

TAXING MULTINATIONALS BEYOND BORDERS: FINANCIAL AND LOCATIONAL RESPONSES TO CFC RULES

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Using a large panel dataset on worldwide operations of multinational firms, this paper studies one of the most advocated anti-tax-avoidance measures: *Controlled Foreign Corporation rules*. By including income of foreign low-tax subsidiaries in the domestic tax base, these rules create incentives to move income away from low-tax environments. Exploiting variation around the tax threshold used to identify low-tax subsidiaries, we find that multinationals redirect profits into subsidiaries just above the threshold and change incorporation patterns to place fewer subsidiaries below and more above the threshold. Roughly half of the resulting increase in global tax revenue accrues to the rule-enforcing country.

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I. INTRODUCTION

The combination of a globally integrated market and sizeable tax rate differentials has created a foundation for tax planning opportunities. In 2014 thousands of documents surfaced in Luxembourg giving the public rare insight into the concrete tax avoidance schemes of large multinational enterprises. Evidence from this so-called *Luxleaks* scandal resonates with an empirical literature documenting substantial tax-related profit shifting (Huizinga & Laeven 2008, Heckemeyer & Overesch 2013, Dharmapala & Riedel 2013). The loss on global corporate tax revenue associated with this behaviour is considerable. Zucman (2014) estimates that the use of low-tax jurisdictions by multinational firms is associated with a 20 percent reduction in the taxes paid by US owned corporations.

In response to this comprehensive migration of profits to low-tax environments, many countries have extended their international tax policy rules with measures designed to curb profit shifting. One of the most important examples is legislation known as *Controlled Foreign Corporation (CFC) rules*. The importance of this measure is reflected in its global prevalence as well as in the political debate where the measure is highly advocated by the OECD in their 2015 BEPS report as well as by the EU commission in several proposed directives.¹ Around two thirds of the OECD countries have CFC legislation and several of the remaining nations are debating the introduction of such a regime.

The CFC measure is essentially a border-crossing corporate tax on multinational firms. The rules concretely impose an immediate and direct tax on selected parts of the income of low-tax foreign subsidiaries. The German rules constitute a typical example of the CFC regimes in place across the world. Germany classifies any foreign subsidiary taxed at a rate lower than 25 percent as a low-tax subsidiary, and targets income such as interest and royalty income from such subsidiaries. The German CFC rules work by including the interest and royalty income of foreign subsidiaries taxed at rates below 25 percent in the German corporate tax base and taxing this income at the much higher German corporate tax rate. Though the design of CFC legislation varies across countries, the German setup is highly representative. Important for the empirical design in this paper most countries set a low-tax threshold as the German 25 percent cut-off. From a pure tax perspective, these rules create an incentive for multinationals to move income types such as interest income away from low-tax subsidiaries and into higher tax host countries above the specified threshold. In line with the incentive to relocate income, they create an incentive to reorganize geographical firm structure

¹For instance *The Anti Tax Avoidance Directive* proposed in January 2016.

and open new subsidiaries in higher tax environments. One obvious objective of this direct tax is to protect the domestic tax base by eliminating incentives for geographical relocation of profits to foreign low-tax subsidiaries. When profits can escape the reach of domestic tax rules it threatens the enforceability of these rules and ultimately the ability of governments to collect tax revenue. Base protection and enforceability in general are integral parts of a country’s tax system and are crucial for the feasibility of optimal tax policy design.

In this paper, we explore the potential of CFC rules in obtaining this objective by studying the behavioural responses of multinational firms. We investigate how the financial and locational structures within multinationals change in response to this tax measure and what this means for domestic and global tax revenue. The analysis draws on a large global dataset containing subsidiary-level panel data from more than 50 countries spanning 25 different CFC regimes.² With its global reach and panel structure the data enables within-subsidiary analysis using exogenous reform variation. We exploit changes in CFC treatment created by the interplay of the low-tax threshold and general tax reforms over time. The low-tax threshold embedded in most rules further facilitates direct non-parametric discontinuity estimates of location responses.

Throughout we uncover sizeable behavioural responses to the CFC tax measure. The distribution of financial profit displays a sharply discontinuous pattern around the low-tax threshold consistent with relocation of profits into higher tax environments. Such non-parametric evidence is supported by a within-subsidiary analysis exploiting reform-induced movements across the threshold. When a reform moves a subsidiary below the CFC tax threshold, we estimate a 13 percent subsequent drop in financial profit within the subsidiary. This suggests that CFC rules, by imposing a potential tax penalty, induce multinationals to move substantial amounts of income out of low-tax environments. To understand the mechanisms behind this effect we broaden the focus from the single subsidiary to the multinational group and consider spillover effects. The fraction of subsidiaries placed below the tax threshold is a measure of group-exposure to the CFC policy. Using variation in this measure, we present evidence that increases in exposure leads to increases in financial profit within higher tax environments. When more subsidiaries are targeted by the tax the un-targeted subsidiaries generate more profit. The combination of these results points to an underlying shifting mechanism within multinationals going from low-tax targeted subsidiaries to higher tax subsidiaries outside the scope of the rules. By separating spillover effects on domestic and foreign corporations we find that both

²The data spans 25 different CFC regimes, but we are only able to include 20 of these regimes in the main analysis due to specific requirements related to the empirical design. We explain these requirements in the later sections.

groups are on the receiving end of relocated profits. Consequently, the CFC instrument leads to increases in corporate tax revenue, that benefit both the rule-enforcing country and other higher-tax countries. In essence the measure protects both the global as well as the domestic tax base without any coordination between countries. This domestic component in the revenue gain is potentially important in a context of international tax policy where the need for coordination has been highlighted as crucial for a successful fight against tax avoidance (OECD/G20, 2015)³.

Aside from responses on the allocation of income, we also investigate extensive margin responses on geographical firm structure. Exploiting the unique design of CFC rules we are able to present non-parametric evidence and elicit a direct discontinuity estimate of the effect of CFC tax policy on the discreet location choice. In contrast to the traditional choice model framework our alternative approach avoids the heavy reliance on parametric assumptions and allows us to directly observe the identifying variation in the data. We find that groups affected by a CFC regime display a higher propensity to choose hosts just above the tax threshold and a lower propensity to choose hosts below the threshold compared to groups unaffected by this type of legislation.

Despite the magnitude of the monetary sums involved and the potential relevance for tax policy design, behavioural responses to CFC tax rules have received very limited attention. Altshuler & Hubbard (2002) focus on a reform from 1986 of the US CFC rules and use country-level aggregate data on asset holdings to show that certain US owned firms become less sensitive to host country tax rates after a tightening of the rules.⁴ Ruf & Weichenrieder (2012) study the asset allocation within German multinational groups and conclude that CFC rules affect the geographical pattern of asset holdings. Egger & Wamser (2015) introduce a multi-dimensional regression discontinuity design to analyse the effect of CFC legislation on the allocation of foreign real investments of German multinationals. They also find substantial differences across subsidiaries treated differentially by the rules.⁵

³The OECD/G20 write in their Base Erosion and Profit Shifting (BEPS) Project, 2015 report: "*The G20 and the OECD have recognised that BEPS by its very nature requires coordinated responses, which is why countries have invested the resources to participate in the development of shared solutions*".

⁴Mutti & Grubert (2007) show however, that after the 1997 implementation of check-the-box rules, US multinationals can avoid triggering the US CFC rules by creating hybrid entities.

⁵A small theoretical literature on CFC rules exists. Weichenrieder (1996) shows that an exogenously imposed CFC rule increases the cost of capital for treated foreign subsidiaries, while Haufler et al. (2018) endogenize the choice of a CFC rule in an optimal tax framework. Within this framework, they derive conditions for the optimality of a CFC rule in combination with other tax instruments.

This paper contributes to several strands of literature. Firstly we contribute to the literature on CFC rules and tax avoidance in several dimensions. We present the first non-parametric graphical evidence showing discontinuities created by CFC tax legislation. Such graphical evidence is provided both for the intensive margin of income allocation and for the extensive margin of subsidiary location. On the intensive margin, we directly study generated profits within multinational corporations. While previous literature has focused solely on the allocation of assets, we concentrate on the actual object of taxation and thereby avoid assumptions on the relationship between asset value and income flows. In essence, we use an outcome that directly reflects the corporate tax base of countries. Further, we present the first evidence on the consequences of CFC legislation for the domestic corporate tax base. Identifying a domestic component within the global tax base response is potentially crucial for policy makers with national objectives of creating tax revenue by fighting corporate tax base erosion. The remaining contributions to this strand of literature are related to identification issues and elimination of potential biases. We present the first micro-study of CFC rules isolating within-subsidiary responses to exogenous variation in targeting. The reach of the dataset enables specifications relying solely on time variation from tax reforms affecting foreign subsidiaries differentially. Further, we depart from the one country case and instead introduce a comprehensive multi-country framework covering many different CFC policy regimes. Studying multinationals from a single regime means that any reform of the tax component determining treatment will affect all subsidiaries within the same foreign host country identically. Introducing a second home country secures variation across subsidiaries within the same host country. This variation is essential because it provides control groups to account for the confounding influence of changes in market conditions affecting corporations operating on a specific market. The multiple country framework hereby allows us to present a study isolating within-subsidiary variation while controlling for market time-trends to identify causal effects of CFC legislation.

Our analysis also contributes to a second strand of literature dealing with the tax determinants of the location choices within multinationals. Barrios et. al. (2012) find that the subsidiary location choice within multinational corporations is sensitive to taxes in several dimensions - both host country corporate taxes and parent-country tax rules affecting foreign income. Buettner & Ruf (2007) find a high sensitivity especially to statutory tax rates in host countries using a sample of German multinational corporations. Devereux and Griffith (1998) find an effect of average effective tax rates on the foreign location choices of US multinationals. Voget (2011) looks at the decision to relocate

headquarters and finds an increased probability of relocation for multinationals headquartered in home countries with higher tax levels on foreign repatriated income. He introduces a dummy for the presence of a CFC regime in the headquarter-country, and concludes that such legislation increases the probability of relocation.⁶

We contribute to this literature by investigating the consequences of the CFC anti-tax-avoidance measure for the geographical pattern of subsidiaries within multinational firms. The pure extensive margin of response is a yet unexplored margin in the context of this tax measure.⁷ We further contribute by exploiting the unique design of these rules to visualize the variation in the data and avoid the heavy parametric assumptions necessary in previous literature on location choices. The unique setup allows us to produce a non-parametric discontinuity estimate of the effect of tax policy on location choices.

The rest of the paper is organized as follows: section II describes the international tax environment facing corporate groups and explains in detail the components of CFC legislation. Section III introduces the data. Section IV puts forward brief theoretical considerations on the incentives created by CFC rules and describes the main variation we exploit for identification. Section V presents the results on both the intensive and extensive margin of response and section VI concludes.

II. THE INTERNATIONAL TAX ENVIRONMENT FOR CORPORATE GROUPS

A salient feature of the corporate landscape today is a remarkably high level of global integration. Such integration complicates taxation of corporate income and renders corporate tax policy a border crossing issue. Consider a multinational group comprising a parent and several subsidiaries. When profit is generated in both the home country of the parent and in one or several of the subsidiary host countries, a fundamental question arises of how to tax this income. Most jurisdictions accept the premise that all corporations in the structure are separate taxpayers and hence each subsidiary is subject to corporate income tax in the host country of incorporation. However, due to the ownership structure of the group all profits are essentially owned by the parent company and this entity can determine a partial or full repatriation of the income at any point in time. To avoid double taxation

⁶For a survey of empirical evidence on the effect of taxation on firm-choices see Devereux & Maffini (2007)

⁷Ruf & Weichenrieder (2012) present an analysis of the asset allocation choice within multinationals, which is slightly related in the sense that they model the geographic location choice of large amounts of passive assets using a conditional logit framework.

most home countries operate an exemption system when within-group profits are remitted. This effectively means that such income is not subject to further taxation by the home country when received by the parent⁸. While this method solves the problem of double taxation it evidently also leaves scope for tax planning using host countries with low tax rates. With the objective of protecting their domestic corporate tax base, high tax home countries have an interest in minimizing potential abuse of this scope.

II.1. CONTROLLED FOREIGN CORPORATION (CFC) RULES

In an attempt to control such tax planning, many countries have introduced so-called *Controlled Foreign Corporation (CFC)* rules. This policy introduces a potential direct tax on foreign subsidiaries of domestic corporations - a corporate tax beyond borders. Consider a multinational firm consisting of three entities: a parent corporation in Germany, a subsidiary in Singapore and a subsidiary in Canada. CFC legislation in Germany will place a tax on the interest income of the Singaporean subsidiary since Singapore has a low tax rate, while the interest income of the Canadian subsidiary will remain untaxed by Germany because Canada already taxes the income at a high rate.⁹ Broadly, CFC legislation enables the home country to tax the income of foreign subsidiaries, if this foreign income lives up to certain criteria. Included criteria vary slightly across regimes, but they tend to include three basic components: a control-, a tax level- and an income source criterion. In consequence, the part of the income of foreign subsidiaries which is most likely to be involved in tax avoidance strategies, is included in the tax base of the parent corporation and taxed directly by the home country. We briefly explain the common features of each criterion to clarify the incentives created by this type of tax legislation.

The control criterion broadly ensures that the shareholder is in possession of control over financial decisions of the subsidiary and is hence able to utilise this ownership privilege for tax avoidance purposes. Most CFC regimes that are currently in place require ownership of the majority of voting rights or some financial privilege such as the right to profit upon distribution. In the example above, the German parent must have control over the financial decisions of the Singaporean subsidiary for CFC rules to activate.

⁸A few countries opt for a credit system instead of an exemption system. Under a credit system the income is taxed when repatriated to the home country, but a credit is given for all foreign taxes already paid.

⁹It is possible that the interest income of the Singaporean subsidiary can be exempt from the rules, if the subsidiary has enough active business income. Such specific details of each set of rules are explained in Appendix C.

The tax-level criterion is included to embed a focus on low taxed income as this seems a logical trait of income used as a vehicle for avoidance motives. Typically this requirement takes the form of a fixed minimum tax level calculated by looking at the actual taxes paid. This level can be stated as a fixed absolute rate, or as a percentage of the calculated tax liability had the subsidiary been liable for taxation in the parent country. It is only the subsidiary in Singapore and not the Canadian which is targeted by the German CFC regime, because Singapore has a low tax rate on corporate profits while Canada does not.

The final criterion concentrates on the source of the income. Most often legislation targets only passive (or tainted) income. The term passive income generally covers sources such as financial income from portfolio holdings, certain types of rental income and royalties from intellectual property. These types of income are perceived as very mobile making them ideal for income shifting with avoidance motives. Income of the Singaporean subsidiary earned through sales of actual products is not affected by the German CFC rules while interest income is included and potentially taxed by Germany.

If a subsidiary fulfils all specified criteria, the passive income of the subsidiary is included in the tax base of the parent corporation and taxed at the rate of the home country. The taxation takes place on accrual basis, and is not postponed until a potential repatriation. Overall this potentially creates an incentive for multinationals to generate passive income in higher tax environments, than would otherwise have been optimal absent the legislation.

The data source underlying our empirical analysis allows us to look at multinational firms from 25 different parent countries with active CFC legislation in some part of the sample period.¹⁰ A simplified overview of these 25 regimes is given in Appendix C. The table in this appendix describes the specifics of each of the three aforementioned criteria for each separate country, as well as further details that are potentially relevant. The data source further includes multinational firms from a large number of parent countries with no CFC legislation in the sample period. An initial simple comparison between the 25 CFC countries and the remaining sample countries reveals an interesting starting point. On average corporate multinational groups under a CFC regime appear to be generating passive income in higher tax environments compared to groups where the parent is located in a country with no such regime. This pattern is illustrated in Figure 1 showing the empirical cumulative distribution function across the range of corporate tax rates for financial profit. Each

¹⁰This number is based on an inspection of the legislation present during the sample period in the 74 non-haven home-countries that account for at least 50 majority-owned observations where the main outcome variable is non-missing. The legislation of countries that account for less than 50 observations is not explicitly scrutinised.

point represents the fraction of total positive financial profit generated within corporations facing a corporate tax rate below the specified value. The figure shows the function separately for groups with a parent based in a CFC country, and for groups where the parent is unaffected by such rules. Importantly we observe a CDF for targeted groups that is consistently located below the CDF for non-targeted groups. This feature implies that groups facing a CFC regime tend to choose higher tax environments when allocating passive income. Affected groups generate only 8 percent of their total positive financial profit in host countries with tax rates below 25 percent, while non-affected groups generate 22 percent of positive financial profit in these low tax environments. Clearly there are considerable differences in the distributional patterns of passive income when we compare potentially targeted and non-targeted groups. The fundamental question is then whether this difference can be attributed to effective CFC tax legislation and subsequently what this means for domestic and global corporate tax revenues.

III. DATA

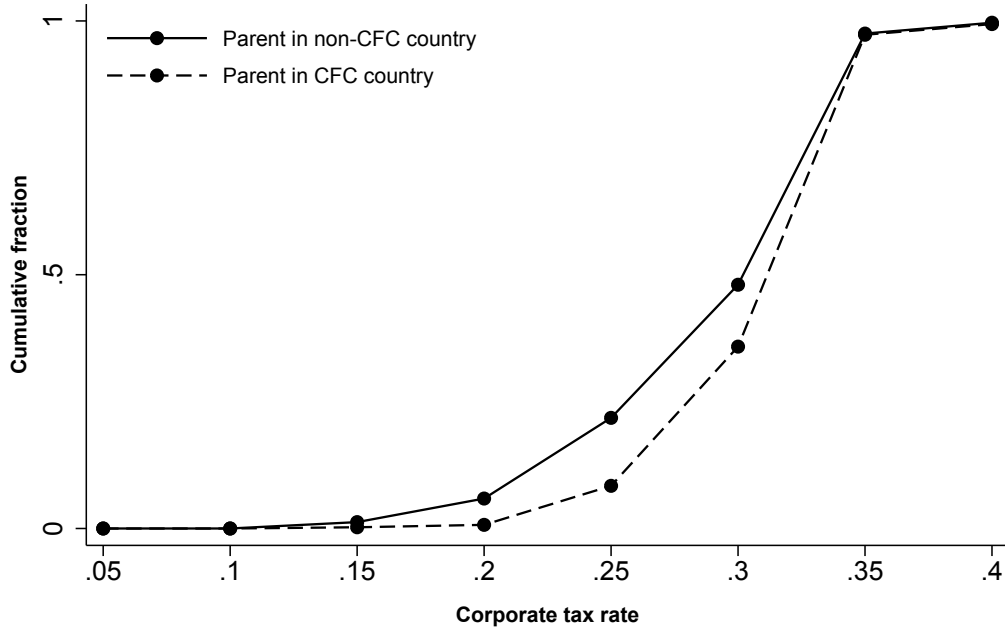
Throughout the analysis we use data from the Orbis database (2013 version) provided by Bureau van Dijk. The database contains firm-level panel data across the period 2003-2013 on a large number of financial and organisational variables. Importantly ownership links and percentages are provided for each separate firm - a feature that enables the linkage of each subsidiary to its parent corporation.¹¹ Since CFC legislation imposes a tax on foreign subsidiaries of domestic corporations, the relevant rules for a specific subsidiary are those in place in the country of the parent. Consequently the recorded ownership links make it possible to disentangle the relevant CFC rules for each particular subsidiary.¹² We are not able to distinguish between direct and indirect ownership, but since CFC rules generally target both directly and indirectly owned subsidiaries this distinction is irrelevant in our context. Ownership links are only available in the database for the most recent date of information. To the extent that these ownership structures have changed in the period from 2003 to 2013, we

¹¹The ultimate owner or parent firm is here defined as the highest placed shareholder in the corporate structure who has the majority ownership of the subsidiary either directly or indirectly.

¹²In the case of ownership chains, situations can emerge where there are some doubt as to which country's CFC legislation is relevant. To exemplify consider a German parent owning a Canadian subsidiary which again owns a Singaporean subsidiary. If the subsidiary in Singapore fulfils the requirements of both the Canadian and the German CFC rules, it can be unclear which CFC regime should activate. This kind of double CFC taxation is not explicitly dealt with in most regimes, but seems to be less of an issue in practice. Consequently we will abstract from this mostly theoretical issue and consider the legislation active in the country of the ultimately owner (here the German corporation) to be the relevant legislation.

Figure 1:

Empirical CDF - financial profit across corporate tax rates



Notes: The figure is constructed using only observations with positive financial profit. Each point represents the fraction of total financial profit belonging to corporations located in countries with a corporate tax rate below or equal to the value indicated on the x-axis. All multinational groups are divided into two: those where the parent is located in a home country with a CFC regime and those where the parent is located in a home country with no CFC regime. We exclude all groups where the parent is situated in a tax haven, since investment patterns in these jurisdictions might be very distinct and not representative of investment patterns more generally. Including these observations results in a very similar figure. All entities of the multinational groups are considered - i.e. both the parent and (majority owned) subsidiaries. Excluding the parent corporations or using only fully owned subsidiaries result in a very similar figure.

are potentially misspecifying the link between parent and subsidiary in parts of the sample period. In line with other studies using this type of data, this is not considered a great concern, since such misspecification will create noise and should therefore only bias our results towards zero.

The final dataset contains multinational groups from more than 50 different home countries with subsidiaries in more than 50 different host countries.¹³ We define a multinational group as a corpo-

¹³Excluding observations where the main outcome variable is missing, the dataset contains 63 non-haven home-countries with more than 100 majority owned observations. These are listed in the Appendix Table 5. The total number of host countries is 91 and of these 52 supply more than 100 observations each. These are listed in the Appendix Table 6.

rate construction consisting of a parent company and at least one foreign subsidiary.¹⁴ Multinational firms in the data vary significantly in size - from a few members to global groups counting hundreds of entities. We exclude banks since these are practically never included under CFC rules, but otherwise we allow all firm types. We do not consider multinational groups from tax haven countries since these are never affected by CFC rules and their investment and incorporation patterns are plausibly very different from those of other countries.¹⁵

As mentioned 25 home countries have active CFC legislation in some part of the sample period. Information on the legislation in each of these countries during the sample period was individually collected using various sources including the *International Fiscal Association* (2013) and numerous legal documents. This legislation is briefly summarised in Appendix C. The dataset is further extended with statutory tax rates from *KPMG*, *Ernst & Young* and *Deloitte*. Note that throughout most of the analysis we isolate variation at a level where country controls are obsolete. However, where country control variables are needed we add country characteristics from the *World Bank Development Indicators* and *Worldwide Governance Indicators*. Descriptive statistics of subsidiary level financials, as well as group characteristics are given in the Appendix Table 4.¹⁶

Note that the dataset is not balanced across the 25 different CFC regimes - some countries account for a larger share of the total number of included multinational groups. In the Appendix Figure 8 we show the number of observations attributable to each of the 25 home countries. First note that a number of policy regimes each contribute with a large observation count alleviating the concern that results could be driven by few unrepresentative regimes. It is also worth highlighting that a number of regimes contribute with very few observations - for instance three regimes account for less than 1000 observations each.

IV. VARIATION AND EMPIRICAL METHODOLOGY

A common feature across many CFC regimes is the inclusion of a low-tax threshold. Of the 25 sample countries with CFC rules 21 of them have a low-tax criterion formulated directly as a threshold value. In our empirical methodology we exploit this threshold for identification and hence our analysis is

¹⁴When considering profit shifting we require at least three entities within the group (i.e. at least two subsidiaries) to ensure the option of shifting income to another location is feasible in the short run. Changing the definition to allow groups with only one subsidiary introduces more noise, but does not qualitatively change any results.

¹⁵We use the list provided in Hines (2010) to define a tax haven.

¹⁶Note that we exclude all observations where financial information is based on consolidated accounts, since we cannot disentangle the individual shares of each subsidiary.

based on these countries. The CFC regime in the United States has features aside from the threshold making our approach infeasible and hence we look specifically at the case of the US in Appendix B. In the Appendix Figure 9 we show the placement of the low-tax threshold over the sample period for the remaining 20 CFC countries. The levels vary significantly across regimes, and within most countries we observe movements of the threshold over time. Since thresholds can be specified as a percentage of own tax level, these movements are often results of general tax reforms not directly related to CFC rules. Such indirect level-changes arguably render endogenous placement less likely. Below we explain in more detail how tax conditions vary across this threshold and what incentives this creates for the multinational firm.

Denote the statutory corporate income tax rate in home country j , τ_j and similarly denote the tax rate in host country i , τ_i . Assume that home country j has a CFC regime in place with a low-tax threshold at α .¹⁷ A subsidiary in host country i with a parent in home country j then faces the tax rate $\tau_{i,j}$ on passive profits, where

$$\tau_{i,j} = \begin{cases} \tau_j & \tau_i < \alpha \\ \tau_i & \tau_i \geq \alpha \end{cases}$$

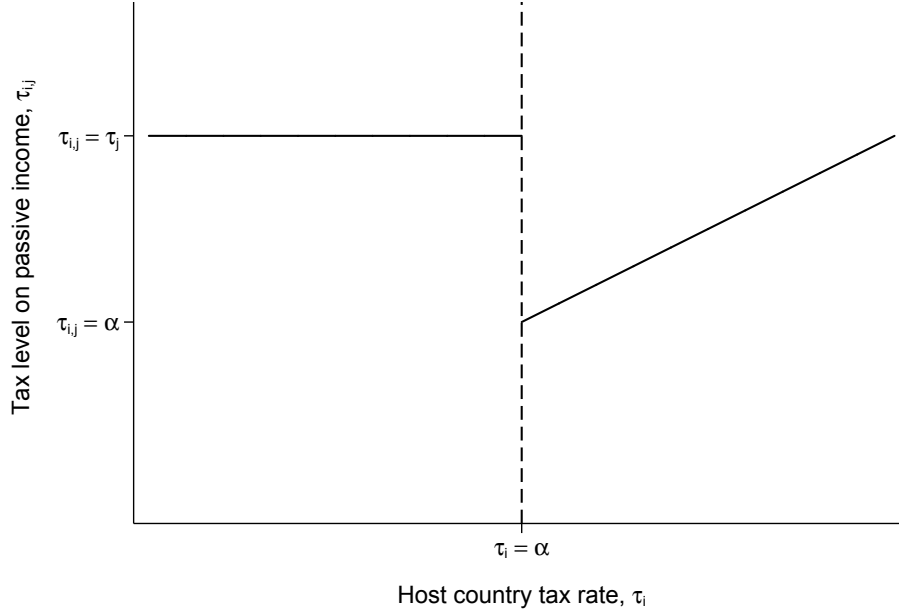
Consider the full range of possible subsidiary tax rates i.e. the range of host country rates. In the decision of where to locate passive income, the multinational firm faces a tax notch just at the low-tax threshold α . Since thresholds are always placed below the home country rate, this notch always features as a downward drop with a magnitude of $\alpha - \tau_j < 0$. Considering a single home country we depict the tax schedule faced by the multinational firm across possible host rates in Figure 2. In the empirical analysis we consider multiple home countries and CFC regimes with different threshold values. While both the absolute size of α as well as the relative size of α compared to τ_j varies across regimes, they all introduce a tax schedule qualitatively illustrated by Figure 2. In the following analysis we utilise the incentives created by this tax schedule to identify the effects of the CFC tax measure.

Our variable of interest is an indicator variable $\mathbb{1}_{[CFC]_{sht}}$ which is equal to 1 if host country s has a corporate income tax rate at time t that falls under the low-tax threshold in the CFC legislation of home country h . Related to Figure 2 this variable is equal to 1 if a subsidiary is placed to the left

¹⁷Note that the stylised presentation here assumes a low-tax cut-off specified in terms of a statutory flat corporate tax rate in the host country. In reality this is typically not the case: thresholds are more often specified in terms of an effective tax measure taking the actual tax paid by the subsidiary into account. However, the statutory tax rate acts as a proxy for this effective tax rate in these cases.

Figure 2:

Taxes on passive income under CFC regime with low-tax threshold

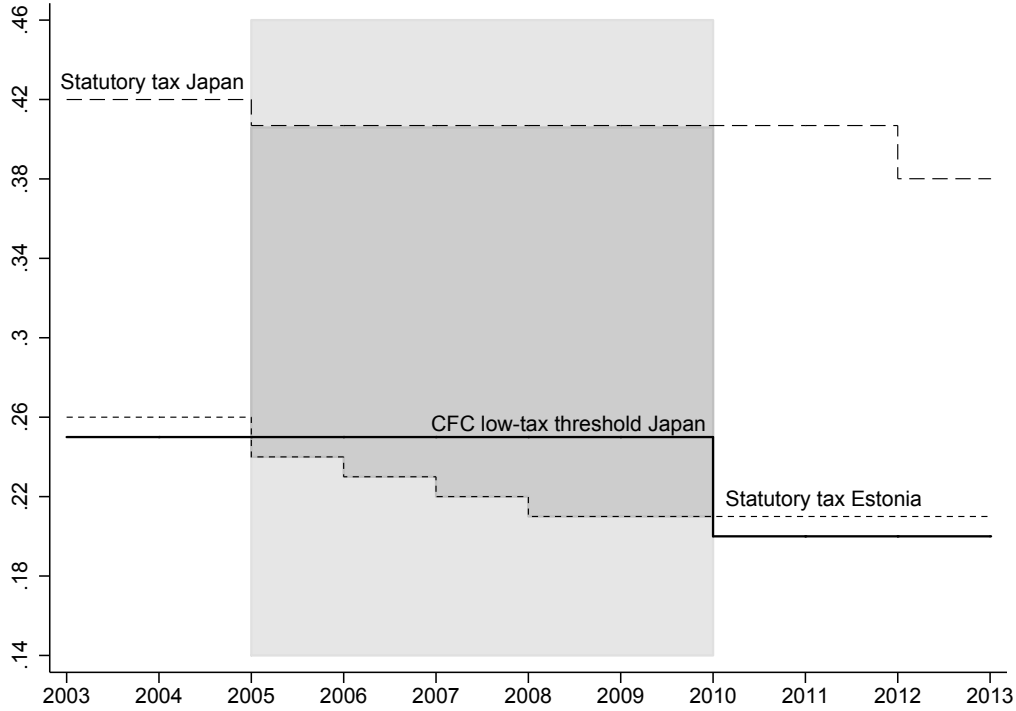


Notes: A stylized illustration of the effective tax rate applicable to the passive profit of multinationals as a function of the host country tax rate faced by the subsidiary generating the profit. We denote the low-tax threshold α , the home country tax rate τ_j and the host country tax rate τ_i .

of the vertical dashed line and 0 if a subsidiary is placed to the right of the dashed line. Since we are using a panel dataset we can exploit within-subsidiary variation from reform-induced movements across the low-tax threshold. Consider Figure 3 showing a stylized illustration of the Japanese CFC regime during the sample period. For illustrative purposes we use Japan and Estonia since this specific example encompasses two of the main dimensions of time variation in the data. In 2005 a tax reform in Estonia changed the statutory corporate income tax rate from 26 to 24 percent and thereby moved the rate below the CFC low-tax threshold in Japan. The reform hereby moved Estonian subsidiaries with parent corporations in Japan into potential CFC targeting. In 2010 Japan lowered its CFC low-tax threshold and hence moved Estonian subsidiaries back above the threshold. The grey shaded area indicates horizontally the period in which Estonian subsidiaries were targeted by the Japanese CFC legislation, while the darker grey shaded area illustrates vertically the potential tax penalty introduced by these CFC rules for Estonian subsidiaries. This is one example illustrating the two main types of time-variation: host country tax reforms and home country movements of the low-

Figure 3:

Illustration - time variation in CFC status



Notes: The figure illustrates the CFC regime in Japan from 2003 to 2013 and the primary time variation used to identify responses to these tax rules. The low-tax threshold in Japan was set at 25pp before 2010, but was changed in 2010 to a value of 20pp. In 2005 a tax reform took place in Estonia moving the top statutory corporate tax rate from 26 to 24 percent and thereby crossing below the CFC low-tax threshold in Japan. The reform therefore moved Estonian subsidiaries with parent firms in Japan into potential CFC taxation. In 2010 the Japanese low-tax threshold was lowered and thereby Estonian subsidiaries was moved back above the threshold and out of potential CFC targeting. Note that this is a stylized illustration that does not factor in the differences between statutory and effective tax rates and how this matters for the Japanese CFC regime.

tax threshold. Given our sample restrictions the data contains shifts from 60 different country-pairs. Our main empirical strategy, when analysing financial responses, exploits only variation coming from shifter corporations i.e. subsidiaries that are moved across the relevant threshold by reforms. In our analysis of the discreet location choice we use a regression discontinuity approach to produce a direct discontinuity estimate around this embedded low-tax threshold.

V. RESULTS

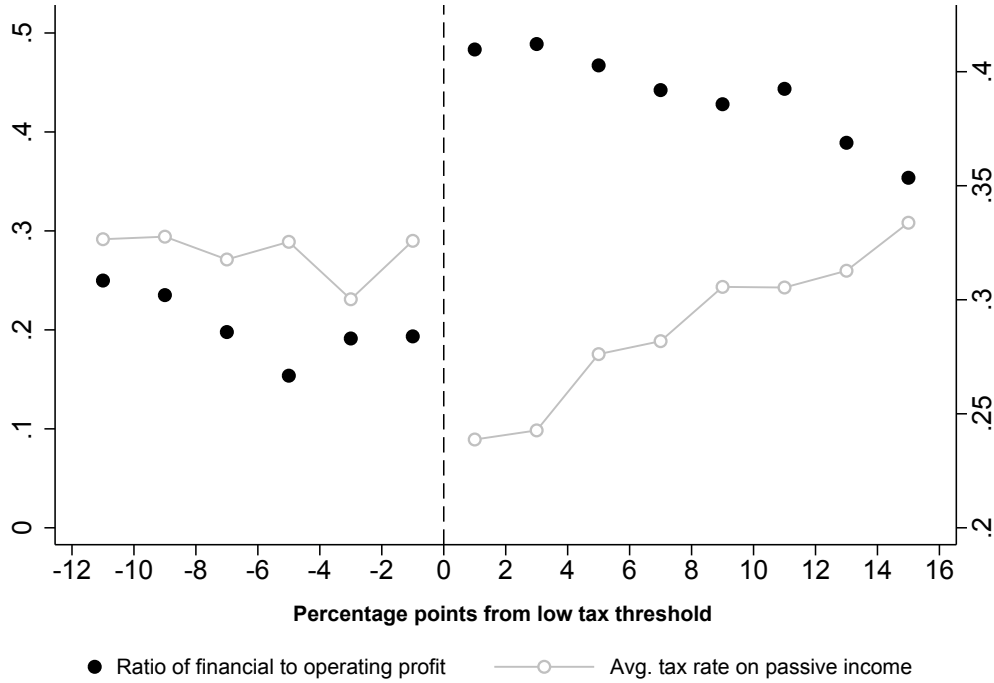
If multinational firms react to CFC rules we should be able to observe this reaction around the tax threshold triggering potential CFC taxation. In Figure 4 each subsidiary is sorted according to the statutory tax rate in their respective host country relative to this threshold. This means that a Canadian subsidiary of a German parent will appear on the graph at a value of 1 in year 2012, since the Canadian rate of 26 percent is 1 percentage point higher than the German low-tax threshold of 25 percent. Consequently, subsidiaries placed to the right of zero are not targeted by CFC taxation while subsidiaries placed to the left are potentially targeted as a result of meeting the low-tax criterion. Figure 4 plots in black the overall ratio of financial to operating profit allocated within each separate bin around the low-tax threshold. A striking feature of the overall pattern is a massive jump in the relative amount of financial profit just at the threshold value. The jump constitutes more than a doubling from around 20 percent to almost 50 percent. To illustrate the variation and incentives created by CFC rules we include in grey the average statutory tax rate on passive income across subsidiaries in each bin. The figure clearly shows the tax notch created by the legislation at the threshold. CFC rules mechanically create this tax notch by upholding the home country rate as the tax rate on the left hand side of the threshold.

From a pure tax perspective this notch in the tax schedule creates an incentive to generate passive income in subsidiaries located just above the threshold. The discontinuous pattern we observe in the relative concentration of financial profit is exactly consistent with these incentives around the cut-off. Further, the decreasing pattern on the right side of the threshold indicates tax sensitivity in line with the increasing average statutory tax rate. We do not observe a pronounced pattern to the left of the threshold consistent with the flat tax schedule under CFC rules. In Appendix Figure 11 we show an alternative version of the figure using only subsidiaries with a known ownership percentage above 50 percent. This is almost exclusively fully owned subsidiaries. The figure shows a very similar pattern and also features a doubling of the ratio exactly at the threshold.

Absent these rules we have no reason to expect any discontinuity in passive profit around this ownership-specific tax level. Consequently, we can interpret the discontinuity as representing the overall response of Multinationals to CFC rules. However, the pattern in itself does not reveal the behavioural mechanisms behind this reaction. On the intensive margin multinationals might react by redirecting passive profits from targeted subsidiaries below the threshold into non-affected subsidiaries above the threshold. This would affect the relative levels of passive profits within otherwise

Figure 4:

Financial profit around low-tax threshold



Notes: Filled circles (left axis) represent the total ratio of financial to operating profit within each 2 percentage point bin. Hollow circles (right axis) represent the average tax rate on passive income faced by the subsidiaries within each bin. Above zero (i.e. above the tax threshold) this is the average host CTR faced by subsidiaries in their respective host countries. Below zero this is the average home CTR i.e. the tax rate in the country where the parent is located. We condition on positive operating- and financial profit and use only home-countries with an implemented CFC regime (with a specified tax threshold). All foreign subsidiaries are included. We leave out domestic subsidiaries to avoid random fluctuations due to home-bias. We further exclude financial corporations and banks to ensure that operating profit is a meaningful scaling variable. We are not able to extend the figure further to the left due to data coverage. The data availability at such low tax rates is very limited.

similar subsidiaries on either side of the threshold. On the extensive margin multinationals might incorporate new subsidiaries or relocate subsidiaries to environments outside the scope of CFC rules to avoid additional taxation. This would affect the composition of subsidiaries above and below the threshold, and could have an effect on the geographical distribution of real economic activity. From a policy perspective the separation of these two responses is important to evaluate consequences for the distribution of economic activity and the size and distribution of corporate tax revenue. In the following analysis we investigate each of these behavioural margins separately using variation created by the tax threshold.

V.1. THE INTENSIVE MARGIN

First we look at the levels of passive profits within foreign subsidiaries and how CFC rules provoke shifting strategies within multinational firms. Such behaviour is what we previously referred to as the intensive margin of response. The starting point of our empirical methodology is a simple semi-log linearised model described by the following equation for corporation f based in host country s , with parent p situated in home country h , at time t ,

$$\ln(\text{profit})_{f\text{spht}} = \alpha + \beta_1 \mathbb{1}_{[CFC]_{sht}} + \beta_2 X_{ft} + \beta_3 \Gamma_f + \beta_4 \Gamma_{t \times s} + \beta_5 \Gamma_{t \times h} + \varepsilon_{f\text{spht}}$$

The CFC targeting indicator variable $\mathbb{1}_{[CFC]_{sht}}$ is equal to 1 if host country s has a corporate income tax rate that falls under the low-tax threshold in the CFC legislation of home country h at time t . The parameter β_1 measures (roughly) the percentage change in profit when moving into CFC targeting. We include subsidiary specific covariates, X_{ft} , to control for size. Disregarding tax incentives there could be other rational reasons for generating a large amount of passive income. A large subsidiary carrying out substantial active economic business, such as commodity production and sale, will presumably have a need for more liquid assets compared to a smaller and less active subsidiary. We control for this need using company size as a proxy. The main specifications also include fixed effects on the subsidiary level to exclude all variation *not* coming from shifters, as well as fixed effects on the *year-by-host* and *year-by-home* country level to flexibly control for time trends. Our identifying variation comes from tax reforms moving subsidiaries across the threshold. This variation mainly consists of reforms changing host country tax rates or home country thresholds, but we also allow shifts to come from the implementation of a CFC regime during the sample period.¹⁸ Note that the specification above eliminates the need for country-level controls, due to the rich set of fixed effects. Changes in tax policy affect different subgroups on a single market differentially and hence we can identify effects from changes within the single subsidiary relative to other subsidiaries operating on the same market.

Using the specification presented above we look at the relationship between CFC rules and financial

¹⁸Turkey, Iceland and China introduce CFC legislation with a low-tax threshold during our sample period. Consequently any potential subsidiary situated in a country below this threshold experience a shift in the year of introduction. We do not allow shifts to come from a reform introducing or removing a low-tax threshold from an already existing CFC regime. Such reforms typically replace a blacklist or a similar provision, and these are often designed to overlap as much as possible such that the same subsidiaries are targeted before and after. In practice we therefore drop observations where the home country is Denmark after 2006, Italy before 2010, Sweden before 2004 and South Africa before 2008.

Table 1:

CFC rules and the allocation of financial profit within multinationals

	Outcome: ln(financial profit)				
	(1)	(2)	(3)	(4)	(5)
CFC Indicator	-0.1410*** (0.0342)	-	-0.1570*** (0.0438)	-0.1346*** (0.0443)	-0.1389*** (0.0423)
CFC \times Ind ^{Large}	-	-0.1847*** (0.0706)	-	-	-
CFC \times (1 - Ind ^{Large})	-	-0.1186*** (0.0273)	-	-	-
ln(Employees)				0.2085*** (0.0228)	
ln(Turnover)			0.1668*** (0.0100)		
ln(Other assets)	0.6975*** (0.0359)	0.6975*** (0.0359)			
Subsidiary FE	✓	✓	✓	✓	✓
Year \times Host FE	✓	✓	✓	✓	✓
Year \times Home FE	✓	✓	✓	✓	✓
Total obs	234 236	234 236	199 309	155 712	260 135
Subsidiaries	63 742	63 742	55 835	47 155	69 488
Total obs w. CFC=1	9 252	9 252	9 028	7 179	10 019
R ²	0.40	0.40	0.06	0.03	0.01

Notes: The unit of observation is majority-owned subsidiaries (excluding banks) within multinational groups with at least 3 entities, where the parent corporation is not located in a tax-haven country. The dependent variable is the natural logarithm of financial profit. Single-year shifts in the CFC indicator (i.e. subsidiaries moved below (above) the threshold by a reform one year and back above (below) by another reform the next year) are not acknowledged as shifts since reforms can happen at any time during a year and hence we cannot know how many months were between such reforms. In practice we keep the CFC indicator constant across such shifts (i.e. if the shift is above and back below the indicator remains at 1 throughout). Two-way clustered standard errors at the home-country and the host-country level are reported in parenthesis.

*** p<0.01, ** p<0.05, * p<0.1

profit. Results are given in Table 1. In the first column we use the total stock of assets as our measure of subsidiary size.¹⁹ The coefficient estimate on the CFC indicator variable is negative, large and significant at the 1 percent level.²⁰ The size of the estimate suggests that a subsidiary moving into

¹⁹In the asset measure we subtract the amount of intangible assets, since income from intangible assets is also affected by CFC legislation.

²⁰We report two-way clustered standard errors in the dimensions host-country and home-country using the formula $\hat{V}(\hat{\beta}) = \hat{V}^s(\hat{\beta}) + \hat{V}^h(\hat{\beta}) - \hat{V}^{s \cap h}(\hat{\beta})$, where each component on the right-hand side are the one-way clustered variance matrices on the host, home and interaction level (Cameron et al. 2011). The result is robust to using one-way clustering in these dimensions instead. Clustering on the host-country level produces a standard error of 0.0586, while clustering

potential CFC taxation experiences a 13 percent drop in financial profit.²¹ In the second column of Table 1 we show response heterogeneity by the size of the tax notch introduced by CFC legislation. For a subsidiary that is moved below the threshold we calculate the size of the tax notch as the difference between the host country rate before the shift and the home country rate after the shift. This difference represents the realised change in the tax rate on passive profits before and after the shift across the threshold. For a subsidiary that is moved above the threshold we analogously take the difference between the home country rate before the shift and the host country rate after the shift. The variable Ind^{Large} is an indicator variable equal to 1 if the notch size at the time of the shift is larger than the median (11.5 percentage points) in the distribution of different notch-sizes. By interacting this indicator variable with the CFC indicator we test whether patterns in observed effect sizes are consistent with the size of the tax incentives created by CFC rules.²² We observe a large and statistically significant response in both groups, however consistent with a larger tax incentive in the group facing larger notches we see a substantially larger coefficient estimate here.²³ In columns (3)-(5) we check robustness to different measures of size. The stock of assets as included in the first specification is arguably a good measure of actual corporation size and the scope of active operations. However, since we are unable to exclude financial assets, this measure might also capture some of the response we are trying to measure. To ensure that this does not bias our results we use two alternative measures - the number of employees and total turnover in columns (3) and (4). Both measures have considerably less coverage in the dataset, but both produce numerically large and statistically significant estimates of the CFC parameter. In column (5) we completely exclude the size measure and rely on the subsidiary fixed effects to capture any time persistent need for liquid capital within a company. The estimated effect size is very stable across all three specifications

in the home-country dimension yields standard error 0.0271. Both are significant on at least the 5 percent level. The result is also robust to excluding multinational groups with parent company in NZ, BR, AU, CA and US from the sample. As discussed these countries have CFC legislation, but we are not able to include them as CFC countries in the analysis due to our identification strategy exploiting the low-tax threshold. If we exclude them from the sample we get a CFC parameter estimate of $-0.1455(0.0380)$.

²¹When interpreting the size of the estimate we have to correct for the fact that we are dealing with a dummy variable in a logarithmic specification. Using the formula $\exp(\hat{c} - \frac{1}{2} \cdot \hat{V}_{\hat{c}}) - 1$ proposed by Kennedy (1981) we get -0.132 . If we instead use differences in predicted values we also get -0.132 .

²²If a company has multiple shifts across the low-tax threshold we let the shift that happens first determine the value of the indicator Ind^{Large} .

²³Note however that we do not have enough statistical power in the estimation to statistically differentiate the two coefficients.

ranging from 13 to 15 percent. In conclusion our flexible setup, exploiting only within-subsidiary time variation, produces robust estimates that are very insensitive to controlling for size differences and even appears to make such controls obsolete. In all five columns we include all majority owned subsidiaries, however results are very similar if we condition on full ownership.²⁴

Since we are exploiting variation created by a threshold, we can perform a simple placebo test by randomly changing the placement of this threshold. For each group of subsidiaries with the same host and home country we randomly add or subtract a number drawn from a uniform distribution on the interval $[1; 10]$. We hence maintain the same time-profile of the threshold, but randomly move it up or down with the same amount for the entire group of companies initially facing the same conditions. Using these placebo thresholds we then use our main specification from Table 1 column (1) to obtain a placebo estimate of the effect. The Appendix Figure 10 shows the distribution of these estimates resulting from 4000 replications of the procedure. As the figure clearly shows the distribution is centred closely around zero, and our true estimates from Table 1 are all placed far in the left tail of this placebo distribution. This strengthens the notion that our estimates reflect true effects of CFC rules, and are not created by random fluctuation or uncaptured time trends.

Using the mean notch-size (8.81) and the mean tax rate on financial profit before a reform (26.84)²⁵ our main estimate from column (1) implies an elasticity with respect to the net-of-tax rate close to 1. Compared to previous studies estimating the elasticity of corporate taxable income, this elasticity estimate is rather large. Dwenger & Steiner (2012) use a repeated cross-sectional dataset on tax returns for German corporations and find an overall elasticity estimate of 0.58. Importantly they also perform a heterogeneity analysis suggesting that elasticities might be considerably larger for companies with greater profit shifting opportunities. Devereux et al. (2014) use UK tax records and find estimates ranging from 0.13 to 0.56. However they note specifically that they estimate responses

²⁴The setup also allows us to create separate CFC indicator variables for each CFC home country in the sample, and estimate effects separately. As explained in the data-section the amount of data and hence variation coming from each regime varies substantially. The five countries providing most variation are Germany, United Kingdom, Spain, France and Japan. If we estimate separate effects for these five countries we get parameter estimates ranging from -0.1032 to -0.1600 using the main specification from Table 1 column (1). However, this split introduces statistical power issues when only using shifters across the threshold for identification, and hence these estimates generally have large standard errors and should be interpreted with caution.

²⁵This is the mean in a distribution using the home country rate for reforms moving subsidiaries above the threshold and the host country rate for reforms moving subsidiaries below the threshold.

for a group of companies with limited international ties.²⁶ In this light our relatively large estimate is not surprising as we are looking exclusively at firms with international activities. An international reach gives opportunities for manipulation of the tax base that is not readily available to smaller domestic firms, and hence we would expect these multinational firms to display more sensitivity to tax rates. This is indeed what we find.²⁷

V.1.1. COMMENTS ON POTENTIAL SOURCES OF BIAS AND THE CADBURY-SCHWEPPES CASE

Often when relying on reforms for identification we worry about endogeneity of timing. Perhaps some driving force provokes tax reform and also affects financial profits within firms directly. Circumstances such as political distress or an economic crisis affecting government budgets could provoke tax reform, but also directly affect investments and firm profits. However, in our setup treatment is determined by an interaction between a tax rate and a low-tax threshold. This means that a tax reform in some host country will cause the same change in the statutory tax rate for all subsidiaries on the market, but the reform will only affect the CFC status of some subset due to differences in the low-tax threshold. Similarly a reform moving the threshold in some parent country will only change the CFC status of some foreign subsidiaries due to differences in foreign host rates. The existence of subsidiaries affected by the same reforms but for whom CFC treatment stays unchanged is exactly the factor that allows us to include host specific time trends and home specific time trends and thereby control for any common factors that potentially drive tax reforms.

Consequently, we do not rely on exogenous timing of tax reforms, but rather on a much weaker condition of random assignment of subsidiaries that move across a threshold by these reforms. A host

²⁶Devereux et al. (2014) write in their conclusion: *"We speculate, though present no evidence in support and leave for future research, that very large companies may also have relatively high elasticity, as they may have more opportunities to avoid tax, or to shift activities between countries."*

²⁷Note that the logarithmic specification in this analysis excludes non-positive recordings of the outcome variable financial profit. Since our sample period encompasses a financial crisis this restriction affects a substantial number of observations. Note however that the nature of our specification is such that we are exactly interested in the response of corporations with positive passive profits. We measure the effect of CFC tax legislation as the change in profit when moved across the tax threshold by a reform. Corporations with no or negative passive profit have a zero tax base and hence little or no incentive to react to a tax change. Loss-carryforward might create some incentives for subsidiaries expecting future positive profits, but such carryforward is not always allowed by CFC rules. Consequently, while this restriction might create some sample selection on profitable subsidiaries, we are exactly measuring responses on the relevant treated population.

country with a desire to strategically set their tax rate to avoid activating foreign CFC legislation would have to respond to several sets of rules characterized by very different definitions of what it means to be a low-tax environment. Moreover threshold changes most often happen as a result of general tax level reforms since thresholds are often fixed as a proportion of own tax level. These indirect movements of low-tax thresholds via general tax reforms and the fact that thresholds are placed at very different levels makes problems with non-random assignment very unlikely in this setup.²⁸

On a related note we should also address any potential bias created by strategic behaviour on the side of the multinational firm. As noted above, we might also expect multinationals to react on the extensive margin by incorporating new subsidiaries or relocating subsidiaries around the threshold. This could affect the composition of subsidiaries around the cut-off and make a comparison between financials of subsidiaries above and below the threshold less meaningful. Note that by relying only on within-subsidiary time variation our intensive margin estimate is not influenced by such a comparison. However, if the potential sorting around the threshold determines which companies are most likely to move across the threshold our result could be biased by a non-random sample of shifters. First note that such a bias would only arise if the selected group has a non-representative responsiveness to taxes. This means that selection on other characteristics or levels of certain variables, which are not related to tax-responsiveness, would not cause a bias. Further, reforms move subsidiaries both below and above the threshold and hence we are identifying both from companies that were initially placed below and initially placed above the threshold. If we look separately at responses of those moving above and those moving below the threshold we find a small insignificant difference.²⁹ Finally, some tax reforms introduce quite substantial changes in tax rates and in some instances we observe a host tax reform at the same time as a change in a low-tax threshold. Such events cause subsidiaries relatively far from the threshold initially to move across. The distance to the threshold

²⁸A slight worry in this regard could be related to the implementation of a new CFC regime. If home countries design new regimes such that the threshold is just below the tax level of their main trading partner for instance, this could cause non-random selection into treatment. However, results are robust to dropping these observations and only relying on host country tax reforms and home country threshold movements.

²⁹If we interact the CFC indicator with an indicator for moving above the threshold in the sample period, then we get an estimate on this interaction term of 0.041 (0.1235). The coefficient on the CFC indicator in this specification is -0.152 (0.050). Note that reforms moving subsidiaries above the threshold are typically always home-country reforms of the threshold. Consequently, this small positive estimate on the interaction term could be the result of the higher salience of host country reforms relative to home country threshold reforms.

prior to a shift is distributed within the interval $[-7; 8.5]$. If we drop shifters who are less than 5 percentage points from the threshold before they move across and focus only on those who move from a position further away, we get a coefficient estimate of -0.1350 using the main specification from column (1). With a standard error of 0.1832 this estimate is not statistically significant due to a small number of firms subject to these specific events. However, the size of this estimate suggests no tendency towards a different responsiveness among companies further from the threshold.

Before moving on to an investigation of the mechanisms behind this response we should mention a ruling by the European Court of Justice with a special relevance for CFC rules within the European Union. In 2006 the European Court of Justice dealt with a case, known as the Cadbury-Schweppes case, concerning the compatibility between the UK CFC rules and EU law. The ECJ ruled that the UK rules were in violation of the EU freedom of establishment because a foreign subsidiary in another EU country could incur a tax that would never fall on a domestic subsidiary. Such taxation within the EU was deemed unjustifiable unless in the case of a fully artificial arrangement created for tax savings purposes. While this decision did not render CFC rules incompatible with EU law, it has been argued that it limited the scope of these rules within the EU by narrowing the focus to fully artificial arrangements (Ruf & Weichenrieder 2013). Using our main specification, we test whether we observe a muted response after the ruling within the EU. We test this by interacting the CFC indicator with a post 2006 indicator and an EU indicator. The coefficient estimate on this double interaction term is 0.019 suggesting a slightly smaller response within the EU after the ruling.³⁰ In other words a slightly smaller change in financial profit is measured if the shift across the threshold comes from an EU subsidiary with an EU parent after the ruling, compared to shifts before the ruling or between non-EU relationships. Note, however, that this estimate has a very large standard error (0.123) and hence does not provide conclusive evidence on the consequences of this ruling.

³⁰To produce this estimate we interact the CFC indicator with both an indicator for the year of the shift being after 2006 and an indicator for parent and subsidiary both being EU members at the time of the shift. Since the decision in principle apply for all EEA members we include Norway, Liechtenstein and Iceland. We drop subsidiaries with multiple shifts, since these are hard to classify as either affected or unaffected by the ruling, but results are similar if we include them. The parameter estimate on this double interaction is equal to 0.019 (0.123), while the coefficient estimate on the CFC indicator in the same regression is -0.148 (0.065).

V.1.2. SPILLOVER EFFECTS AND REVENUE CONSEQUENCES

Entering potential CFC taxation leads to a sizeable drop in financial profit within a foreign subsidiary of a multinational firm. This conclusion raises the question of whether the observed drop arises from a genuine downsizing or from a redirection of profits. In other words, does the missing profit reappear within the multinational group and if so where? Mapping the underlying behavioural patterns within the multinational firm is essential for the ability to evaluate consequences for the magnitude and distribution of global corporate tax revenues – a question of high importance to policy makers. To investigate group dynamics and spillover effects we introduce the concept of group-exposure to CFC taxation into a framework very similar to the one presented earlier. Group-exposure measures the degree to which a multinational group is affected by CFC legislation. One way to construct such a measure is to consider the relative number of subsidiaries within a group placed in environments below the relevant tax threshold at a given point in time. Based on this idea we use the fraction of subsidiaries placed below the threshold as a proxy for group-exposure. By using the relative portion of the group placed within the targeted tax area we account for the large differences in group-size. This measure differentiates the importance of a single shift across the threshold and allows such a shift to create a larger change in exposure for a smaller group than for a larger group. This is potentially important as we would expect a single shift to have larger spillover effects on another group member if the group is small, compared to a situation where there are many other group members. Using variation in the exposure measure we can evaluate spillover effects within a multinational group when a subsidiary is targeted by CFC taxation. For identification we again use the time-variation coming from reform-induced movements across the threshold. However, this variation is not sufficient in this context because such single shifts create very little variation in a group-level variable when groups are relatively large. To facilitate the identification of spillover effects we therefore add one very specific dimension of cross-sectional variation by allowing the comparison between two subsidiaries within the same host country, owned through the same home-country. Such comparisons allow us to exploit the variation coming from the different placements of subsidiaries within two otherwise similar groups, while at the same time only comparing subsidiaries subject to the same host country shocks, market conditions and home-country influences. Hence, instead of including subsidiary fixed effects, we include *home-by-host* country fixed effects to allow for this additional source of variation. In line with the analysis above we flexibly control for time trends by including both host specific time trends and home specific time trends. Note that this type of subsidiary comparison introduces addi-

tional variation to identify the effect of the group-exposure variable because two similar subsidiaries can be members of groups with different geographical placements of other within-group subsidiaries. However, it does not add additional variation to identify the CFC indicator, as variation in CFC treatment is exactly at the home-by-host level.

Table 2 presents estimation results. In the first column we show the analogue of the previously estimated effect of CFC targeting. Since the identifying variation in this specification is the same reform-induced time variation as used previously we should expect a similar effect unless firm-heterogeneity is not sufficiently controlled for without the full set of subsidiary fixed effects. The estimate is slightly larger, but as expected the effect is very comparable both in magnitude and significance level to the estimates obtained earlier.

In the second column we introduce the group-exposure measure. For each subsidiary observation, the exposure variable measures the fraction of group members within the same multinational group that falls under the CFC low-tax threshold at that point in time. From column (2) we observe a marginally significant positive effect of this variable. The result implies that other entities within the same multinational group generate more financial profit when a group member falls below the threshold and the share of CFC targeted subsidiaries increases. A control for the total number of subsidiaries in each group is included to make sure the effect is not a scale effect related to group size, but indeed a within-group compositional effect. The magnitude of the estimate suggests that an increase of 10 percentage points in the fraction of targeted subsidiaries within a group raises the financial profit of other group members by about 3.1 percent.

In column (3) we interact the exposure variable with our CFC targeting indicator. The purpose of this interaction is to differentiate the spillover effect based on relative placement to the low-tax cut-off and hence CFC treatment status. The interaction investigates whether the spillover, and hence the gain in financial profit, accrues to all other group members or only those *not* themselves targeted by CFC legislation. Results presented in the third column indeed indicate the latter to be the case. Considering only members above the threshold, measured effects are significant at the 5 percent level, positive and larger than the overall effect presented in column (2). This is however not the case for members who are CFC targeted themselves, where effects are very close to zero and insignificant at all traditional significance levels.

In column (4) we additionally include an interaction with an indicator for being a domestic subsidiary. The objective of this specification is to explore whether the positive effect for non-targeted subsidiaries also applies to domestic subsidiaries placed in the home country of the group parent.

Table 2:

CFC rules and the allocation of financial profit within multinationals

	(1)	(2)	(3)	(4)	(5)
CFC Indicator	-0.1768*** (0.0555)	-0.2180*** (0.0583)	-0.1722*** (0.0563)	-0.1721*** (0.0561)	-0.1759*** (0.0568)
Group Exposure		0.3069* (0.1623)			
Exp. \times CFC			-0.0023 (0.2053)	-0.0020 (0.2048)	-0.0020 (0.2047)
Exp. \times (1 - CFC)			0.4712** (0.1997)		
Exp. \times (1 - CFC) \times Dom				0.4374*** (0.1605)	0.4372*** (0.1606)
Exp. \times (1 - CFC) \times (1 - Dom)				0.5233* (0.3119)	
Exp. \times (1 - CFC) \times (1 - Dom) \times CTR ^{low}					0.5896** (0.2958)
Exp. \times (1 - CFC) \times (1 - Dom) \times (1 - CTR ^{low})					0.3988 (0.3537)
Group size	0.0001 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)
ln(Other assets)	0.9429*** (0.0261)	0.9424*** (0.0262)	0.9421*** (0.0263)	0.9421*** (0.0262)	0.9421*** (0.0262)
Host \times Home FE	✓	✓	✓	✓	✓
Year \times Home FE	✓	✓	✓	✓	✓
Year \times Host FE	✓	✓	✓	✓	✓
Obs (total)	234 236	234 236	234 236	234 236	234 236
Obs (w. CFC=1)	9 252	9 252	9 252	9 252	9 252
R ²	0.50	0.50	0.50	0.50	0.50

Notes: The unit of observation is majority owned subsidiaries (excluding banks) within multinational groups with at least 3 entities, where the parent corporation is not located in a tax-haven country. The dependent variable is the natural logarithm of financial profit. The group exposure measure is the fraction of subsidiaries within a multinational group situated below the relevant tax threshold. Single-year shifts in the CFC indicator (i.e. subsidiaries moved below (above) the threshold by a reform one year and back above (below) by another reform the next year) are not acknowledged as shifts since reforms can happen at any time during a year and hence we cannot know how many months were between such reforms. In practice we keep the CFC indicator constant across such shifts (i.e. if the shift is above and back below the indicator remains at 1 throughout). In columns (3)-(5) the CFC exposure variable is centered around the sample mean (0.12) calculated from groups with at least one CFC targeted subsidiary. Two-way clustered standard errors at the home-country and the host-country level in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

Note that these companies by construction of the rules always appear above the low-tax threshold. The result of this interaction suggests that domestic subsidiaries, as well as other subsidiaries above the threshold, experience an increase in financial profit when group-exposure increases. For domestic subsidiaries the effect is significant at the 1 percent level and indicates a 4.4 percent increase when group exposure increases by 10 percentage points. For other foreign subsidiaries the effect is only marginally significant but indicates a 5.2 percent increase in financial profit if group exposure in-

creases by 10 percentage points. If we consider the case of a multinational group with 10 members, then results suggest that a reform moving one of the subsidiaries below the threshold would cause a 4.4 percent increase in financial profit within each domestic group member and a 5.2 percent increase within each foreign member above the threshold.

In the final column we introduce yet another interaction to differentiate the effect on foreign subsidiaries above the threshold. The variable CTR^{low} is an indicator for the host tax rate being in the range between the low-tax threshold and the home country rate. By interacting with this variable we look separately at foreign subsidiaries just above the threshold and foreign subsidiaries in countries with a higher tax environment than the home country. In line with expectation and previous evidence we observe a large positive spillover-effect on foreign subsidiaries just above the threshold. The effect on these subsidiaries is significant at the five percent level and materially larger than the effect on other foreign subsidiaries. The effect on subsidiaries above the home-country rate is still positive, but smaller and insignificant. In other words we cannot reject that there might be some positive effect on these high-tax corporations, but the main effect seems to be driven by the lowest-tax subsidiaries outside targeting.³¹

The overall patterns described in this section are consistent with shifting behaviour within multinationals in the direction from targeted to non-targeted subsidiaries. The results seem to document a behavioural pattern where multinationals extract financial profit from subsidiaries falling under the threshold, and place this additional profit within members placed above. The consequence of such behaviour is a movement of profit up along the corporate income tax range into higher tax environments, whereby more global corporate tax revenue emerges. The patterns also suggest that part of this additional tax revenue accrues to the home country administering the CFC rules, since domestic subsidiaries attract more financial profit when other foreign group-members are targeted.

From a policy perspective the exact division between countries of the global tax revenue gain appears crucial. To quantify the part accruing to the home country, we do a simple back-of-the-envelope calculation using median group characteristics. In median terms groups with positive exposure have 9 percent of their subsidiaries placed under the low-tax threshold. The remaining 91 percent outside CFC targeting consist of 42 percent domestic subsidiaries and 58 percent foreign subsidiaries. The

³¹As noted all standard errors reported in Table 2 are two-way clustered standard errors in the dimensions home-country and host-country. Clustering only in one of these dimensions produces similar standard errors. Looking at column (5) the three main estimates all remain significant on at least the 5 percent level if we cluster in either the home-country dimension or in the host-country dimension.

median amount of positive financial profit generated yearly within a domestic subsidiary in a CFC country is roughly 60 percent larger than the median amount generated within a foreign subsidiary above the cut-off. If we multiply the median amount of positive financial profit within domestic subsidiaries with the estimated spillover effect and the median number of domestic subsidiaries, we get a number reflecting total profit accruing to the home country from spillover effects within a representative group. This number is relative to some specified increase in exposure, however by comparing it to the analogous number for other foreign subsidiaries above the cut-off we get an idea of the relative divide of the tax revenue gain. The comparison tells us the fraction of shifted profit, following a subsidiary moving below the threshold, going to the home country. The simple calculation reveals a fifty/fifty allocation.³² In other words about half of the tax-base increase and resulting tax revenue gain from these rules seem to accrue to the rule-enforcing country, while the other half benefits other higher-tax countries.

V.2. THE COMPOSITION OF INCOME

To supplement these results we now turn to an analysis of the relationship between passive and active profits within each subsidiary before turning to the pure extensive margin analysis. Since CFC legislation only targets passive income, it is still possible for subsidiaries to benefit from a low host tax rate on the active part of profits.³³ This distinction creates a discrepancy between the impact of CFC legislation for a subsidiary with a high ratio of passive to active profit versus a lower ratio company. Under CFC rules a high-ratio company will potentially be liable to additional home country taxation on a large fraction of income, and correspondingly the benefit of enjoying a low tax rate on active income is small. In other words, the effect of CFC legislation on the average tax rate at the subsidiary level is large, because a larger portion of the profit base is affected. The change in the average tax rate will all else equal be less severe for a lower ratio company. This means that, measured by the change in average tax rate, the incentives created by CFC legislation intensify with the ratio of passive to active income. As previously discussed we can imagine several reactions to this increase in average taxes including the redirection of passive income to unaffected subsidiaries or

³²The calculation goes as follows. The median yearly amount of positive financial profit within a domestic subsidiary in a CFC country is USD 154.000, and hence $154 \times 0.04374 \times 0.42 = 2.83$. The median yearly amount of positive financial profit within a foreign subsidiary above the cut-off is USD 95.000, and therefore $95 \times 0.05233 \times 0.58 = 2.88$. Consequently the relative part going to the home country must be $2.83/(2.83 + 2.88) = 0.50$.

³³This is the case for almost all CFC regimes, however examples do exist of legislation that targets both dimensions - for instance the CFC rules in Brazil.

relocation of the subsidiary to an unaffected location or a change in the role of the subsidiary to make it more reliant on active income streams. Devereux & Griffith (1998) argue that average taxes are specifically important in the location decision of multinationals. Each of these reactions would cause the number of high-ratio subsidiaries to drop within CFC affected low-tax environments. Moreover, since the change in average tax rate caused by CFC rules is increasing in the passive-active ratio we would expect the relative drop in the number of very high-ratio subsidiaries to be larger than the drop in the number of subsidiaries with more moderate ratios. This would for instance arise if the probability of relocating a subsidiary increases with the average tax rate.

For each subsidiary and year we calculate the ratio of financial to operating profit, conditioning only on operating profit being non-negative. Operating profit reflects actual sales and other entries traditionally viewed as active economic business. Consequently, this ratio proxies the overall ratio of passive to active profit within the subsidiary. We set up a simple linear probability model where the left hand side is a binary indicator for this ratio being above a threshold value. The right hand side variables include the CFC treatment indicator as well as *home* \times *year* and *host* \times *year* fixed effects. This specification encompasses reactions both on the intensive- and extensive margin by comparing the propensity to have a high passive-active ratio among targeted and non-targeted subsidiaries controlling for all time-invariant and time-variant differences between host and home countries.³⁴ Essentially we compare the probability among targeted and non-targeted subsidiaries within the same host country of having a high ratio of passive to active income. To make sure we are capturing differences related to CFC legislation we exclusively compare within host countries situated close to the low-tax threshold. Specifically we focus within 5 percentage points from each relevant cut-off.³⁵

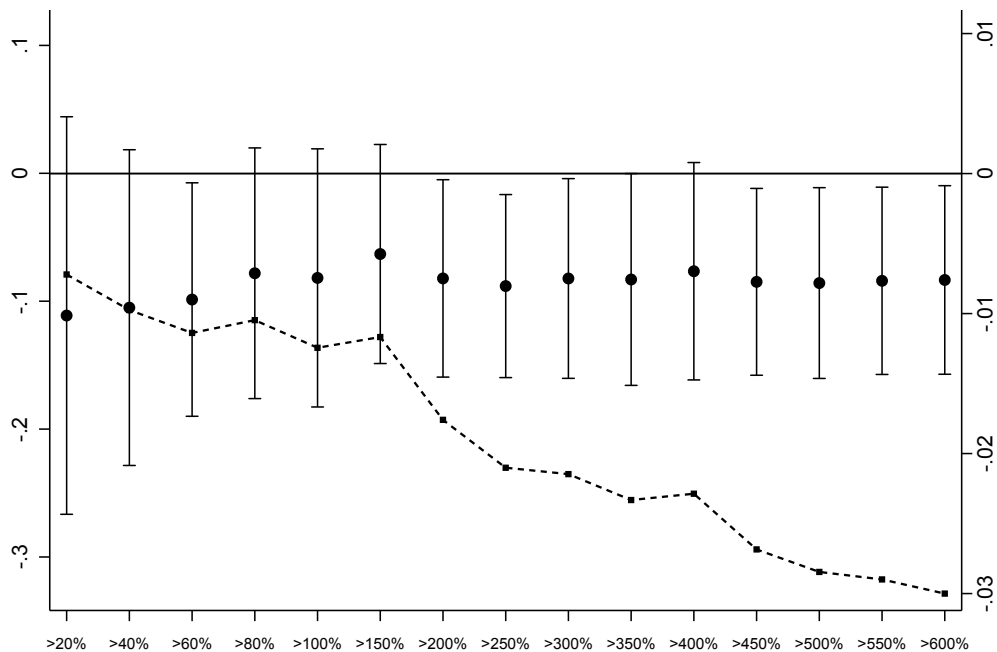
³⁴Note that we do not include subsidiary fixed effects in this specification. Firstly, focusing on within-subsidiary variation to a large extent excludes responses on the extensive margin. If the multinational wishes to relocate a subsidiary and does this by opening a new subsidiary in a different country and transferring operations, then we cannot observe this link in the data. Second, in a specification relying solely on time variation we are likely to incur problems with mean reversion which could spuriously create a pattern of larger reactions among larger ratio companies. Companies with very high ratios at the beginning of the sample period are more likely to experience a drop in this ratio simply due to mean reversion. Such mean reversion is likely to be more pronounced when we focus solely on very high ratio companies, and hence mean reversion could create the pattern we expect to emerge as a result of CFC rules. By using cross-sectional variation within host countries we largely avoid this issue.

³⁵We include all observations from non-CFC countries as controls. Varying this bandwidth affects the number of observations in the estimation and hence affects significance levels. However, the qualitative results are similar with bandwidths closer or further from the threshold.

Figure 5 plots in circles the coefficient estimate of the CFC targeting variable in the described model.

Figure 5:

Linear probability model for financial profit ratio



Notes: The LHS is an indicator variable equal to 1 if the ratio of financial to operating profit is above the specified threshold indicated on the x-axis. Circles (right axis) represent estimates of the coefficient on the CFC targeting indicator and vertical capped lines represent 95 % confidence intervals using standard errors clustered in the two dimensions home and host country. All estimations include *home* \times *year* fixed effects and *host* \times *year* fixed effects, as well as a control for group size. We condition on non-negative operating profit for the ratios to be meaningful, but allow negative or zero financial profit. We only include observations within ± 5 pp of the relevant cut-off. We include all observations from Non-CFC countries as controls. The dashed connected line (left axis) shows each estimate scaled by the fraction of positives of the LHS variable i.e. the CFC indicator estimate as a fraction of the baseline probability. We exclude observations before/after the introduction of a low-tax threshold, but keep observations before/after the introduction of a CFC regime. We exclude observations from tax haven multinationals or from multinationals from CFC countries with no low-tax threshold. Apart from these restrictions we include all majority owned subsidiaries within groups consisting of at least 3 members.

Each point corresponds to a different threshold value for the left-hand-side indicator. All threshold choices result in a negative estimate and most estimates, especially within the larger fractions, are statistically significant at the 5 percent level. This consistent result indicates that CFC targeting reduces the probability of having a high ratio of passive to active profit. Moreover to create a transparent picture of the magnitude of these effects, we also express each estimate as a fraction of the baseline probability. We scale each estimate with the sample probability of having such a large

ratio of passive to active income. These scaled estimates are given by the squares and connected dashed line. Concretely, targeting reduces the probability of having more financial than operating profit by 14 percent and the probability of having three times as much financial as operating profit by 24 percent. In line with the increasing change in average tax rate, we observe a monotonically decreasing pattern of the relative estimates. This suggests that the absolute effect of CFC legislation is increasing for increasing ratios as we would expect.³⁶

V.3. THE EXTENSIVE MARGIN - LOCATION OF NEW SUBSIDIARIES

Until now we have mainly focused on the allocation of income within a multinational firm conditional on the observed corporate structure. However, the underlying firm structure might also be responsive to tax rules in the sense that multinationals might adjust the location of new subsidiaries or move existing subsidiaries to new locations as a result of CFC legislation.

We proceed by investigating this extensive margin of response. Using the recorded date of incorporation we can identify subsidiaries created during the sample period from 2003 to 2013. Only considering foreign subsidiaries with a parent based in a non-haven country, the dataset contains a total of 69.302 new incorporations in the sample period.³⁷ The set of new subsidiaries has an international reach and spreads across 99 different host countries. Multinationals from CFC countries with a low-tax threshold account for roughly half of these new incorporations.

Analysing the discrete location choice is challenging due to the existence of unobservable market conditions rendering some locations attractive for non-tax related reasons. To overcome this issue we use multinational groups that are not affected by a CFC regime to account for these unrelated factors. Specifically we look at the incorporation patterns of CFC affected groups relative to other unaffected multinational groups.³⁸ Hereby we implicitly assume that multinationals from countries with no CFC legislation respond to the same underlying market conditions in each potential host country as affected groups. In other words, a German and an Austrian multinational firm respond

³⁶Note that the analysis above does not rely on a logarithmic transformation of the outcome variable, and hence includes both zero- and negative recordings of financial profit.

³⁷This number refers to all majority owned subsidiaries. We exclude domestic subsidiaries as we are interested in the characteristics determining foreign location choice conditional on the choice to open a new foreign subsidiary. To identify tax haven countries we use the list of countries provided in (Hines, 2010) Table 1.

³⁸In the group of unaffected multinationals we do not include groups where the parent is located in a tax haven country. We include all other groups owned by parents in countries with no CFC legislation. For robustness we show that results are robust to including groups from the five countries with CFC legislation that we are not able to include in the analyses (US, BR, CA, AU, NZ).

to the same non-tax related market conditions on the Swiss market when considering an investment in Switzerland. This could for instance be a well-functioning financial market, an effective banking sector or simply an increase in demand for some product or service.

First we compute for each home country the probability of opening a new foreign subsidiary in each host-year combination. This probability is calculated as the number of incorporations within that host-year pair divided by the total number of incorporations during the year. The underlying question answered by these probabilities is roughly: given that a German multinational wants to set up a new subsidiary in 2010, what is the probability that this new subsidiary will be Swiss. This probability is calculated as the fraction of new German incorporations in 2010 that were placed in Switzerland.

We calculate these yearly incorporation probabilities separately for each home country with CFC rules containing a low-tax threshold. The Appendix Figure 12 shows the distribution of new incorporations across home countries. Panel (a) shows only home countries with a CFC low-tax threshold. It is evident that for some home countries we observe a large number of new incorporations while for others we observe few. This lack of observations severely complicates the calculation of informative overall distributions for some home countries. For this reason we require a total of at least 200 observations at the overall home country level to be able to calculate distributions. This is a very non-restrictive requirement in the sense that it only excludes four home countries which have such a limited observation-count that such calculations would be uninformative. Consequently we calculate yearly distributions for the remaining 16 home countries. We perform the same yearly calculation for the collected group of multinationals from Non-CFC countries. By subtracting the probabilities calculated for the latter group from the corresponding probabilities for each CFC country, we generate a set of *incorporation probability differences*. These differences reflect how the incorporation pattern of multinationals from each CFC country differs from the pattern of new incorporations made by all international groups that are unaffected by CFC legislation. If a CFC home country has an underlying incorporation pattern identical to the pattern of unaffected countries then all these differences will be random noise. Conversely, a significant positive value indicates that the respective CFC country has an over-probability of incorporation while a negative value signifies an under-probability.

In Figure 6 panel (a) we sort these differences in incorporation probabilities relative to the low-tax threshold and compute the average within 2 percentage point bins. The figure shows a striking pattern of negative probability mass below the cut-off and positive mass above. This means that we observe a tendency for CFC groups to place less new subsidiaries in targeted environments below

the threshold and more new subsidiaries in environments above the threshold relative to unaffected groups.

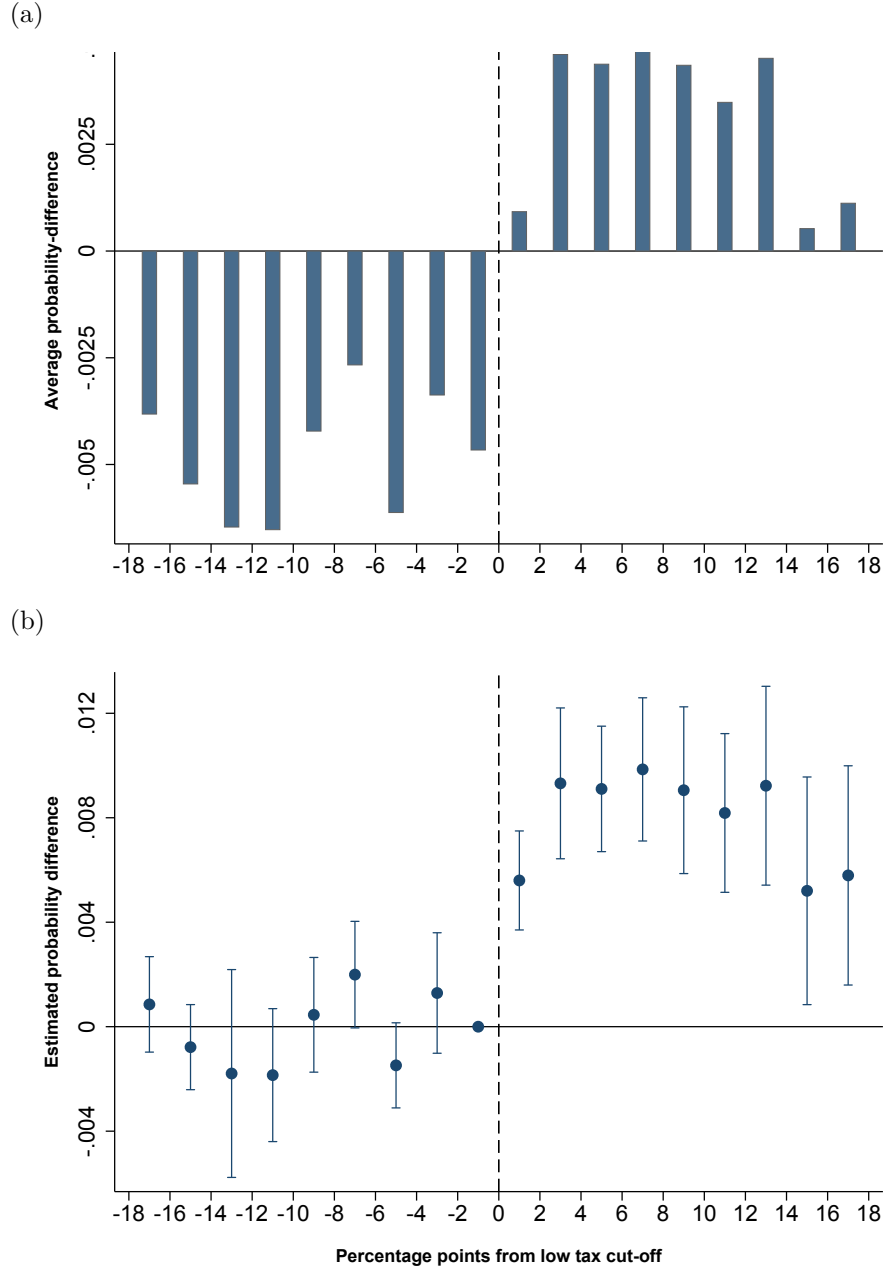
Remember that the threshold-value varies substantially across CFC countries and across years creating a diverse combination of host countries within most bins. This also means that the same host country will appear in several different bins representing different placements relative to the thresholds. The result from this figure is consequently more subtle than simply showing that CFC groups invest in higher tax environments. The specific point in the range of corporate tax rates at which CFC groups go from incorporating less to incorporating more than non-CFC groups aligns with the exact tax threshold specified in the CFC legislation relevant for them. This interesting descriptive pattern would seem to indicate some effect of CFC rules on incorporation choices. A minor point relates to the first bin immediately above the threshold. While the difference in incorporation probability is on average positive in this bin it is not as large as the difference in the subsequent bins. Note however that in the sample period we observe a large number of tax reforms and for the majority of these reforms the host corporate tax rate is lowered. Assuming it is costly to set up a new foreign subsidiary and firms are aware of the risk of tax reform, firms might not want to incorporate too close to the threshold. At these very close locations the risk of moving below the threshold due to a later tax reform is large and this might compensate for the slight tax difference between the first and subsequent bins. Importantly we would not expect the same risk-consideration regarding actions that are less costly to change after a reform such as the location of profits.

In the construction of this figure we as mentioned use all CFC home countries with more than 200 observed incorporations to ensure meaningful distributions. As earlier we again exclude years before the introduction of a low-tax threshold and years after the removal of one, but keep years before the introduction of a full CFC regime. The pattern remains if we instead use the sum of probability differences within each bin instead of the average difference (see the Appendix Figure 13).

To obtain a direct estimate of the effect of CFC targeting on the incorporation decision we exploit the discontinuity created by the low-tax threshold. Consistent with the nature of the low-tax threshold as a cut-off point determining CFC targeting, we observe a sharp upward jump just at the threshold value. Assuming that host countries just above and just below are otherwise similar, and specifically that there are no other systematic differences between these countries affecting CFC groups and non-CFC groups differentially, this jump represents a direct estimate of the effect of CFC targeting on the incorporation probability.

Figure 6:

Incorporation pattern around low-tax threshold



Notes: Only foreign majority owned new incorporations are included. Incorporations from earlier years made by groups in home countries that later implement a low tax threshold are dropped (analogously for home countries that remove a low-tax threshold). We only consider CFC home countries with at least 200 observed incorporations and only groups whose parent is not based in a tax haven. In panel (a) bars represent the average probability-difference within 2pp bins relative to the cut-off. In panel (b) bars represent parameter estimates from a regression of the probability differences on bin dummies describing the placement relative to the tax cut-off. We use the $[-2,0)$ bin as the base bin. Capped lines illustrate 95 percent confidence intervals calculated using a non-parametric bootstrap approach with 500 bootstrap replications. We re-sample within the original dataset of new incorporations clustering at the home country by main industry level. The main industry classification is taken from the NACE rev. 2 overall classification.

In Figure 6 panel (b) we plot the mean within each bin relative to a base bin below the threshold. These points are hence the coefficients from a simple regression of the probability differences on dummies for placement relative to the cut-off. Confidence bands are calculated using a non-parametric bootstrap approach with re-sampling within the original set of new incorporations to account for the uncertainty underlying the initial calculations of probability-differences.³⁹ From this figure we again clearly observe a jump just at the threshold value. The size of the jump is equal to the estimated mean within the first bin above the threshold. As shown in the Appendix Table 7 column (1) this direct discontinuity estimate is equal to 0.0056.⁴⁰ This suggests that CFC targeting causes the probability of incorporation in a host country to drop by 0.56 percentage points.

Comparing mean values of the bins closest to the low-tax threshold is essentially a very simple and intuitive non-parametric implementation of a regression discontinuity design. We continue with a more elaborate regression discontinuity approach investigating robustness to different specifications of the setup and validity of the underlying assumptions.⁴¹

As noted the main assumption underlying our estimate is similarity between hosts above and below the threshold. Within the RD framework this corresponds to the requirement that host countries are not able to perfectly manipulate their placement relative to the low-tax threshold. Such full manipulation could create a situation where host countries with most to gain from avoiding CFC targeting place themselves just above the threshold and hence we would get an upward biased estimate of the effect of CFC targeting. There are several reasons why this is not likely to be the case despite host countries having full control over their corporate tax rate. Firstly, host countries typically set only one tax rate. Low-tax thresholds vary substantially by regime and hence a host can never obtain the same placement for all foreign CFC regimes. Second, most low-tax thresholds vary substantially over time, and hence to obtain the same placement within a single regime over time a host country

³⁹We cluster re-sampling at the main industry level within home countries to account for any dependence between choices over time and across similar multinationals. We use the NACE Rev. 2 to classify the main industry of the parent corporation. This is a very aggregate-level industry classification - i.e. examples of a main industry is for example *Manufacturing* or *Information and Communication*. For parent companies where NACE is unknown we cluster on the group level to account for correlation over time. However, if we instead pool all these multinationals together in one cluster within home countries and treat all missing observations as one industry we get similar results.

⁴⁰In the Appendix Table 7 column (2) we show analogous results allowing CFC countries unaffected by a low tax threshold to enter the control group. This produces a very similar pattern and a similar discontinuity estimate of 0.0045.

⁴¹For a comprehensive and intuitive description of RD designs, with a focus on their application within economics, see Lee & Lemieux (2010).

will have to implement tax reforms following the reforms of the specific home country. Considering the amount of other factors that determine tax rates this is unlikely to be practically feasible.

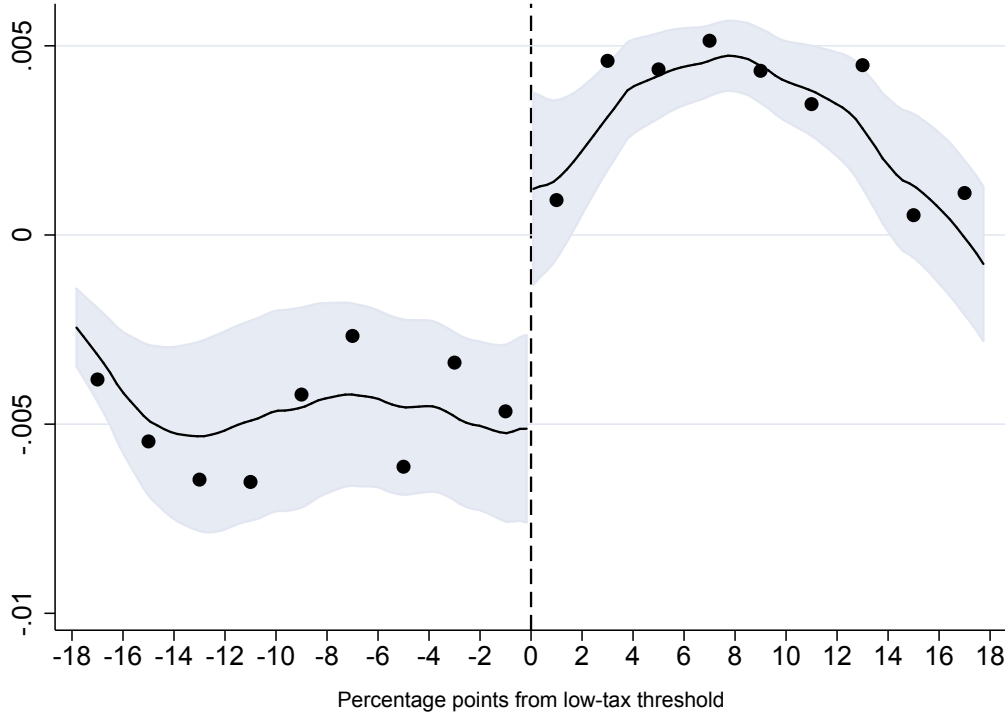
We can more directly test this assumption by looking at the distribution of host countries across the running variable. In the Appendix Figure 14 we consider all the CFC home countries used in the main analysis and calculate for each observed host country in the sample the relative placement to the low-tax threshold in each year. Panel (a) shows the combined histogram for all home countries. The peaks in the figure are created by popular round numbers which tend to be popular choices of corporate tax rate in many countries. Panel (b) shows the same histogram, but removing host countries with a corporate tax rate in the set $\tau \in \{20, 25, 30, 35\}$. Removing these round-number tax rates eliminates the major peaks in the distribution and importantly we do not observe any discontinuity in the distribution at the low-tax threshold. This validates the notion that host countries are not able to perfectly manipulate the running variable and hence our discontinuity estimate is not likely to be biased by sorting of host countries.

In Figure 7 we non-parametrically estimate the CFC targeting effect in a RD setup using local linear regressions on each side of the threshold. We use a triangular kernel function and a bandwidth of 6 percentage points in the estimation. Essentially this means that we use 6 ($\times 2$) percentage points around the threshold to estimate the main effect putting most weight on observations closest to the cut-off. To estimate standard errors we again use a non-parametric bootstrapping approach to account for the additional uncertainty stemming from the calculated probability differences.⁴² The discontinuity estimate corresponding to the specifications in Figure 7 is reported in Table 3 column (1). This estimate is very similar to the simple difference in means reported earlier and indicates that CFC targeting causes the probability of incorporation in a host country to drop by 0.63 percentage points. In columns (2)-(3) we report estimates based on different choices of bandwidth around the threshold. The estimate is very robust to either decreasing (column 2) or increasing (column 3) this bandwidth. In the Appendix Figure 15 we show estimates for all bandwidths in the range 1-15. Apart from the very small bandwidths where estimates are naturally noisy we obtain statistically significant estimates at the 1 percent level which are all close in magnitude to the main estimate. In columns (4)-(6) of Table 3 we instead take a parametric approach and fit a polynomial to either side

⁴²In practice we use 250 values around the threshold to construct the fitted lines in figure 7 and bootstrap each point drawing random samples from the original dataset of new incorporations. When drawing random samples we cluster the re-sampling at the home-country by main industry level to account for the correlation in choices over time and across multinational groups from the same overall industry within the same country.

Figure 7:

Regression Discontinuity Design - Extensive margin response



Notes: Dots represent average probability differences (CFC vs. non-CFC) within 2 percentage point bins relative to the low-tax threshold. The solid line represents fitted values from local linear regressions using a bandwidth of 6 percentage points and a triangular kernel. The grey shaded area represents 95 percent confidence intervals using a nonparametric bootstrapping approach with random samples collected from the main dataset of new incorporations. The re-sampling is clustered at the home-country by main-industry level using the NACE rev. 2 industry classification at the most aggregated level.

of the threshold. We fix the degree of the polynomial to be the same, but allow all parameters to vary on each side of the cut-off. From Figure 7 it is clear that a linear specification would produce an upward biased estimate since we clearly have some curvature on the right side of the threshold. Therefore we start in column (4) with a 2nd degree polynomial and increase the degree to 3 and 4 in the subsequent columns. Using the 2nd degree polynomial produces a relatively large estimate perhaps indicating that we should allow more flexible curvature. Both estimates using higher degree polynomials are very close to the main estimate from column (1).

Exploiting discontinuities and non-parametric estimation has not been the traditional approach in the literature on location choices. This is likely due in part to the rareness of such discontinuities and partly to the lack of within-country variation. To ensure robustness of our results we

Table 3:

Regression Discontinuity Estimates

	(1)	(2)	(3)	(4)	(5)	(6)
	LL	LL	LL	Pol	Pol	Pol
RD Estimate	0.00633 *** (0.00110)	0.00622 *** (0.00130)	0.00637 *** (0.00099)	0.00918 *** (0.00092)	0.00620 *** (0.00108)	0.00671 *** (0.00126)
Bandwidth	6	4	8	—	—	—
Order of polynomial	—	—	—	2	3	4
Observations	3 138	1 926	3 992	9 848	9 848	9 848

Notes: The table shows regression discontinuity estimates using different specifications. The first three columns shows estimates using local linear regressions with a triangular kernel on each side of the threshold. The unit of the indicated bandwidth is percentage points. Columns (4)-(6) show estimates fitting a polynomial on each side of the threshold. We use the same order of the polynomial on both sides of the threshold but allow all parameters of the polynomial to vary. We use all observations on either side and do not restrict to a certain bandwidth around the threshold.

also implement the standard choice model approach.⁴³ The relevant choice model in this context is the McFadden alternative specific conditional logit model, used to analyse the impact of alternative specific variables on choice probabilities. Again we only consider the choice of host country in the initial year of incorporation, since a location decision tends to be relatively persistent causing dependence between initial and subsequent location. We model the effect of CFC targeting on the choice between different foreign host countries conditional on choosing a foreign location. For each year where a multinational opens one or more new subsidiaries the dependent variable takes a value of 1 for the host countries of actual placement and zero for non-selected host countries. Results are reported in the Appendix Table 8. In the first two columns we simultaneously model the location choices of a single multinational across all years, such that each alternative is a specific host in a specific year. This enables the inclusion of year fixed effects. In the last two columns we model the choice within years, such that each alternative is a specific host and a new choice is taken in each year. All specifications include host fixed effects and we cluster standard errors on the alternative level. In both approaches the coefficient on the CFC indicator is negative and sizeable regardless of the inclusion of standard control variables. While the size of these estimates is difficult to compare with our earlier non-parametric results, this result nevertheless confirms the conclusion that CFC tax rules affect international location choices.

⁴³See Barrios et al 2012 for a very related implementation of this approach.

The main findings above suggest that CFC targeting dampens incorporation probabilities by about 0.5-0.7 percentage points. Using our main estimate, a host country moving below the CFC threshold of a foreign home country would experience a 0.63 percentage point drop in the probability of hosting a new subsidiary. This is a rather large effect given that the mean incorporation probability for a specific host in a given year is 4.9 percent if we for each home country and year only consider host countries that actually get a new incorporation. Using this mean as our baseline, CFC targeting causes a 12 percent reduction in the probability of incorporation.

VI. CONCLUSION

The prevalence of CFC legislation among both developed and developing economies today suggests a belief among policy makers in the effectiveness of this measure in curbing international tax avoidance. This belief is expressed by the OECD in their 2015 final report on base erosion and profit shifting, BEPS (OECD/G20, 2015), where a full chapter is solely focused on CFC rules. Also in the EU such views are apparent with CFC rules featuring as one of the five anti-abuse measures included in the anti-tax avoidance directive adopted in 2016. In the context of the EU Directive for a Common Consolidated Corporate Tax Base (CCCTB) relaunched in 2016, CFC legislation is highlighted as a key tool to avoid erosion of the common EU tax base via shifting to third countries.⁴⁴

The conclusions presented in this paper largely support the view that CFC rules are effective in redirecting profits away from low-tax environments. Studying the allocation of financial profit around tax thresholds embedded in current CFC legislation reveals large discontinuities consistent with a movement of profit into higher tax environments. This mechanism is confirmed through an analysis exploiting reform time variation, where we find a 13 percent reduction in financial profit upon entering CFC targeting. This effect could suggest that the largest international tax savings opportunities are effectively eliminated through this border-crossing tax measure.

Our results further provide highly policy relevant insights into the final destination of reallocated profits. We find that the profit reduction within low-tax subsidiaries is accompanied by a subsequent increase within higher tax environments including both the domestic market and foreign higher

⁴⁴This directive suggests common rules across EU countries for computing the corporate tax base combined with an apportionment formula for dividing the taxable profits among member states. Within such a consolidated tax system, member states remain vulnerable to geographical income shifting using low-tax third countries and hence the issues addressed by CFC rules remain highly relevant.

tax countries. Based on estimated spillover effects we conclude that roughly half of this tax base increase accrues to the domestic rule-enforcing country. This highlights the potential of these rules to obtain both international and national objectives of protecting the ability to tax corporate income at higher effective rates. In an international tax environment where coordination has proved challenging the access to an unilateral policy tool with a direct effect on the domestic tax base is potentially essential.

Aside from the effect on the allocation of profits we further look into the consequences of these border-crossing taxes for location decisions. By taxing across domestic borders targeting specific locations, CFC rules affect the discreet investment choice through after tax returns. The design of CFC rules provides us with a unique opportunity to study the responsiveness of location choices to tax policy without imposing the strict parametric assumptions which are usually necessary in this context. Comparing location patterns, around discontinuities introduced by CFC legislation, we show non-parametric evidence that the location choice responds significantly to these rules. A direct discontinuity estimate suggests that the magnitude of such responses are large and can lead to significant changes in the corporate structures of multinationals. This would indicate that CFC rules discourage multinationals from opening tax haven subsidiaries and subsidiaries in other low-tax environments for tax saving purposes. While our results do not speak to the type or function of subsidiaries for which location choices are affected, it seems likely that at least some real economic activity is influenced by these location effects. One could imagine that the location of a subsidiary with heavy R&D activity would be affected due to large amounts of targeted royalty income.

REFERENCES

- [1] Altshuler, R., Hubbard, R.G., 2002. *The effect of the tax reform act of 1986 on the location of assets in financial services firms*. Journal of Public Economics 87, 109-127.
- [2] Barrios, S., Huizinga, H., Laeven, L., Nicodeme, G., 2012. *International taxation and multinational firm location decisions*. Journal of Public Economics 96, 946-958.
- [3] Buettner, T., Ruf, M., 2007. *Tax incentives and the location of FDI: Evidence from a panel of German multinationals*. International Tax and Public Finance 14, 151-164.
- [4] Cameron, A. C., Gelbach, J.B., Miller, D.L., 2011. *Robust inference with multiway clustering*. Journal of Business and Economics Statistics, Vol. 29, No. 2, 238-249.
- [5] Devereux, M.P., Griffith, R., 1998. *Taxes and the location of production: evidence from a panel of US multinationals*. Journal of Public Economics 68, 335-367.
- [6] Devereux, M.P., Liu, L., Loretz, S., 2014. *The Elasticity of Corporate Taxable Income: New Evidence from UK Tax Records*. American Economic Journal: Economic Policy, 6(2), 19-53.
- [7] Devereux, M.P., Maffini, G., 2007. *The impact of taxation on the location of capital, firms and profit: a survey of empirical evidence*. Oxford University Centre for Business Taxation Working Paper 07/02, Oxford.
- [8] Dharmapala, D., Riedel, N., 2013. *Earnings shocks and tax-motivated income-shifting: Evidence from European multinationals*. Journal of Public Economics 97, 95-107.
- [9] Dwenger, N., Steiner, V., 2012. *Profit taxation and the elasticity of the corporate income tax base: Evidence from German corporate tax return data*. National Tax Journal 65(1), 117-150.
- [10] Egger, P.H, Wamser, G., 2015. *The impact of controlled foreign company legislation on real investments abroad. A multi-dimensional regression discontinuity design*. Journal of Public Economics 129, 77-91.
- [11] Halvorsen, R., Palmquist, R., 1980. *The interpretation of dummy variables in semilogarithmic equations*. The American Economic Review 70, Issue 3, June 474-475.

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- [12] Haufler, A., Mardan, M., Schindler, D., 2018. *Double tax discrimination to attract FDI and fight profit shifting: The role of CFC rules*. Journal of International Economics, Volume 114, 25-43.
- [13] Heckemeyer, J.H., Overesch, M., 2013. *Multinationals' profit response to tax differentials: Effect size and shifting channels*. Centre for European Economic Research ZEW, Discussion Paper No. 13-045.
- [14] Hines, J.R., 2010. *Treasure Islands*. Journal of Economic Perspectives, Volume 24, Number 4, 103-126.
- [15] Huizinga, H., Laeven, L., 2008. *International profit shifting within multinationals: A multi-country perspective*. Journal of Public Economics 92, 1164-1182.
- [16] International Fiscal Association (IFA), 2013 Copenhagen Congress. *The taxation of foreign passive income for groups of companies*. Cahiers de droit fiscal international volume 98a. Sdu Uitgevers, The Hague, The Netherlands.
- [17] Kennedy, P.E., 1981. *Estimation with Correctly Interpreted Dummy Variables in Semilogarithmic Equations*. American Economic Review Vol. 71, No. 4, 801.
- [18] Lee, D.S., Lemieux, T., 2010. *Regression Discontinuity Designs in Economics*. Journal of Economic Literature 48, 281-355.
- [19] Mutti, J.H., Grubert, H., 2007. *The effect of taxes on royalties and the migration of intangible assets abroad*. NBER Working Paper No. 13248
- [20] OECD/G20, 2015. *Base Erosion and Profit Shifting Project - Explanatory Statement*, Final Reports. <http://www.oecd.org/ctp/beps-explanatory-statement-2015.pdf>.
- [21] OECD/G20, 2015. *Base Erosion and Profit Shifting Project - Action 3: Designing effective controlled foreign company rules.*, Final Reports. <http://www.oecd.org/tax/designing-effective-controlled-foreign-company-rules-action-3-2015-final-report-9789264241152-en.htm>.
- [22] Ruf, M., Weichenrieder, A.J., 2012. *The taxation of passive foreign investment: lessons from German experience*. Canadian Journal of Economics, Vol. 45, No. 4, 1504-1528.
- [23] Ruf, M., Weichenrieder, A.J., 2013. *CFC legislation, passive assets and the impact of the ECJ's Cadbury-Schweppes decision*. Oxford University Centre for Business Taxation, Working Paper 13/15.

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- [24] The United States Senate, Committee on homeland security and governmental affairs, Permanent subcommittee on investigations. Hearing report from hearing September 20, 2012. *Offshore profit shifting and the U.S tax code - Part 1 (Microsoft and Hewlett-Packard)*. Available at: https://www.hsgac.senate.gov/subcommittees/investigations/hearings/offshore-profit-shifting-and-the-us-tax-code_-part-2 (accessed April 2018)
- [25] The United States Senate, Committee on homeland security and governmental affairs, Permanent subcommittee on investigations. Hearing report from hearing May 21, 2013. *Offshore profit shifting and the U.S tax code - Part 2 (Apple Inc.)*. Available at: https://www.hsgac.senate.gov/subcommittees/investigations/hearings/offshore-profit-shifting-and-the-us-tax-code_-part-2 (accessed April 2018)
- [26] Ting, A., 2014. *iTax - Apple's international tax structure and the double non-taxation issue*. British Tax Review, No.1, 40-71.
- [27] Voget, J., 2011. *Relocation of headquarters and international taxation*. Journal of Public Economics 95, 1067-1081.
- [28] Weichenrieder, A.J., 1996. *Anti-tax-avoidance provisions and the size of foreign direct investment*. International Tax and Public Finance 3, 67-81.
- [29] Zucman, G., 2014. *Taxing across borders: Tracking personal wealth and corporate profits*. Journal of Economic Perspectives - Volume 28, Number 4, 121-148.

APPENDIX A - FIGURES AND TABLES

Table 4:

Descriptive statistics

	Observations	Mean	Std.Dev.	Median
<i>All majority owned subsidiaries¹</i>				
Size of group ²	3 991 878	160	328	31
Host corporate tax rate	3 940 536	28.81	6.93	29.55
Home corporate tax rate	3 980 530	30.73	5.68	30
CFC low-tax cut-off (specified in home country)	2 174 993	20.42	4.03	21
Nr Employees	753 491	183	1 967	18
Total Assets ³	1 259 164	157 398	$3.68 \cdot 10^6$	2 995
Turnover	822 219	98 240	$1.2 \cdot 10^6$	4 837
Operating Profit	841 491	1 862	498 573	57
Financial Profit	860 345	4 699	$1.27 \cdot 10^6$	0

¹ Excluding multinationals from Tax haven countries and banks.

² Measured by the number of firms in the database with the same parent, i.e. members of the group which are not in the database will not be counted.

³ All subsidiary-specific financial variables are measured in thousands of USD.

Table 5:

Home countries in the dataset

Argentina	Colombia	Iran	Moldova	Sierra Leone	The Philippines
Australia	Croatia	Israel	Montenegro	Slovakia	The United Kingdom
Austria	Denmark	Italy	New Zealand	Slovenia	The United States
Belarus	Estonia	Japan	North Korea	South Africa	Turkey
Belgium	Finland	Kazakhstan	Norway	South Korea	Ukraine
Bosnia and Herz.	France	Kuwait	Poland	Spain	United Arab Emirates
Brazil	Greece	Latvia	Portugal	Sweden	Uruguay
Bulgaria	Germany	Lithuania	Romania	Taiwan	Uzbekistan
Canada	Hungary	Macedonia	Russia	Thailand	
Chile	Iceland	Malaysia	Saudi Arabia	The Czech Republic	
China	India	Mexico	Serbia	The Netherlands	

Notes: The table lists non-haven parent countries with more than 100 observations for which ownership is above 50 percent and the main outcome variable (financial profit) is not missing.

Table 6:

Host countries in the dataset

Argentina	Croatia	Iceland	Malaysia	Russia	The Czech Republic
Australia	Cyprus	India	Malta	Serbia	The Netherlands
Austria	Denmark	Ireland	Mexico	Slovakia	The Philippines
Belgium	Estonia	Italy	New Zealand	Slovenia	The United Kingdom
Bosnia and Herz.	Finland	Japan	Norway	South Korea	The United States
Brazil	France	Kazakhstan	Peru	Spain	Turkey
Bulgaria	Germany	Latvia	Poland	Sweden	Ukraine
China	Greece	Lithuania	Portugal	Switzerland	
Colombia	Hungary	Luxembourg	Romania	Taiwan	

Notes: The table lists host countries with more than 100 subsidiary observations for which ownership is above 50 percent and the main outcome variable (financial profit) is not missing.

Table 7:

Subsidiary location choice

Placement relative to threshold	(1)	(2)
$1_{[-18;-16]}$	0.00085 (0.00093)	-0.00053 (0.00083)
$1_{[-16;-14]}$	-0.00078 (0.00083)	-0.00132* (0.00074)
$1_{[-14;-12]}$	-0.00179 (0.00203)	-0.00218 (0.00182)
$1_{[-12;-10]}$	-0.00185 (0.00130)	-0.00088 (0.00093)
$1_{[-10;-8]}$	0.00045 (0.00112)	0.00089 (0.00097)
$1_{[-8;-6]}$	0.00199* (0.00104)	0.00173* (0.00102)
$1_{[-6;-4]}$	-0.00148* (0.00083)	-0.00095 (0.00071)
$1_{[-4;-2]}$	0.00129 (0.00118)	0.00120 (0.00098)
$1_{[-2;0]}$	0	0
<hr style="border-top: 1px dashed;"/>		
$1_{[0;2]}$	0.00560*** (0.00097)	0.00447*** (0.00096)
$1_{[2;4]}$	0.00932*** (0.00147)	0.00620*** (0.00128)
$1_{[4;6]}$	0.00910*** (0.00123)	0.00511*** (0.00124)
$1_{[6;8]}$	0.00985*** (0.00140)	0.00645*** (0.00119)
$1_{[8;10]}$	0.00905*** (0.00163)	0.00554*** (0.00138)
$1_{[10;12]}$	0.00818*** (0.00155)	0.00324** (0.00136)
$1_{[12;14]}$	0.00923*** (0.00194)	0.00489*** (0.00140)
$1_{[14;16]}$	0.00520** (0.00222)	0.00156 (0.00149)
$1_{[16;18]}$	0.00579*** (0.00214)	0.00382** (0.00169)
Total obs	9 857	10 508
R ²	0.006	0.006

Notes: The unit of observation is incorporation probability differences (calculated as explained in the main text). We sort each of these probability differences relative to the relevant low-tax threshold and include on the right-hand-side a dummy for each 2 percentage point bin. We report estimates for the 18 bins closest to the threshold. Dummies for the remaining bins are included in the regression but estimates are not reported here. We use the bin just below the threshold as the base bin. Standard errors are calculated using a bootstrap approach where we re-sample within the pool of new incorporations in the sample years. In column (1) we exclude home-countries with less than 200 observations in the original sample and in the control group we only include countries with no CFC legislation. In column (2) we exclude home-countries with less than 200 observations in the original sample and in the control group we include all countries with no CFC legislation and countries with CFC rules but no low-tax threshold.

Table 8:

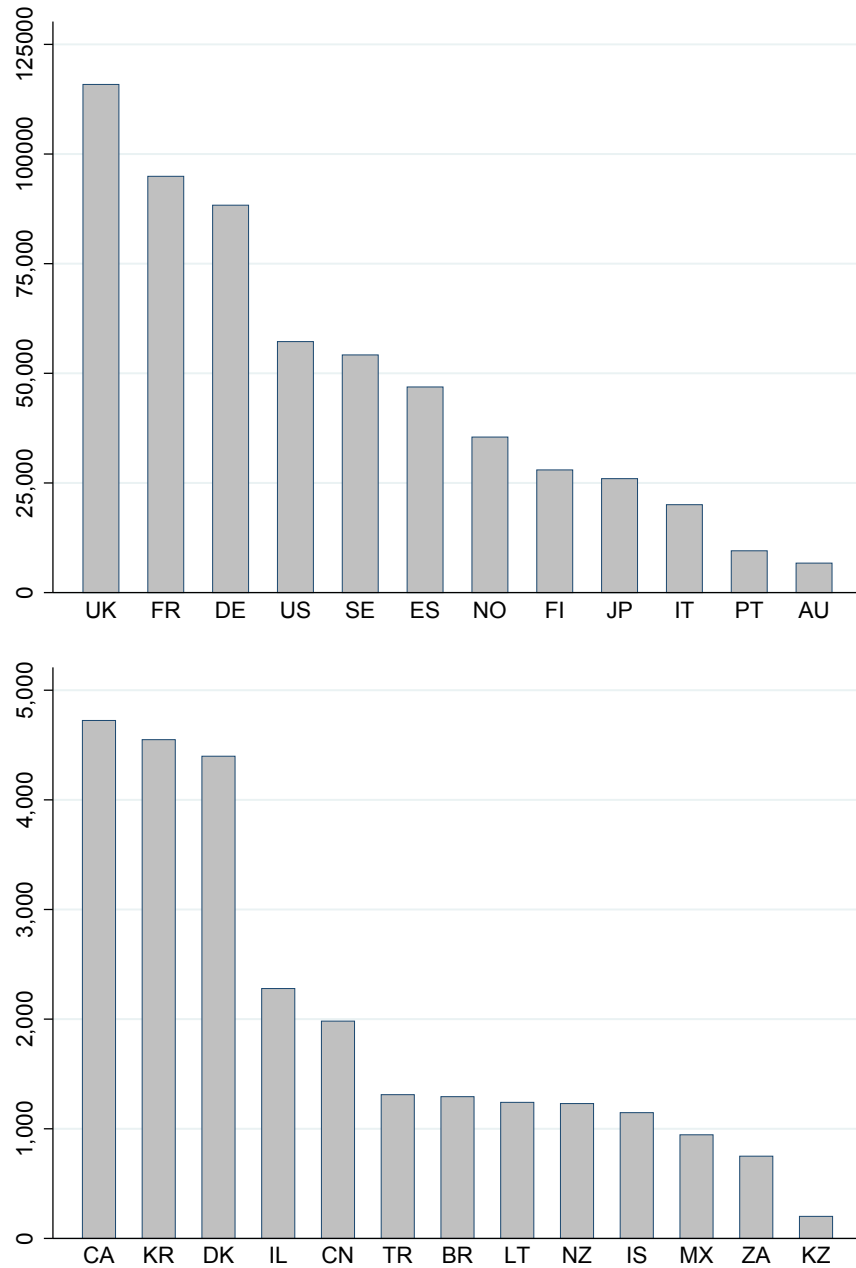
McFadden's conditional logit choice model

	(1)	(2)	(3)	(4)
CFC Indicator	-0.2234*** (0.0734)	-0.3252*** (0.0838)	-0.4515** (0.1838)	-0.3983* (0.2113)
CTR (Host)	-0.0478 (0.0314)	-0.0544 (0.0338)	-0.0525*** (0.0135)	-0.0559*** (0.0131)
GDP relative (Bilateral)		-0.1873** (0.0889)		-0.1930** (0.0791)
GDP per capita (Host)		-0.0000 (0.0001)		-0.0000 (0.0000)
Corruption (Host)		-0.2328 (0.4557)		-0.2284 (0.3296)
Population (Host)		-0.0000 (0.000)		-0.0000 (0.000)
Distance (Bilateral)		-0.0003*** (0.0000)		-0.0003*** (0.0000)
Potential Host FE	✓	✓	✓	✓
Potential Year FE	✓	✓		
Total obs	42 319 441	29 867 199	5 156 403	3 676 885
Choices	38 190	28 738	39 662	37 229

Notes: The table shows results from McFadden's alternative specific conditional logit model. CTR is the top statutory corporate tax rate in the host country. Columns 1-2: For each group that incorporates a new subsidiary in the sample period we create a binary variable for each potential host country in each year, equal to one if the group incorporates a new subsidiary in the specific host in the given year. Columns 3-4: For each year we observe a multinational group incorporate a new subsidiary we create a binary variable for each potential host country in the sample, equal to one if the group chooses that location for a new subsidiary. In the cases where the same multinational firm opens several subsidiaries in the same year and host country, we collapse and count this as only one new incorporation since these are unlikely to be independent observations. Each estimation contains fixed effects at the potential host country level and in columns 1-2 we are also able to include fixed effects on the potential year level. Standard errors are clustered at the alternative level i.e. in columns 1-2 at the potential host times potential year level and in columns 3-4 at the potential host level.

Figure 8:

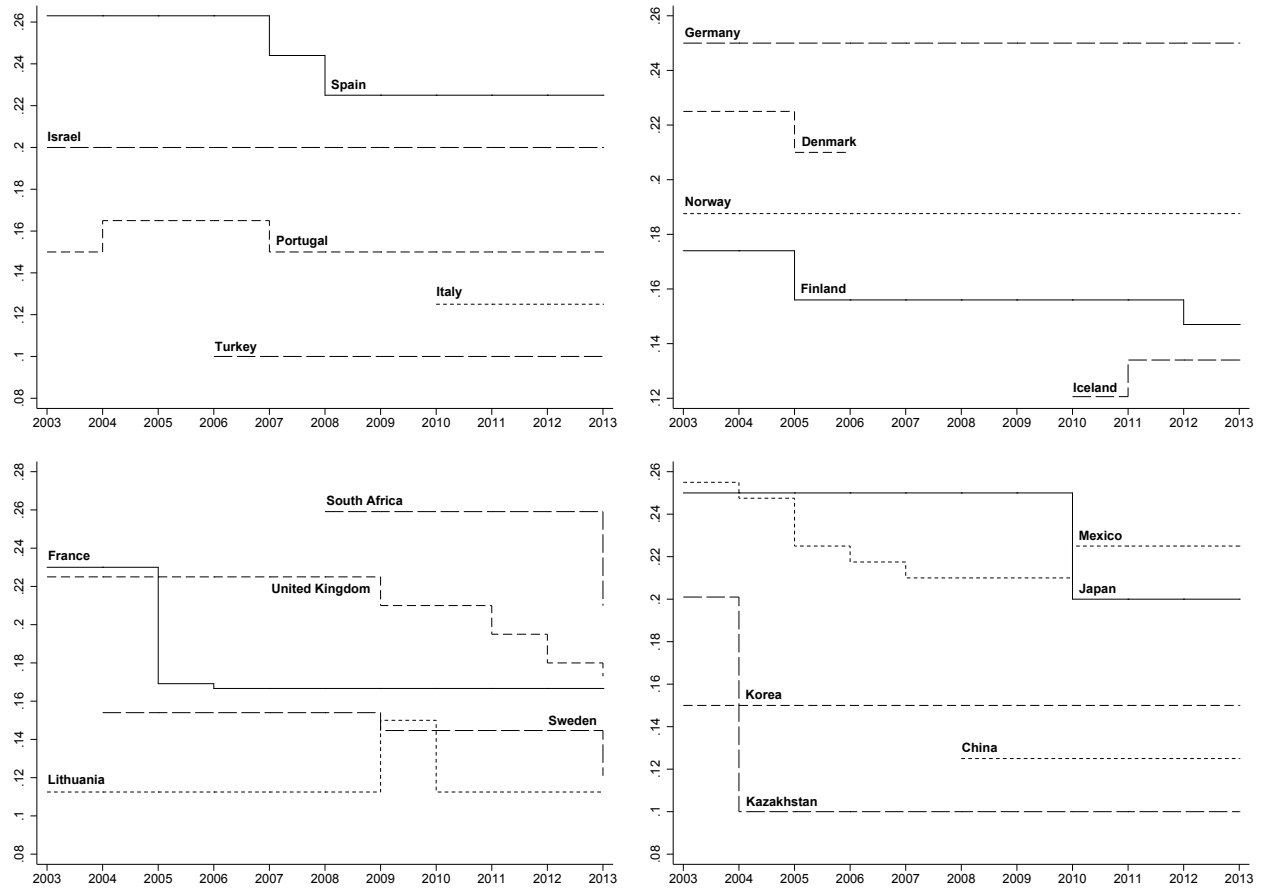
Number of observations by parent-country (only countries with CFC legislation)



Notes: The figure shows the number of observations on the key outcome variable, financial profit, within multinational groups by home-country of the group parent. We only consider observations where the parent is located in a home country with CFC legislation and only subsidiaries with a known ownership percentage above 50 percent are included. The top panel shows countries with more than 5000 observations, and the lower panel shows countries with less than 5000 observations.

Figure 9:

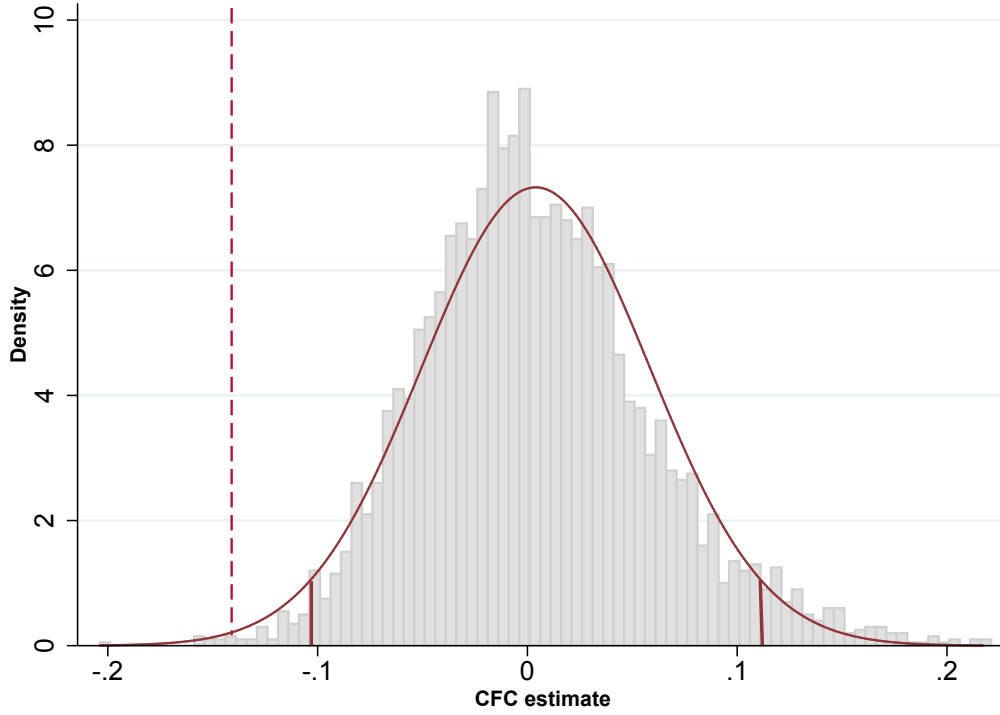
The CFC low-tax thresholds over the sample period 2003-2013



Notes: The graph illustrates low-tax thresholds over the sample period in the countries where a threshold is specified in the CFC legislation. Note that CFC legislation in many cases refers to an effective tax rate instead of a statutory tax rate. In these cases the illustration shows the approximation given by the statutory rate.

Figure 10:

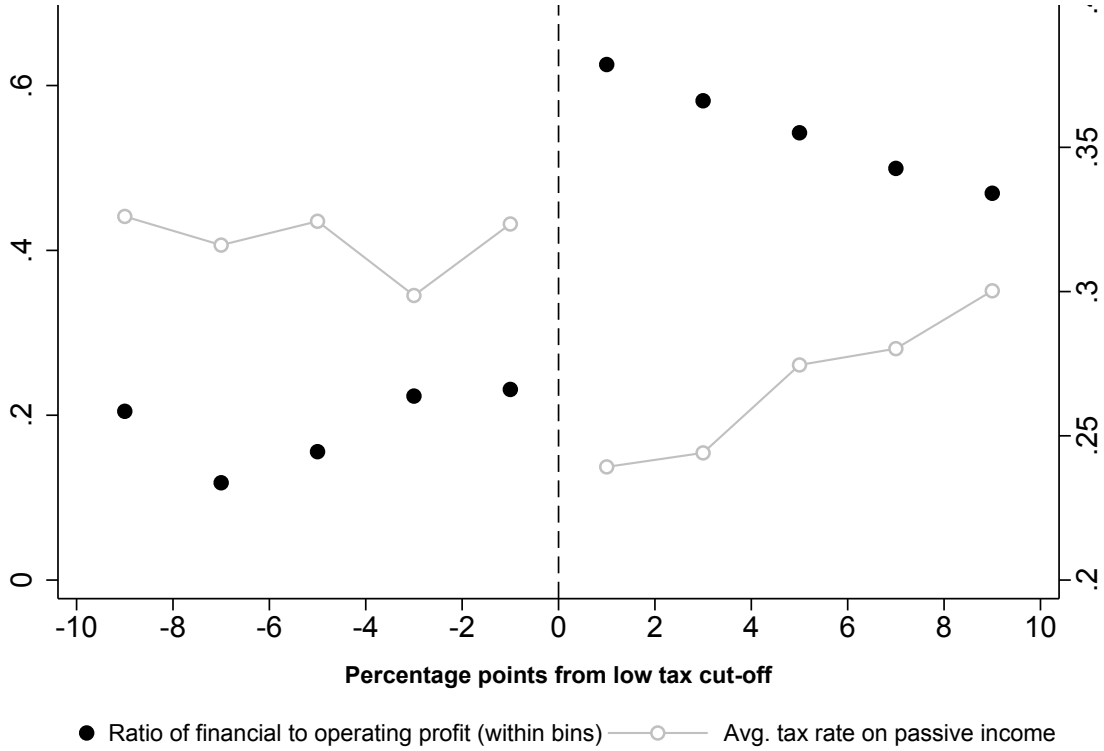
Placebo test - Moving threshold



Notes: The graph shows a histogram of placebo CFC estimates. To produce each estimate we randomly subtract or add a number drawn from a uniform distribution on the interval $[1; 10]$ to the true low-tax threshold. We draw a number for each home-host combination and add/subtract the same number in all years. We use the main specification: dependent variable $\ln(\text{financial profit})$, controlling for $\ln(\text{other assets})$, $\text{year} \times \text{host time trends}$, $\text{year} \times \text{home time trends}$ and subsidiary fixed effects. This estimation is replicated 4000 times and the histogram shows the resulting distribution of these estimates. The solid line shows the density function of the normal distribution with mean (0.0040) and standard deviation (0.0544) equal to the mean and standard deviation in the pool of placebo estimates. The vertical solid lines indicate the critical values (0.025, 0.975) of this distribution. The dashed vertical line shows the main estimate (-0.1410) from Table 1 using the true threshold for estimation.

Figure 11:

Financial profit around low-tax threshold

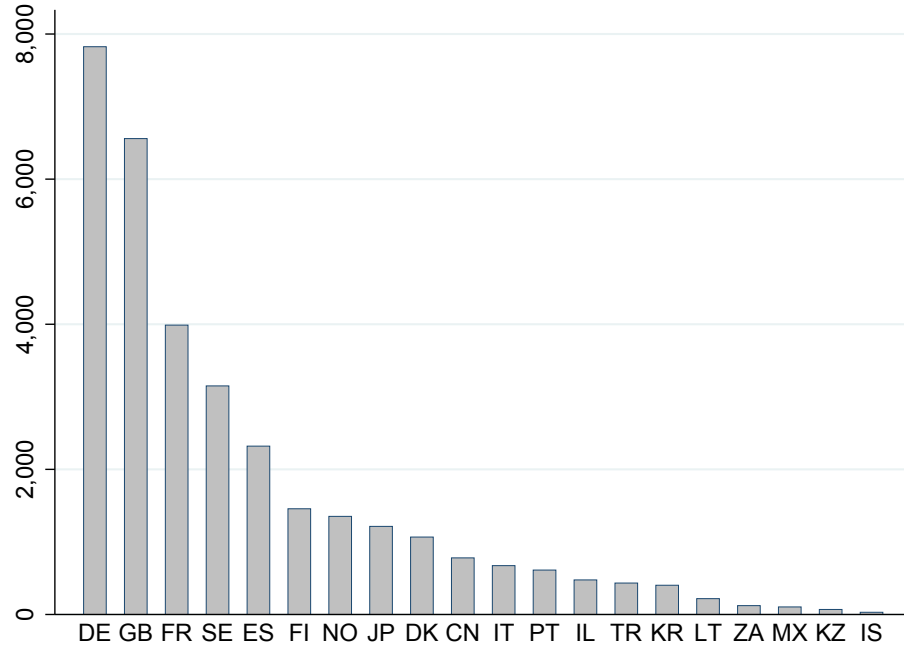


Notes: Filled circles (left axis) represent the total ratio of financial to operating profit within each 2 percentage point bin. Hollow circles (right axis) represent the average tax rate on passive income faced by the subsidiaries within each bin. Above zero (i.e. above the tax threshold) this is the average host CTR faced by subsidiaries in their respective host countries. Below zero (i.e. below the tax threshold) this is the average home CTR i.e. the corporate tax rate in the country where the parent of the subsidiary is located. We condition on positive operating- and financial profit and use only home-countries with an implemented CFC regime (with a specified tax threshold). Foreign subsidiaries with a known ownership percentage above 50 percent are included. We leave out domestic subsidiaries to avoid random fluctuations due to home-bias. We further exclude financial corporations and banks to ensure that operating profit is a meaningful scaling variable. We are not able to extend the figure further to the left due to data coverage. The data availability at such low tax rates is very limited.

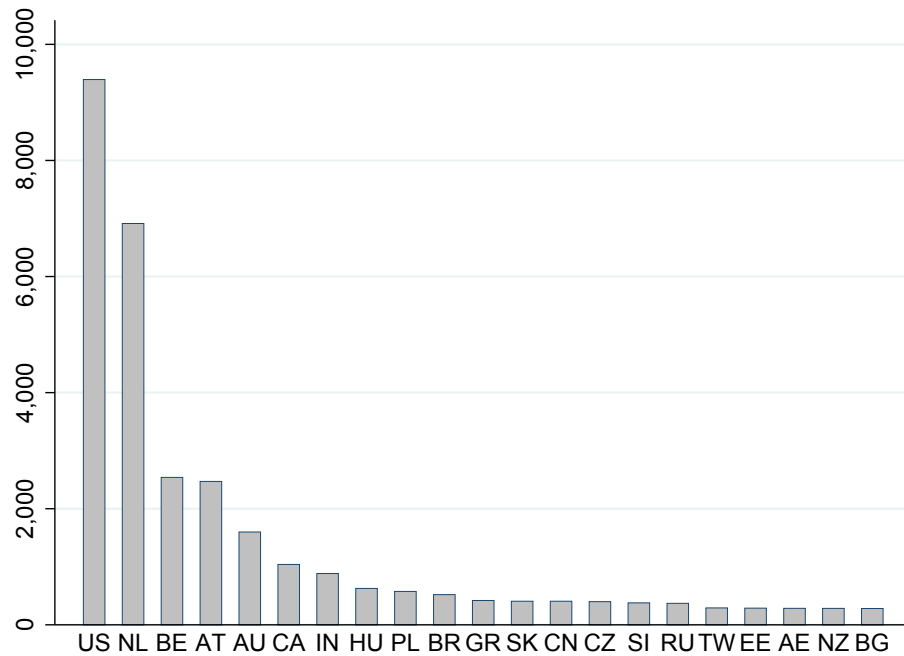
Figure 12:

Number of new incorporations (2003-2013) by parent-country

(a) Countries with CFC low-tax threshold



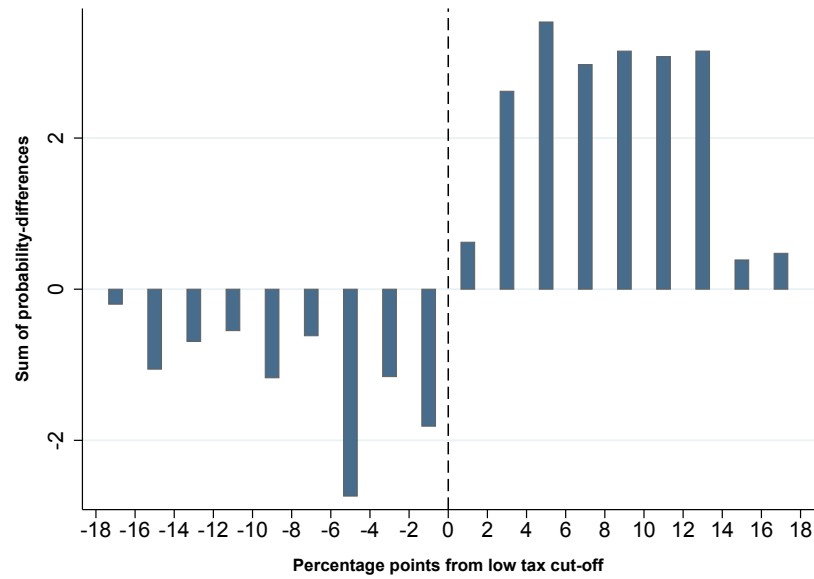
(b) Other countries excluding tax havens (>250 obs)



Notes: The figure shows the distribution of new majority owned foreign incorporations across home countries (i.e. place of group-parent). Panel (a) shows all home countries with a CFC regime including a low-tax threshold, while panel (b) shows the remaining home-countries excluding tax haven countries and countries with less than 250 new incorporations (We include home countries with less than 250 incorporations in the analysis, but for space issues we cannot show them here).

Figure 13:

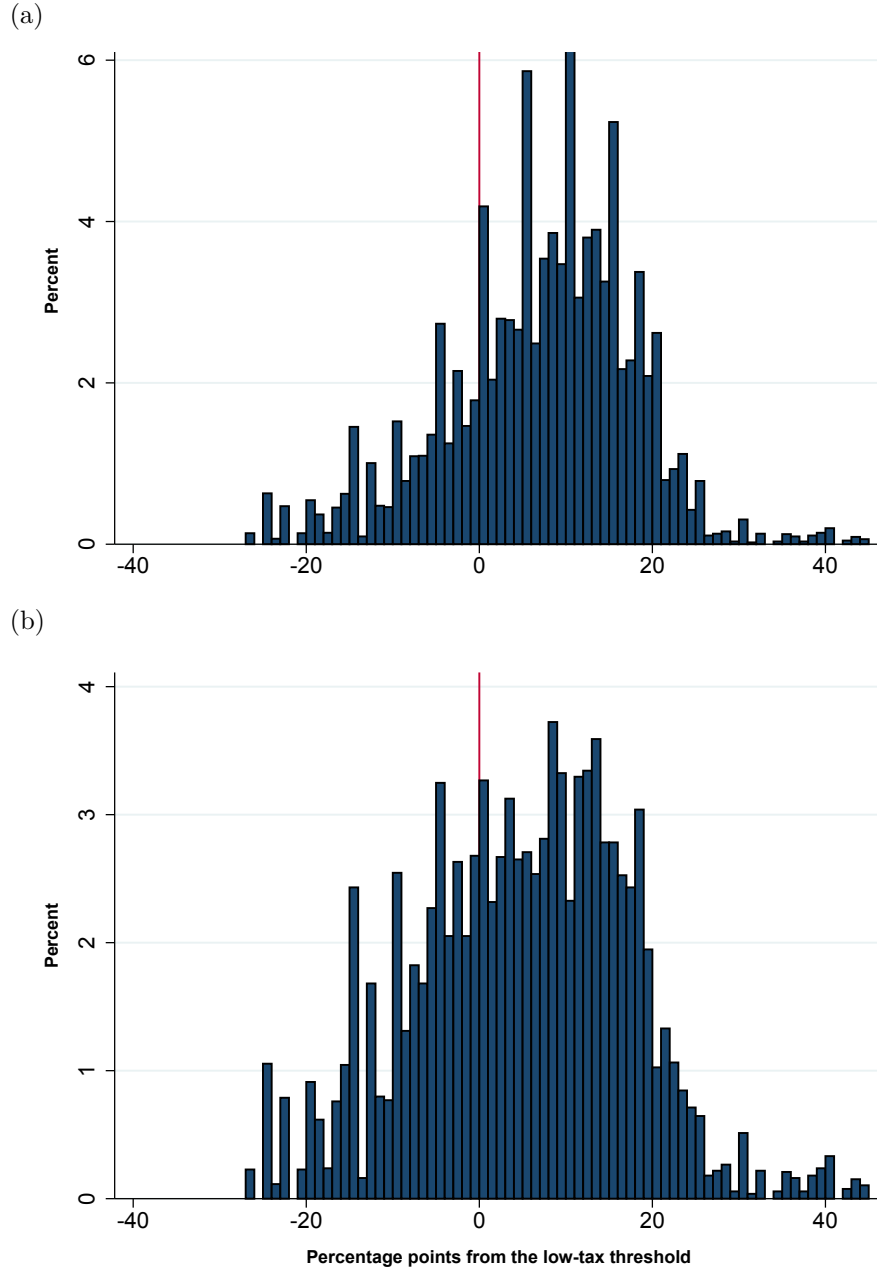
Differences in incorporation probabilities (CFC groups vs. other groups)



Notes: Bars represent the sum of probability-differences within 2pp bins relative to the cut-off. Only majority owned foreign subsidiaries are included. Incorporations from earlier years made by groups in home countries that later implement a low tax threshold are dropped (analogously for home countries that remove a low-tax threshold). We only consider CFC countries with more than 200 observed incorporations and only groups whose parent is not based in a tax haven.

Figure 14:

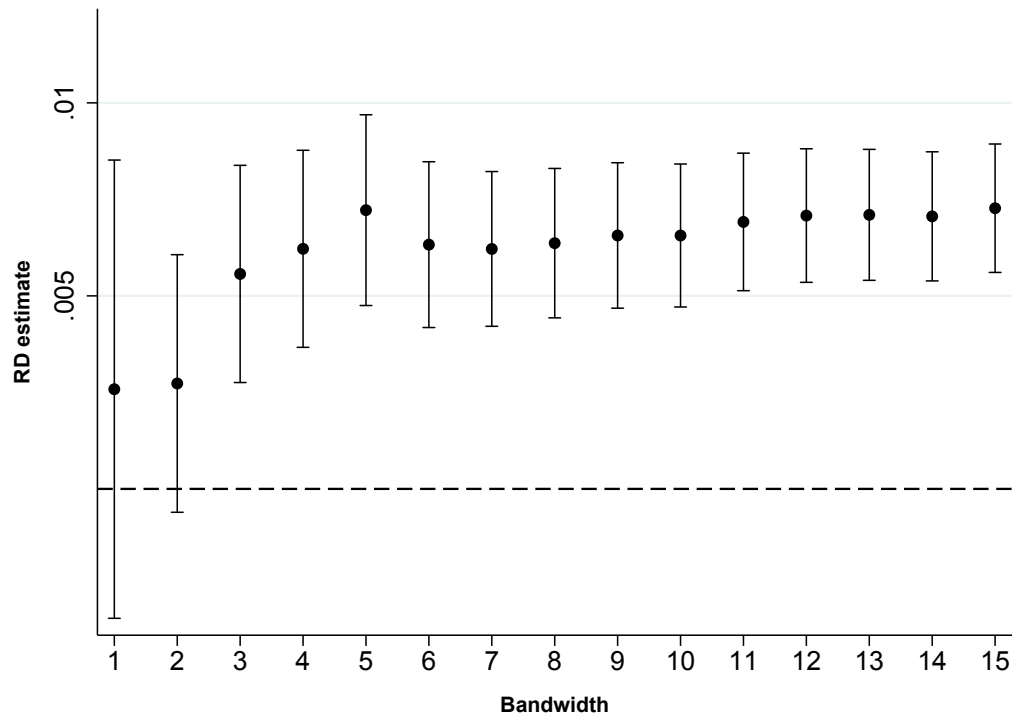
Distribution of host countries relative to the threshold



Notes: The figure shows histograms of the number of host countries relative to the low-tax threshold. I.e. For every year each of the 133 host countries in the dataset are sorted by their corporate tax rate relative to the low-tax threshold of each of the 16 CFC home countries used in the main analysis (all CFC home countries with more than 200 observed incorporations in the sample period). The figure hence shows how many (observed) host countries have a tax rate above/below the low-tax threshold specified in these 16 CFC countries. In panel a) we show all host countries in all years. In panel b) we drop host countries that have a corporate tax rate in the set $[20, 25, 30, 35]$. The red line indicates $x = 0$.

Figure 15:

Robustness of the RD estimate to bandwidth choice



Notes: The figure shows RD estimates using local linear regressions and a triangular kernel. Each point represents an estimate with a different choice of bandwidth as indicated in percentage points on the x-axis. Capped lines represent 95 % confidence intervals calculated using non-parametric bootstrap with clustered re-sampling at the home by main industry level (Using the NACE rev. 2 overall industry classification).

APPENDIX B - A SPECIAL CASE: THE US SUBPART F LEGISLATION

As shown in Appendix C the United States introduces CFC legislation, known as *Subpart F*, already in 1962 and the tax code still contains *Subpart F* legislation throughout our sample period 2003-2013. However, in 1997 the implementation of other tax provisions in the tax law almost effectively deactivates the US CFC regime. In many ways one can argue that the US has CFC legislation, but lacks an active CFC regime. Therefore we regard the United States as a special case and we do not include the US rules in the main analysis. We explain in more detail below why the United States is not included as a CFC country and we look at the robustness of the main result to the inclusion of the United States.

In 1997 *check-the-box* tax regulations are enacted in the US.⁴⁵ With this legislation multinationals are given the right to choose the entity classification of each of their subsidiaries. By allowing multinationals to choose which subsidiaries are regarded as separate corporations and which are disregarded for federal tax purposes, this legislation effectively dismantles the US CFC legislation. The simplicity of a setup that avoids the US *Subpart F* rules is best illustrated through an example. Consider a US multinational corporation that owns a subsidiary in Belgium named Sub BE. Assume that Sub BE owns a subsidiary in Ireland, Sub IE. The US multinational can choose the classification of these two entities for US tax purposes due to *check-the-box* regulation and can hence elect Sub IE to be a disregarded entity. This means that for US tax purposes Sub IE becomes an integrated part of Sub BE and hence the two subsidiaries constitute one single entity. Say that Sub IE provides a loan to Sub BE, and hence interest payments are paid from Belgium to Ireland. Because Sub IE is a disregarded entity, these interest payments effectively disappear in the eyes of the US tax authority because they happen within a single entity. Consequently such standard passive income accruing to a subsidiary in a low-tax country is not affected by the US CFC rules. In Belgium both subsidiaries classify as corporations and hence the Belgian subsidiary can deduct the interest payments as a deductible expense. In this very simple way a US multinational can generate passive income in every low-tax environment without activating US CFC legislation. Importantly this outcome is obtained through a specific entity classification which multinationals are free to choose themselves. To some extent one could argue that *check-the-box* rules make CFC targeting voluntary for US multinationals.

⁴⁵The description of the legislation in this section does not give a full overview of the details, exceptions etc. of *check-the-box* regulations. We only attempt to give an overview of how *check-the-box* matters for the practical feasibility of a CFC regime.

In 2006 another piece of legislation, with similar consequences for CFC taxation, comes into effect. This law is known as the CFC *look-through-rule* and is at first a temporary measure which is later extended for multiple years. This law excludes several types of passive income from *Subpart F* taxation provided that the income stems from another related controlled foreign corporation. By disregarding payments from one subsidiary to another this rule basically obtains the same outcome as *check-the-box* regulations in terms of the effect on the CFC regime.

In two parliamentary hearings in 2012 and 2013 a subcommittee of the U.S. Senate committee on homeland security and governmental affairs investigates issues related to profit shifting by US multinationals. With a special focus on Microsoft, Hewlett-Packard and Apple Inc. the subcommittee looks into profit shifting strategies and the relation to specific aspects of the US tax code.⁴⁶ In the hearing memorandum from the first hearing report the subcommittee concludes on part of the investigation: *"In FY2011, Microsoft Corporation excluded an additional \$2 billion in U.S. taxes on passive income at its offshore subsidiaries, relying on the "check-the-box" regulations and the controlled foreign corporation (CFC) "look-through" rule, which have undermined the intent of the tax code's Subpart F to prevent the shifting of passive CFC profits to tax havens to avoid U.S. tax"*⁴⁷. In the second hearing report they write *"..., regulations, temporary statutory changes, and certain statutory exceptions have nearly completely undercut the intended application of Subpart F."*⁴⁸

These statements vividly describe the consequences of *check-the-box* regulation for the US CFC regime. Such rules effectively remove the relevance of *Subpart F* legislation. For this reason we do not regard the United States as one of the CFC countries in our main sample, but for completeness we look separately at the US case below. We also check the robustness of our main result to re-classifying the US as a country with an active CFC regime.

First we use the main specification from Table 1 column (1) and include the United States as a CFC country. Remember that the US legislation contains a low-tax threshold set at 90 % of own-tax level. In Table 9 column (1) we simply replicate the main specification from Table 1, and hence the CFC estimate is *not* based on information for the US. In column (2) we add the US as a CFC country along with the original sample. The coefficient estimate on the CFC indicator remains negative, sizeable and significant at the 5 percent level. In other words the choice of whether to include the US does not change the main result of a large negative impact of CFC targeting on passive profits.

⁴⁶For a detailed description of the corporate structure of Apple Inc., and how they have circumvented the US *Subpart F* rules using *check-the-box*, see Ting (2014).

⁴⁷From the United States Senate, hearing report (2012), memorandum page 2.

⁴⁸From the United States Senate, hearing report (2013), memorandum page 12.

Table 9:

The US CFC rules

	Outcome: $\ln(\text{financial profit})$		
	(1)	(2)	(3)
CFC Indicator	-0.1410*** (0.0342)	-0.0805** (0.0357)	-0.1407*** (0.0347)
CFC ^{US} Indicator			-0.0181 (0.0419)
$\ln(\text{Other assets})$	0.6975*** (0.0359)	0.6974*** (0.0359)	0.6975*** (0.0359)
Subsidiary FE	✓	✓	✓
Year \times Host FE	✓	✓	✓
Year \times Home FE	✓	✓	✓
Total obs	234 236	234 236	234 236
Subsidiaries	63 742	63 742	63 742
Total obs w. CFC=1	9 252	24 025	9 252
R^2	0.40	0.40	0.40

Notes: The unit of observation is majority-owned subsidiaries (excluding banks) within multinational groups with at least 3 entities, where the parent corporation is not located in a tax-haven country. The dependent variable is the natural logarithm of financial profit. Single-year shifts in the CFC indicator (i.e. subsidiaries moved below (above) the threshold by a reform one year and back above (below) by another reform the next year) are not acknowledged as shifts since reforms can happen at any time during a year and hence we cannot know how many months were between such reforms. In practice we keep the CFC indicator constant across such shifts (i.e. if the shift is above and back below the indicator remains at 1 throughout). Two-way clustered standard errors at the home-country and the host-country level are reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note however that the inclusion of the US causes a drop in the magnitude of the estimate. For the reasons explained above we do not expect US owned subsidiaries to experience a change in CFC status when crossing the threshold. Since US owned subsidiaries constitute a relatively large portion of the observations in the sample a lack of response among these subsidiaries has the potential to severely bias the coefficient estimate towards zero. In column (3) we again only include the original sample of CFC countries in the definition of the CFC Indicator, but create a separate variable for the US system. In other words CFC^{US} is an indicator variable equal to 1 if firm f in year t is owned by a US parent corporation and is below the US threshold. While the coefficient estimate on the US targeting variable is negative, it is close to zero and statistically insignificant on all traditional significance levels.

The fact that we obtain a statistically insignificant estimate, when looking solely at a single CFC regime, is not surprising as the specification using a full set of subsidiary fixed effects requires substantial reform variation. However, if we compare the coefficient estimate for the US to coefficient estimates for countries that contribute with comparable levels of data and variation we generally obtain numerically much larger coefficients for other countries. Looking at the five CFC countries providing most variation in the data we get coefficient estimates ranging from -0.1032 to -0.1600 .⁴⁹ Note that each of these estimates are associated with large standard errors and hence substantial uncertainty. Consequently this comparison between coefficients is suggestive but in no way statistically conclusive.

While it is beyond the scope of this paper to provide a full picture of the US tax rules for foreign income, our results suggest that the US is in fact a special case. Why the tax code includes these counter-working provisions is an interesting question in itself but a question outside the main focus of this analysis.

⁴⁹These countries are The United Kingdom, Japan, Germany, Spain and France.

APPENDIX C

Overview of CFC legislation (2003-2013)

Country	Year of intro.	Concerning years	Tax cut-off	Country list	Control requirement	Exemption related to type of income/assets
Australia	1990	2003-2013	-	Grey list	Three tests of control: (i) Strict control: > 50 % interest owned by 5 or less res. shareh. (must be 1 % entities and control is associate inclusive - AI). (ii) Objective de facto: Single res. entity with (AI) control interest of > 40 % (iii) Subjective de facto: Other forms of "control" in economic sense by 5 or fewer res. entities. Further: Separate entity only attributable if it has (AI) control interest > 10 % (special rule of > 1 % if control based on (iii))	Active income test: several conditions on transparency and compliance with accounting principle plus tainted income ratio must be less than 5 %. De minimis: Entity is in a listed country AND EDCI ¹ < min(AUD 50.000, 5% of gross turnover)
Brazil	2001	2003-2013	-	-	Company must be either controlled or affiliated. Controlled: shareh. has rights assuring influence over business decisions and power to appoint majority of administrators (directors or officers). Affiliated: requires "relevant influence" - this is assumed when > 20 % of voting stock is owned.	. ²
Canada	1972	2003-2013	-	-	Taxpayer's equity percentage > 1 % and total equity percentage of taxpayer and related persons > 10 %. Further taxpayer (along with the three classes of persons) ³ must have voting control.	If tainted (FAPI) income < \$ 5.000.
China	2008	2008-2013	50 %	White list ⁴	> 10 % of shares with voting rights and > 50 % of shares w. other res. shareholders. Or effective control.	If "mainly" active (in practice: > 50% active income)
Denmark	1995	2003-2006	75 %	-	Controlling interest	< 33.3% of total taxable income is financial
Denmark	1995	2007-2013	-	-	Decision-making influence: > 50% of voting rights	< 50% of taxable income is tainted < 10 % of total assets are financial
Finland	1995	2003-2013	60 %	Blacklist	> 50 % capital or voting rights, or entitled to > 50 % of yield of net wealth - aggr. across res. shareh. AND	If income mainly from shipping, industrial or oth. comparable production

Continued on next page

¹EDCI: "Eligible designated concession income" - refers to income in (listed) countries that is not deemed "comparably taxed", i.e. income benefiting from preferential regime or a gap in tax base.

²The Brazilian CFC regime targets both passive and active income.

³The three classes of persons: 1. persons not dealing at arm's length with the taxpayer. 2. Any four Canadian resident persons - there does not have to be any relationship between the taxpayer and the four other Canadian shareholders. 3. Persons not dealing at arm's length with the four shareholders mentioned earlier.

⁴Only effective since 2009

Table 1 – *Continued from previous page*

Country	Year of intro.	Concerning years	Tax cut-off	Country list	Control requirement	Exemption related to type of income/assets
					each shareh. > 25% interest.	activity. If entity located in tax treaty country, not on "blacklist", and has "economic substance".
France	1980	2003-2004	67%	-	> 10% of shares, interest shares, financial rights or voting rights.	
France	1980	2005-2012	50%	-	> 50% of shares, interest shares, financial rights or voting rights. OR > 5% of shares and > 50% shares, interest shares, financial rights or voting rights held by resident shareholders.	If profits come from an "effective industrial or commercial activity" carried out in own territory AND < 20% of profits derive from "tainted" income.
Germany	1972	2003-2007	25	White- and blacklist ⁵	> 50 % of shares or voting rights held by resident shareholders.	< 10 % of overall gross income is passive and the disregarded amount < €62.000 (both at CFC level and at shareh. level across subs.). Selected industries are exempt - such as insurance and banking.
Germany	1972	2008-2013	25	White- and blacklist ⁶	> 50 % of shares or voting rights held by resident shareholders.	< 10 % of overall gross income is passive and the disregarded amount < €80.000 (both at CFC level and at shareh. level across subs.). Selected industries are exempt - such as insurance and banking.
Iceland	2009	2010-2013	67 %	-	> 50 % of capital or voting rights. If in other way "control" can be established.	If located in a tax treaty state AND < 50 % tainted (passive) income.
Israel	2003	2003-2013	20	-	> 50 % of any "means of control" ⁷ owned by res. shareh. in aggr.; OR > 40 %, and > 50% along with non-res. relative. OR a res. has right to prevent taking of substantive managerial decisions. The shareholder in question must hold separately (or with relative or similar) > 10 % of any "means of control".	< 50 % of income and of profits derive from passive (tainted) income.
Italy	2002	2003-2005	-	Blacklist	> 50 % of voting rights OR sufficient voting rights to	Carrying out true industrial/commercial

*Continued on next page*⁵ Only function as unofficial and unbinding lists of guidance⁶ Only function as unofficial and unbinding lists of guidance⁷ The term "means of control" is defined as one of the following: a) right to profits, b) right to appoint director or chief executive officer, c) right to vote in the general meeting, d) right to a share in the remainder of assets after a dissolution, e) right to instruct someone who has any of the rights listed above.

Table 1 – *Continued from previous page*

Country	Year of intro.	Concerning years	Tax cut-off	Country list	Control requirement	Exemption related to type of income/assets
					exert "dominant influence" OR contractual ties permitting "dominant influence"	activity (as main activity) on local market OR If proven that CFC is not set up for tax avoidance purposes (> 75% of income taxed in non-blacklist states).
Italy	2002	2006-2009	-	Blacklist	> 20 % of financial rights	(Same as above)
Italy	2002	2010-2013	50%	Blacklist	> 50% of voting rights OR sufficient voting rights to exert "dominant influence" OR contractual ties permitting "dominant influence". If in blacklist: > 20 % of profits.	< 50% "tainted income" and entity in a non-blacklist territory OR in a blacklist territory carrying out true industrial/commercial activity on local market OR in a blacklist territory and > 75 % of income taxed in non-blacklist states.
Japan	1978	2003-2009	25	-	> 50 % of shares, capital, voting rights or rights to receive dividends (separately or aggr. across res. shareholders (each > 5%))	If CFC engages in "substantive business" (list of criteria for this classification is given) ⁸
Japan	1978	2010-2013	20	-	> 50 % of shares, capital, voting rights or rights to receive dividends (separately or aggr. across res. shareholders (each > 10%))	If CFC engages in "substantive business" (list of criteria for this classification is given)
Kazakhstan	1995	2003	67%	-	>10 % authorized capital or voting shares (directly or indirectly)	. ⁹
Kazakhstan	1995	2004-2013	10	Blacklist ¹⁰	>10 % authorized capital or voting shares (directly or indirectly)	
Korea	1996	2003-2013	15 ¹¹	Blacklist ¹²	A "special relationship" ¹³ between the resident and the	If CFC actively engages in business

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⁸ Parts of the CFCs income can still fall under CFC taxation if this income is passive and generated for certain types of assets (interest from bonds, royalties from IP etc.)

⁹ Kazakhstan does not differentiate between active and passive income of the CFC, and also has no exemptions related to types of income.

¹⁰ Introduced in 2005.

¹¹ This rate refers to the average effective income tax rate for the most recent three consecutive years.

¹² Only in the years before 2010.

¹³ A "Special relationship" is defined as either of the following: a) ownership of > 50 % of voting shares b) third party owns > 50 % of voting shares of the two parties considered c) common interests through investment, transaction of goods, loan etc. and power to make business decisions on behalf of the company d) common interests through investment, transaction of goods, loan etc. and third party has power to make business decisions on behalf of both parties considered.

Table 1 – *Continued from previous page*

Country	Year of intro.	Concerning years	Tax cut-off	Country list	Control requirement	Exemption related to type of income/assets
Lithuania	2002	2003-2013	75%	Grey- and blacklist	foreign company must be present. Furthermore the resident must separately ¹⁴ own > 10 % of shares or capital. > 50% of shares, or other rights to profit (or rights to acquisition thereof) aggr. across related residents. Shareholder must separately hold > 10 % of shares or other rights to profits (or rights to acquisition thereof)	through fixed place such as office, shop, factory etc. ¹⁵ . Or "De minimis" : If earned profits < KRW 200 million. If income of the CFC comprises < 5 % of the income of the shareholding (controlling) corporation.
Mexico	1997	2003-2013	75%	Blacklist ¹⁶	Ability of shareh. (or connected persons) to determine timing of profit distribution (control is assumed until proven otherwise). Based on avg. daily participation	<20% of the CFC's total income is passive. ¹⁷
New Zealand	1988	2003-2013 ¹⁸	-	Grey list ¹⁹	Group of five or less res. hold > 50 % "control interest" or control exercise of decision making rights. Or single res. holds >40% "control interest". ²⁰ (Res. generally only taxed if owning >10 % income interest)	The CFC is exempt if < 5% of gross income is passive. Australian CFCs (taxed in AU) are (generally) exempt. Insurance industry is exempt.
Norway	1992	2003-2013	67 %	White- and blacklist	> 50 % of shares or capital is owned or controlled (separately or aggr. across res. shareholders)	If a DTA is in place and income of the CFC is "not mainly of passive character"
Portugal	1995	2003-2013	60%	Blacklist	Resident shareholder have holding of > 25 % OR > 10 % if > 50 % of share capital held by Portuguese tax res. entities	Entity excluded if: 1. > 75 % of profits from agricultural/industrial activity in own juris., or commercial activity not with Portuguese entities. 2. Cannot engage in specified transactions ²¹ .

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¹⁴When ownership percentage is determined the ownership of the following relatives are counted: spouse, lineal relatives and siblings, spouse of lineal relatives in same household, lineal relatives and siblings of a spouse in the same household.

¹⁵There are a few exceptions to to this rule, namely: a) the exemption does not come into effect if the CFC is doing business in wholesaling, financing, insurance, property rental or business services AND its aggregate revenue and aggregate purchase cost generated from these activities exceeds 50% of total revenue or total purchase cost b) exemption is not valid if CFC's primary business (i.e. revenue from activity represents more than 50 % of total revenue) is owning stocks, equities or bonds or providing IP rights, leasing ships, aircraft or equipment or making investments in trusts or funds.

¹⁶This list is currently just for reporting purposes and no longer determines CFC treatment. Resident taxpayers must each year report any income earned from a listed country.

¹⁷If the CFC is liable for CFC taxation both passive and active income will be taxed.

¹⁸The rules were significantly reformed in 2008. Before both passive and active income of the CFC was taxed, while from 2009 only passive income was targeted.

¹⁹This list exempted companies resident in one of the mentioned countries if they had not benefited from certain specified tax preferences. The original list contained: Australia, Canada, Japan, Germany, UK, US and Norway. Spain was added in 2006. The grey list was abolished in 2008.

²⁰A "control interest" can be either shareholdings, rights to receive income or rights to receive distributions of net assets. It can be either direct or indirect and also counts holdings of associated persons.

²¹The business of the corporation must not involve the following: a. Transactions traditionally related to banking activities. b. Transactions related to insurance business (if income relates to the insurance of assets located mostly outside own jurisdiction). c. Transactions related to equities, other securities, IP, industrial property, knowhow or the rendering of technical assistance. d. Leasing of assets (except land and property in own jurisdiction).

Table 1 – *Continued from previous page*

Country	Year of intro.	Concerning years	Tax cut-off	Country list	Control requirement	Exemption related to type of income/assets
South Africa ²²	2001	2008-2013	75%	-	> 50 % of participation rights ²³ , or > 50% of voting rights aggr. across res. persons. (voting rights in listed companies not counted, and if single res. holds < 5 % in a listed company also not counted). Shareholder must separately (or with connected person) hold > 10 % of participation rights or voting rights to be subject to CFC taxation.	If CFC has a "place of business" (FBE), defined by characteristics such as "on site employees" etc., AND the tainted income < 5% of total amounts accrued to the CFC attributable to the FBE.
Spain	1994	2003-2013	75% ²⁴	Grey list	> 50 % capital, equity, profits or voting rights (separately or "group control")	< 15 % of total income is tainted income OR < 4% of total gross income is tainted income. ²⁵
Sweden	2004 ²⁶ /1991	2004 - 2013	55 %	White-, grey- and blacklist	Holding/having control over > 25 % of capital or voting rights (separate or w. entities "in association")	Income assignable to int. shipping business and shareholder also engaged in shipping business
Turkey	2006	2006-2013	10	-	> 50% of capital, share of profit or voting power. Separately or w. other res. shareh.	< 25% of gross income is passive OR annual gross income < 100.000 TL.
UK ²⁷	1984	2003-2013 ²⁸	75 %	Grey list	> 50 % shares, capital or voting power or entitled to > 50 % of distributed profits (or options to acquire rights in the future) aggr. across UK res. Further: each must separately have rights to > 25 % of profits.	1. CFC distributes > 90 % of chargeable profits to UK res. 2. CFC on excluded countries list AND non-local source income < max(£ 50.000, 10 % of com. quantified income) ²⁹ . 3. > 35 % voting power allotted the public AND principal members ³⁰ own < 85 % of voting power.

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²² South Africa has over the years implemented many changes to their CFC regime, and hence going through all variants before the introduction of the low-tax threshold in 2008 is beyond the scope of this table. We therefore only show the overall characteristics of the regime between 2008-2013, and not for the full sample period.

²³ *Participation rights*: The benefits attached to a share in a company, or interest of a similar nature, or to voting rights.

²⁴ A CFC resident in a tax haven will per assumption live up to the low tax requirement.

²⁵ A special exemption applies to foreign holding companies, as passive income from such a source might just be "formally passive" . Requirements regarding participation as well as the source of the income applies.

²⁶ There is some disagreement as to whether the system in place before 2004 could also be classified as a CFC regime. Significant changes were however completed in 2004.

²⁷ Note that the United Kingdom has undergone major changes to other parts of the corporate tax system in this period - amongst others a shift from a credit system to a dividend exemption system.

²⁸ Small changes were made to the legislation in 2011, including two new exemptions regarding overseas trading and IP companies. The UK CFC regime was more fundamentally reformed in 2013 with the introduction of different "gateways" and a focus on taxing profits deriving from UK activity, rather than worldwide activity. Initial drafts for this reform were published already from 2009, and hence might have been expected by some corporations. Importantly the "low tax threshold" was not altered in this reform, but was re-formulated, now in terms of an exemption instead of a requirement for CFC status.

²⁹ Commercially quantified income is profits before tax, while non-local source income is gross income.

³⁰ A principal member is an entity, who together with associated parties possesses > 5 % of the voting power.

Table 1 – *Continued from previous page*

Country	Year of intro.	Concerning years	Tax cut-off	Country list	Control requirement	Exemption related to type of income/assets
USA	1962	2003-2013	90%	-	> 50 % of total combined voting power or total value of the stock owned in aggr. by res. shareholders. Separately shareh. must own > 10 % of total combined voting power to be subject to CFC taxation	4. CFC runs true business in juris. of residents and management. 5. CFC's transactions do not achieve sign. reduc. in UK tax (or have this motive) Income may be excluded if subject to "high rate of foreign tax". De minimis: If gross tainted (FBCI) income < min(5 % of gross income, \$ 1 million)

Hungary also has a CFC regime, but it is only targeted at Hungarian individual shareholders, and not corporations. Therefore this regime is not relevant for the analysis in this study, where the focus is on Multinational corporations. Argentina has a set of rules known as the "international fiscal transparency rules" (IFT), which bear a lot of resemblance to a CFC regime. These rules contain a "blacklist" of low-tax countries targeted by the rules and they target passive income of foreign corporations. However they only apply for share-corporations and they do not require control over the foreign corporation.