ *is centered around the mean tax rate for all treated affiliates in column (3). Standard errors are clustered at the firm-group level.*
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.2: *Effectiveness of CFC rules – robustness check*

Dep. variable: $log(PTP_{it})$	(1)	(2)	(3)	(4)
CFC_{ijt}	-0.011	-0.033**	-0.053***	-0.047***
	(0.015)	(0.014)	(0.017)	(0.016)
CIT_{it}		-0.637***		
		(0.085)		
$(1 - CFC_{ijt}) \times \overline{CIT_{it}}$			-0.659***	-0.659***
			(0.091)	(0.086)
$CFC_{ijt} \times \overline{CIT_{it}}$			-0.189	-0.0132
			(0.275)	(0.264)
CIT_{jt}		0.126		0.133*
		(0.078)		(0.079)
$log(FA_{it})$	0.095***	0.102***	0.100***	0.102***
	(0.002)	(0.002)	(0.002)	(0.002)
$log(Empl_{it})$	0.290***	0.266***	0.271***	0.266***
	(0.004)	(0.004)	(0.004)	(0.004)
$log(Sales_{it})$				
$log(GDP_{it})$		-0.372***	-0.382***	-0.378***
		(0.133)	(0.144)	(0.133)
$log(GDP\ p.c._{it})$		0.823***	0.816***	0.834***
		(0.136)	(0.147)	(0.136)
$GDP\ growth_{it}$		0.012***	0.010***	0.0124***
		(0.001)	(0.001)	(0.001)
$Inflation_{it}$		-0.005***	-0.004***	-0.005***
		(0.001)	(0.001)	(0.001)
$Unemployment_{it}$		-0.007***	-0.007***	-0.007***
		(0.001)	(0.001)	(0.001)
$Corruption_{it}$		-0.130***	-0.118***	-0.131***
		(0.016)	(0.017)	(0.016)
Affiliate FE	YES	YES	YES	YES
Year FE		YES		YES
Pair FE		YES	YES	YES
Host-Year FE	YES			
Home-Year FE	YES		YES	
N	1,034,030	1,034,085	1,033,875	1,034,085
R^2	0.884	0.883	0.883	0.883

Notes: CFC_{ijt} is an indicator variable that takes the value 1 if the respective affiliate is in a host country with a corporate income tax below the specified threshold. Host CIT is centered around the mean tax rate for all treated affiliates in column (3) and (4). Standard errors are clustered at the firm-group level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.3: *Summary statistics – tax bins*

Bin	*Obs.*	*tax differential to parent*	*distance to threshold*	*mean affiliate tax rate*	*share of foreign affiliates*	*share with* $CIT_{it}<$ CIT_{jt}
1	102,454	0.08	0.01	0.22	1.00	1.00
2	73,164	0.07	0.03	0.21	0.97	0.96
3	301,782	0.02	0.05	0.24	0.30	0.26
4	184,917	0.01	0.07	0.26	0.41	0.27
5	165,680	0.00	0.09	0.25	0.40	0.15
6	87,750	0.00	0.11	0.26	0.76	0.29
7	104,051	-0.01	0.13	0.28	0.55	0.24
8	113,408	-0.02	0.15	0.31	0.41	0.12
9	109,534	-0.01	0.17	0.34	0.18	0.05
10	51,957	-0.03	0.19	0.36	0.34	0
11	28,220	-0.06	0.23	0.41	0.49	0

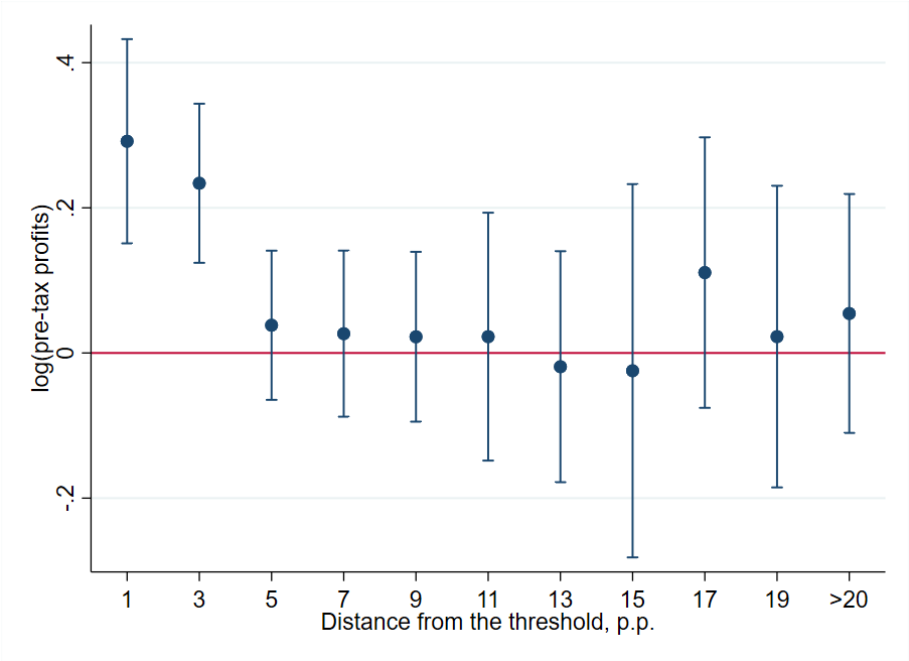
Notes: Mean values for each defined bin of affiliates above their threshold

Table B.4: *Group exposure on domestic affiliates*

Dep. variable:	$log(PTP_{it})$	
$(1 - DOM_{it}) \times EXP_{it}$	0.104**	(0.050)
$DOM_{it} \times EXP_{it}$	0.054	(0.046)
CIT_{jt}	-0.124	(0.079)
$log(FA_{it})$	0.104***	(0.002)
$log(Empl_{it})$	0.261***	(0.004)
$log(GDP_{it})$	-0.187	(0.141)
$log(GDP\ p.c._{it})$	0.594***	(0.143)
$GDP\ growth_{it}$	0.014***	(0.001)
$Inflation_{it}$	-0.004***	(0.001)
$Unemployment_{it}$	-0.009***	(0.001)
$Corruption_{it}$	-0.131***	(0.017)
# Observations	939,832	
R^2	0.885	
Firm & Year FE	YES	

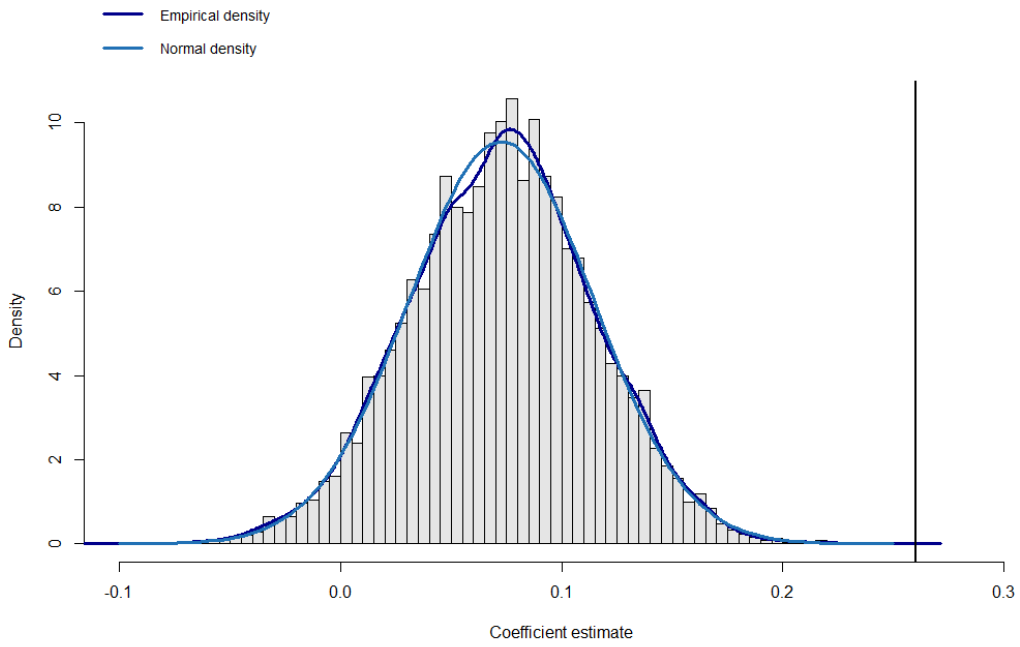
Notes: Includes affiliate and year fixed effects, affiliate controls include log(Fix.Assets), log(Empl), country controls include home and host CIT, inflation, corruption, unemployment, GDP level, growth and GDP per capita. Standard errors are clustered at the firm-group level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure B.1: *Heterogeneity analysis - CIT bins, full sample*



Notes: Dependent variable log(pre-tax profit$_{it}$) of the affiliate. Estimations control for the log of fixed assets and employment, GDP level, growth and GDP per capita, inflation, unemployment and corruption. Affiliate and year fixed effects included, standard errors clustered at the firm-group level. Vertical lines represent 95% confidence intervalls.

Figure B.2: *Profit reallocation after treatment - Permutation test*



Notes: Figure shows the distribution of placebo estimates for coefficient on the interaction term $[tax_{it} \in tax_1] \times EXP_{it}$*, e.g., the effect of group exposure on affiliates located not more than 2 percentage points above their relevant CFC threshold. For each estimate, we randomly reassign the ranks of all affiliates in the estimation sample. The estimation is repeated 5000 times and results in the distribution of coefficients shown in the figure. The critical values of the fitted normal distribution are (-0.01 0.154), the coefficient estimated on the true ranks is* $\alpha_1 = 0.268$ *and is marked by the black vertical line.*

Table B.5: *Robustness test – excluding all affiliates incorporated during the sample period (from 2010)*

Dep. variable:	$log(PTP_{it})$	
$\mathbb{1}[Bin = 1] \times EXP$	0.336***	(0.074)
$\mathbb{1}[Bin = 2] \times EXP$	0.273***	(0.058)
$\mathbb{1}[Bin = 3] \times EXP$	0.075	(0.054)
$\mathbb{1}[Bin = 4] \times EXP$	0.042	(0.061)
$\mathbb{1}[Bin = 5] \times EXP$	0.068	(0.062)
$\mathbb{1}[Bin = 6] \times EXP$	0.026	(0.090)
$\mathbb{1}[Bin = 7] \times EXP$	-0.018	(0.085)
$\mathbb{1}[Bin = 8] \times EXP$	-0.034	(0.140)
$\mathbb{1}[Bin = 9] \times EXP$	0.077	(0.098)
$\mathbb{1}[Bin = 10] \times EXP$	0.025	(0.109)
$\mathbb{1}[Bin = 11] \times EXP$	0.121	(0.086)
# Observations	787,200	
R^2	0.881	
Firm & Year FE	YES	

Notes: Includes only unaffected affiliates ranked 1st to 19th lowest tax neighbors (which includes 99% of all affiliates that are unaffected by CFC rules in our ample) in parent countries that have a defined CFC threshold. Includes affiliate and year fixed effects, affiliate controls include the log of fixed assets and employment, country controls include home and host CIT, inflation, corruption, unemployment, GDP level, growth and GDP per capita. Standard errors are clustered at the firm-group level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.6: *Robustness Test - Excluding all affiliates incorporated during the sample period (from 2010)*

Dep. variable:	$log(PTP_{it})$	
$\mathbb{1}[Rank = 1] \times EXP$	0.120***	(0.038)
$\mathbb{1}[Rank = 2] \times EXP$	0.106**	(0.053)
$\mathbb{1}[Rank = 3] \times EXP$	0.094	(0.064)
$\mathbb{1}[Rank = 4] \times EXP$	0.060	(0.074)
$\mathbb{1}[Rank = 5] \times EXP$	0.024	(0.081)
$\mathbb{1}[Rank = 6] \times EXP$	-0.053	(0.104)
$\mathbb{1}[Rank = 7] \times EXP$	-0.116	(0.117)
$\mathbb{1}[Rank = 8] \times EXP$	0.141	(0.139)
$\mathbb{1}[Rank = 9] \times EXP$	0.040	(0.167)
$\mathbb{1}[Rank = 10] \times EXP$	-0.059	(0.175)
$\mathbb{1}[Rank = 11] \times EXP$	0.095	(0.217)
$\mathbb{1}[Rank = 12] \times EXP$	0.294	(0.216)
$\mathbb{1}[Rank = 13] \times EXP$	0.147	(0.241)
$\mathbb{1}[Rank = 14] \times EXP$	0.189	(0.296)
$\mathbb{1}[Rank = 15] \times EXP$	0.197	(0.293)
$\mathbb{1}[Rank = 16] \times EXP$	-0.264	(0.405)
$\mathbb{1}[Rank = 17] \times EXP$	-0.153	(0.432)
$\mathbb{1}[Rank = 18] \times EXP$	-0.202	(0.465)
$\mathbb{1}[Rank = 19] \times EXP$	-0.379	(0.382)
# Observations	780,265	
R^2	0.881	
Firm & Year FE	YES	

Notes: Includes only unaffected affiliates ranked 1st to 19th lowest tax neighbors (which includes 99% of all affiliates that are unaffected by CFC rules in our ample) in parent countries that have a defined CFC threshold. Includes affiliate and year fixed effects, affiliate controls include the log of fixed assets and employment, country controls include home and host CIT, inflation, corruption, unemployment, GDP level, growth and GDP per capita. Standard errors clustered at the firm group level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.7: *Industry composition of parent shareholders*

NACE sector	Number of shareholder firms	Relative frequency
A	1,271	0.6%
B	1,101	0.5%
C	72,943	35.3%
D	1,710	0.8%
E	907	0.4%
F	82,38	4.0%
G	41,514	20.1%
H	8,506	4.1%
I	1,485	0.7%
J	15,066	7.3%
K	13,056	6.3%
L	4,081	2.0%
M	24,160	11.7%
N	9,160	4.4%
O	99	0.0%
P	552	0.3%
Q	853	0.4%
R	826	0.4%
S	863	0.4%
T	2	0.0%
Total	206,393	100%