Real Effects of Private Country-by-Country Disclosure

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Abstract

We investigate the effects of mandatory private Country-by-Country Reporting (CbCR) to European tax authorities on multinational firms' corporate real activities and organizational structures. We exploit the threshold-based application of this 2016 disclosure rule to conduct difference-in-differences and regression discontinuity tests. We document increases in tangible fixed assets and human capital, but these effects are concentrated in countries with preferential tax regimes in Europe and absent in the larger European economies. We also find evidence that firms respond to CbCR by reducing organizational complexity. Collectively, our results support the conclusion that mandatory private CbCR causes firms to change real economic activities to substantiate their tax avoidance activities in Europe while reducing the appearance of aggressive tax practices.

Keywords: Real Effects, Disclosure Regulation, Private Disclosure, Mandatory Disclosure, Country-by-Country Reporting, Tax Transparency, Tax Avoidance, Tax Havens, Organizational Complexity

JEL Classifications: H20, H25, H26, H32, K22, L51, M41, M48, O47

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1. Introduction

There is widespread interest in the effectiveness and consequences of regulations stipulating the amount, content, and format of disclosure. However, there is limited evidence on the real effects of disclosure, particularly regarding *private* (i.e., confidential) disclosures made to regulators but not made available to the public (Leuz and Wysocki, 2016; Roychowdhury et al., 2019). We begin to fill that void by examining the real effects of private Country-by-Country reporting (CbCR) disclosures to tax authorities. In Europe, regulations effective in 2016 require multinational entities (MNEs) active in the European Union (EU) to disclose privately to tax authorities both subsidiary ownership and economic activity by jurisdiction. Although the EU adopted CbCR to increase transparency and curb perceived harmful tax practices of MNEs, the response by MNEs can extend beyond observed changes in effective tax rates and tax avoidance strategies. We study externalities of this mandatory private CbCR disclosure related to affected firms' disclosed tangible investment, employment, and overall organizational structures, which should be of central interest to policymakers.

The EU adopted CbCR to provide tax authorities with indicators of country-level economic activity for every tax jurisdiction MNEs operate in (OECD, 2013; OECD, 2015a; Financial Times, 2016). Although tax authorities previously received tax return information about MNEs' operations within their own jurisdiction, they had only limited visibility outside their jurisdiction.[1] Further, some information required by the reports was typically not available at all (OECD, 2015a). Starting in 2016, multinational groups with a parent or subsidiary in an EU country and

[1] Separate entity financial reports and beneficial ownership information are publicly available, but the aggregation of these data by multinational firm and country is costly and typically not available to tax authorities. As stated in the preface of an OECD handbook on effective tax risk assessment with CbCR disclosures, "This information has never previously been available to tax authorities and represents a great opportunity for tax authorities to understand the structure of a group's business in a way that has not been possible before" (OECD, 2017a).

consolidated revenues greater than €750 million were required to report aggregated country-level financial information to tax authorities annually, including a complete list of subsidiaries as well as revenues, pre-tax profits, cash income taxes paid, number of employees, and tangible assets (see Directive 2016/881/EU (Council of the European Union, 2016)).

CbCR disclosures could alter corporate decisions if firms believe the reports contain new, proprietary information to recipients (e.g., Kanodia and Sapra, 2016). If CbCR disclosures are informative to tax authorities, reporting firms face an increased risk that tax authorities will use the information to detect and challenge tax avoidance. Even if the reports are not useful to or used by tax authorities to increase enforcements, firms could respond if they believe the information will lead to increased enforcement. Firms could respond to CbCR by reducing tax avoidance, as documented through higher effective tax rates (Joshi, 2020; Hugger, 2020) and reduced cross-jurisdictional income shifting (Joshi, 2020). The higher overall tax burdens resulting from reduced tax avoidance could lead to reduced investment and employment in all EU jurisdictions receiving the new disclosures (Hines and Rice, 1994; Suarez Serrato, 2019; Bruehne and Jacob, 2019).

However, firms could attempt to mitigate the scrutiny resulting from increased CbCR transparency by making investment and employment decisions intended to better substantiate their tax avoidance. Aligning taxation with economic activity is a central policy goal of CbCR (OECD, 2015a,b). Consequently, firms could increase real activities in jurisdictions offering preferential tax regimes. This increased investment and employment could better substantiate profits shifted to these jurisdictions (Grubert and Slemrod, 1998; Hanlon, 2018), especially in the presence of an informed tax authority able to newly observe a high ratio of profits to real activities in countries with preferential tax regimes relative to the ratio reported in its own country with fewer tax preferences. Firms could also liquidate obsolete entities and close tax haven subsidiaries, which

are likely to be (at least perceived as) lacking economic substance (Dyreng et al., 2020). We therefore study tangible investment, employment, and organizational complexity separately in European countries offering preferential tax regimes and countries with the largest gross domestic products and relatively high levels of taxes and tax enforcement. This approach should inform policy debates as different European countries have arguably different interests and strategies for taxing MNEs, as is evident in their diverging views on tax transparency.[2]

Our empirical approach leverages both a difference-in-differences (DiD) and a regression discontinuity design (RD). The CbCR mandate's size-based threshold of €750 million provides a natural testing ground for causal effects of mandatory disclosure because this threshold was chosen without considering firm-specific characteristics likely to be associated with tax avoidance or investment and employment decisions. We retrieve and combine several sources of detailed financial statement and ownership data from fiscal years 2012 to 2018 on multinational groups operating in the EU from Bureau van Dijk (BvD). Fuest et al. (2021) provide evidence via direct comparison that these financial figures reflect real activities reported in CbCR disclosures, likely due to the EU Directive's encouragement that firms use consolidated and unconsolidated GAAP financial statements (as well as, optionally, managerial accounting systems) to produce the confidential CbCR disclosures. We leverage multinational firms' subsidiaries' unconsolidated financial statements to examine real activities newly disclosed in the CbCR disclosures. We also exploit extensive annual data on firm's beneficial ownership status on legal entities from all over

[2] For example, countries offering preferential tax regimes for MNEs are typically less aggressive in promoting tax transparency as evidenced by Ireland, Malta, and Cyprus opposing the idea of making CbCR disclosures public. See https://news.bloombergtax.com/daily-tax-report/eu-states-block-plan-for-public-multinational-tax-reporting.

the world collected by BvD to construct several organizational structure measures, including the number of subsidiaries in countries with preferential tax regimes.[3]

We examine investment activities reported in unconsolidated financial accounts by subsidiaries in European countries, whose tax authorities are the primary recipients of the private CbCR disclosures. Unfortunately, data limitations preclude us from investigating subsidiary-level investments worldwide.[4] Our DiD evidence is consistent with subsidiaries of affected firms increasing their economic activity in European jurisdictions that offer preferential tax regimes: Switzerland, Cyprus, Ireland, Luxembourg, Malta, and the Netherlands.[5] Affected firms' investments in tangible assets in subsidiaries in these countries increase up to 35 percent more after the CbCR mandate relative to firms below the CbCR threshold. While CbCR firms' differential number of employees across all European jurisdictions increase by around 5 percent, estimated magnitudes more than double when we focus on the European countries with preferential tax regimes. In contrast, we find no evidence of differential investments in tangible assets or employees between the two sets of firms in the four largest European economies of Germany, France, Italy and the United Kingdom.

We additionally study each MNE's total activity by country by aggregating unconsolidated financial data across all subsidiaries located in the same country and belonging to the same MNE.

[3] In particular, we use public information on direct legal ownership links between associated entities. Starting with the ultimate corporate parent, we iterate through this data to link all majority-owned entities belonging to the same multinational firm and construct several variables on the organizational structure, including the existence of tax haven subsidiaries. While data on direct ownership links are publicly available, it is unlikely the full ownership structure was available to tax authorities in all countries in which a multinational firm operated before CbCR. Our approach circumvents the challenge of disentangling real corporate responses from non-compliance with disclosure rules as documented for a sample of listed firms in the U.K. (Dyreng et al., 2016). Throughout the study, we refer to the parent or MNE as the "firm" and its majority-owned entities as the "subsidiaries."

[4] We observe ownership information on the existence of all global subsidiaries, including those in tax haven countries, every year, but we are unable to observe unconsolidated financial information for all global subsidiaries.

[5] We focus on European countries on the blacklist created by the Tax Justice Network using criteria published by the EU for identifying non-cooperative tax jurisdictions (or tax havens). Additional information on these criteria and the full list of blacklisted countries is available at http://datafortaxjustice.net/paradiselost/. See Appendix B.

This aggregated approach is unaffected by legal restructurings that could induce large balance sheet changes in individual subsidiaries and thus contaminate the DiD results. It also allows us to more explicitly proxy for amounts reported in the new CbCR disclosures. We additionally employ a local RD design to mitigate concerns about systematic differences between firms well above versus below the €750 million CbCR threshold (Angrist and Pischke, 2009; Lee and Lemieux, 2010; Leuz and Wysocki, 2016). Results corroborate inferences from the DiD tests. These results support that CbCR causes affected firms to increase tangible asset investment and employment primarily in jurisdictions with preferential tax regimes but not in Europe's largest economies, effectively creating relative winner and loser jurisdictions regarding economic growth resulting from increased transparency.

Because CbCR provides information on multinationals' full organizational charts to many tax authorities for the first time, we also examine the effects of CbCR on multinational firms' organizational structures. Although firms can use complex corporate structures, including legal entities in tax haven countries, to facilitate tax avoidance, several studies suggest non-tax motivations for these structures (Dyreng et al., 2015; Bennedsen and Zeume 2018; Balakrishnan et al. 2019). If firms adjust their organizational structures in response to increased transparency, these changes are an important real effect because organizational complexity is associated with control weaknesses, costly governance responses, and lower transparency (Bushman et al., 2004; Ashbaugh-Skaife et al., 2007; Balakrishnan et al., 2019). We find evidence that firms reduce their number of subsidiaries in European countries with preferential tax regimes, in tax havens located worldwide, in all countries worldwide, and subsidiaries at hierarchical levels deeper down in the organizational chart, thereby reducing organizational complexity. Moreover, the effect sizes are increasing across those three geographies.

Collectively, our results are consistent with firms supporting their tax strategies, leading to substantial real effects in response to CbCR. Firms increase investments in fixed assets and employees in a set of European countries that have preferential tax regimes. Doing so could better substantiate tax avoidance activities in these countries to other European tax authorities. At the same time, firms at least "wind down" obsolete entities in these jurisdictions as well as in tax haven countries. These results suggest that reporting firms aim to avoid the appearance of being overly tax aggressive in tax audits, a conclusion supported anecdotally by conversations with tax executives.[6] The overall effect of these firm responses could be a reduction in tax avoidance, consistent with Joshi (2020) and Hugger (2020).

A number of tests validate identifying assumptions and the robustness of results, including addressing potential manipulation of treatment status, evaluating the parallel trends assumption, testing for covariate balance, conducting falsification tests around placebo reporting thresholds and event years, and evaluating anticipatory effects (e.g., Lee and Lemieux, 2010; Atanasov and Black 2016; Cattaneo et al., 2018). We acknowledge that several tax enforcement and whistleblowing events occurred around this time, such as the European Commission's investigations into illegal state aid (Fox et al., 2020), the OECD/G20's Base Erosion and Profits Shifting (BEPS) initiative, and leaks about Luxembourg's corporate tax arrangements, which may have disproportionately impacted larger firms above the CbCR threshold. Although our RD results lend additional validity to our inferences, as these events should not differentially apply to firms just above versus below the CbCR threshold, we acknowledge they could contribute to the magnitude of our RD results. Further, we are unable to observe financial information for all global subsidiaries, thus limiting our ability to test real activities outside Europe.

[6] We thank participants at the February 2020 International Tax Policy Forum Member Meeting for their helpful comments.

Our study contributes to the nascent literature on the real effects of disclosure (e.g., Christensen et al., 2017; Chen et al., 2018; Rauter, 2020) and responds to the call for research on the effects of tax disclosures on firm decisions (Dyreng and Maydew, 2018). Our study is unique in that we examine real effects of private disclosures to tax authorities, many of which have a vested interest in curbing perceived harmful tax practices by multinational firms. Other papers find evidence of an increase in corporate effective tax rates and a decrease in income shifting among firms impacted by CbCR (Joshi et al. 2020; Joshi 2020; Hugger 2020). However, firms could increase effective tax rates and reduce income shifting by altering their transfer prices (i.e., accounting manipulations) with little to no changes to their global economic footprint (i.e., the location of real factors of production). We therefore extend this literature by examining whether the changes in effective tax rates and income shifting documented by these studies coincide with and reflect real changes in corporate investment, employment, and organizational complexity. Because tax policy is often used as a tool to incentivize economic growth related to real factors of production, investment and employment are important outcomes for policymakers at the domestic and EU level.

We also contribute to the tax avoidance literature by leveraging a unique setting to examine the role of the tax authority as a monitor of the firm. Our findings suggest increased monitoring has heterogenous effects across countries, potentially creating winners and losers of increased transparency. We document real externalities of private disclosures to tax authorities; more transparency for all EU tax authorities has distinct positive capital allocation effects for those countries with regimes that presumably facilitate tax avoidance strategies. We thus complement prior work suggesting the tax authority may be a powerful monitor (e.g., Hoopes et al., 2012). Our interpretation is consistent with evidence from the U.S. that private tax disclosures can be

incrementally informative, resulting in a decrease in IRS attention to public reports (Bozanic et al., 2017). Our study is also consistent with private tax disclosures having (potentially unintended) consequences with respect to both disclosed and undisclosed information, such as reduced magnitudes of unrecognized tax benefits and capital investments after rules requiring firms to privately disclose uncertain tax positions to U.S. tax authorities on Schedule UTP (Towery, 2017; Jacob et al., 2020). At a broader level, our insights shed new light on the effectiveness of disclosure regulation aimed at mitigating information asymmetry between MNEs and tax authorities as another important stakeholder group beyond investors (Roychowdhury et al., 2019).

Our study should be of interest to tax authorities and policymakers worldwide for several reasons. First, our examination of externalities suggests additional mandates to increase private reporting, such as for intermediaries of cross-border transactions effective July 2020, might have consequences beyond merely increasing tax transparency. Second, making the CbCR disclosures public, for example in annual reports as recently proposed by the Global Reporting Initiative (GRI 2019), may be costly in that they may exacerbate our documented distortions in corporate decisions.[7] Third, the CbCR mandate likely spurs international tax competition as there are relative winners and losers from increased tax transparency. Specifically, firms seem to increase economic activity in jurisdictions with attractive tax codes and economies sufficiently large to host substantial physical investments, while countries with large, developed economies but less preferential tax laws do not experience such economic growth. As a result, transparency initiatives could actually worsen the "race to the bottom" by putting pressure on high-tax jurisdictions to

[7] See European Commission (2016) and Transparency International, (2016) for arguments in favor of public CbCR to combat tax avoidance. Hanlon (2018) and Spengel (2018) discuss some potential costs of public CbCR.

reduce their tax rates to mitigate the investment and employment externalities of increased transparency.

2. Institutional Background and Related Literature

Country-by-Country Disclosures

CbCR disclosures to tax authorities arose as a recommendation from the OECD/G20's BEPS initiative. The initiative is a multinational approach to combatting perceived harmful tax practices of multinational corporations and formally started with a first report in 2013. The BEPS efforts divided research and recommendations into 15 separate topics, with Action 13 devoted to transfer pricing documentation and CbCR. The EU formally adopted the BEPS CbCR recommendations on May 25, 2016 with an effective date of January 1, 2016. Worldwide, some 73 countries had adopted some form of CbCR as of 2019 (Spengel et al., 2019). The OECD's Multilateral Competent Authority Agreement provides an automatic exchange mechanism for tax authorities to share these reports across jurisdictions. Additionally, several countries have openly considered making the reports available to the public.

Within the EU, the CbCR requirement applies to MNE groups whose parent firm is a tax resident of an EU country or if any of the groups' subsidiaries are incorporated in the EU. Additionally, the group's consolidated revenues reported by the parent firm must exceed €750 million in the fiscal year preceding the reporting year, with the first reporting year being 2016 (Council of the European Union, 2016). MNEs meeting these criteria must report to the tax authorities several indicators of country-level economic activity by each tax jurisdiction: unrelated party revenues, related party revenues, total revenues, profit before income tax, income tax paid (on a cash basis), current year income tax accrued, stated capital, accumulated earnings, number of employees, tangible assets other than cash and cash equivalents. Reporting firms must also

provide a list of affiliated legal entities by tax resident jurisdiction, the country of incorporation of each entity if different from the tax residence, and the main business activities of each entity. Figure 1 depicts the template for a CbCR disclosure published as part of European Council Directive 2016/881/EU. Financial accounting (book) numbers may be used for these reports. The EU directive asks firms to use their consolidated and unconsolidated financial statements as well as the managerial accounting system as data sources.

Related Literature

Prior research generally provides evidence that public tax disclosures create incentives for firms to reduce behavior that could give rise to reputational risk.[8] Dyreng et al. (2016) examine newly mandated public subsidiary disclosures in the U.K., a regulation representing a marked increase in tax transparency for firms operating in the U.K. They find many firms were initially non-compliant with the disclosure rule. When their non-compliance gained public attention, these originally non-compliant firms exhibited a larger decrease in tax haven subsidiaries in the years following compliance relative to other firms.

Focusing on market reactions to public tax disclosures, Hoopes et al. (2018) find negative reactions around Australian legislation mandating tax disclosures for firms that paid no tax in Australia, and Johannesen and Larsen (2016) find negative reactions for oil and gas firms to an EU law requiring public CbCR disclosures.[9] Collectively, these studies suggest that investors

[8] A broad literature examines real effects of financial reporting and disclosure regulation, for example finding reduced pollution following mandated CSR disclosures in China (Chen et al., 2018) and improved mining safety following the inclusion of (already public) mandated mine safety records in financial reports (Christensen et al., 2017). In the setting of extractive industries, Rauter (2020) finds a positive association between the public disclosure of payments to foreign governments and the magnitude of those payments; additional tests point to shaming and enforcement being two mechanisms behind the increased payments. See Leuz and Wysocki (2016) for a review the literature examining real effects of mandated public disclosures. Among their findings, they observe little causal evidence and recommend non-traditional and non-U.S. settings to provide more variation and tighter research designs.

[9] A separate literature examines the reporting effects of public tax disclosures, generally finding limited compliance with required tax disclosures (e.g., Belnap, 2019) and a positive association between reported tax avoidance and the

respond to increased public disclosures, while Dutt et al. (2018) do not document significant market reactions after the introduction of public CbCR disclosures in the EU banking sector (which, at the same time, was subject to several other regulation changes). Our setting deviates from this literature by examining the effects of disclosures that are not public but private in the sense that they are only reported to the regulating tax authorities.

Two related papers study the private CbCR setting and find higher effective tax rates (Joshi, 2020) but no change in tax payments for affected firms (Hugger, 2020). Both papers also provide some limited evidence that firms reduced tax-motivated profit shifting following CbCR (i.e., reported profits became less sensitive to domestic corporate income tax rates). We extend this literature by examining whether these effects of private CbCR disclosures also reflect changes in the factors of production because tax policy is often used as a tool to incentivize economic growth. We study economic outcomes included in CbCR disclosures that could potentially be used by tax authorities to assess the firms' tax practices: investment, employment, and organizational structure. Evaluating these externalities of CbCR transparency is important for understanding the economic growth implications of transparency initiatives worldwide.

3. Reasons CbCR Could Have Real Effects

CbCR could incentivize managers to alter corporate decisions if the reports contain proprietary information firms perceive to be new to its recipients (e.g., Kanodia and Sapra, 2016). We expect affected firms to respond to CbCR for one of two reasons. First, we expect firms to respond if they are concerned there could be a change in enforcement actions by tax authorities. This channel is predicated on the perception by firms that the information disclosed is

aggregation of financial reporting by segment (Brown et al., 2019) or geography (Hope et al., 2013; Akamah et al., 2018).

incrementally informative to the tax authority, and that the tax authority will use the information to increase enforcement.[10] Second, we expect CbCR to have real effects if they actually provide enhanced information to tax authorities and tax auditors use the information to improve enforcement. Changes in tax audit behavior could include additional scrutiny in transfer pricing assessments or more aggressive audits based on the information in the CbCR reports, even if firms comply with existing transfer pricing regulation (OECD, 2017b). For CbCR to induce changes in tax enforcement, the reports would need to provide incremental information to tax authorities, which may or may not be the case. On the one hand, pre-CbCR disclosures to tax authorities only typically include information on legal entities (i.e., taxpayers) located in the tax authority's own jurisdiction and those foreign entities that engage in intrafirm transactions with domestic taxpayers. CbCR expands this information set to include country-level information about all subsidiaries that belong to the same multinational group, not just those transacting with the domestic legal entity. For affiliated entities outside the jurisdiction, CbCR newly provides local authorities with information on a firm's operations in foreign countries. On the other hand, tax authorities could obtain separate entity financial reports for affiliates operating within the EU due to relatively expansive reporting requirements.[11]

[10] Survey participants in the Thomson Reuters 2017 Global BEPS Survey Report named CbCR the single most relevant concern among all recent OECD initiatives (Action Points) to fight corporate tax avoidance (Thomson Reuters, 2017).

[11] These reports exclude partnerships and hybrid companies (often used in more aggressive tax planning strategies) and subsidiaries outside the EU, in particular in tax haven countries. Many entities, especially in tax havens, are structured to avoid public reporting requirements. In some European jurisdictions, firms are required to inform tax authorities when acquiring or establishing foreign corporations, but updated information on such foreign subsidiary ownership is not disclosed thereafter. For example, if a German multinational acquired or established a subsidiary in a tax haven in 2000, it would have reported this to the German tax authorities in 2001 together with its 2000 corporate tax return, but no further reporting was required after that date (see, Par. II of Sec. 138 in the German General Tax Code (Abgabenordnung)). Tax authorities generally have no knowledge about operations of other affiliated but not controlled entities of the same firm (i.e., if a French multinational firm has a German subsidiary and also tax haven subsidiaries not owned through the German subsidiary, the German tax authorities have no knowledge about these tax haven operations).

If the disclosed information is incremental to tax authorities, we expect that the CbCR disclosures will be used in tax audits. Practitioners and academics expect that they will either directly or indirectly lead to changes in transfer pricing assessments (Hanlon, 2018). Proponents of CbCR argue that the increased disclosures provide tax authorities more information to better evaluate a firm's international tax and transfer pricing arrangements, therefore potentially increasing enforcement effectiveness.[12] However, critics argue CbCR may not help tax authorities assess transfer pricing arrangements but lead to a disconnect between taxation and transfer pricing rules, which do not strictly tie the location of reported profits to the location of economic activities, in favor of formulary apportionment (Hanlon, 2018; Spengel, 2018). Ultimately, firm beliefs about tax authorities' use of CbCR would create incentives for multinationals to mitigate the risk of appearing tax aggressive through complex organizational structures and to more strongly align economic activity with their tax planning strategies. Consistently, survey evidence indicates that firms were likely to not only change transfer pricing policies but also to review their value chains and historical business structures as well as implement restructurings (Thomson Reuters, 2017), all constituting real economic effects.

4. Data and Methodology

Difference-in-Differences Design

[12] We acknowledge any increased information to tax authorities comes with trade-offs. The reporting requirement introduces compliance costs and the risk of divulging proprietary information (Hoopes et al., 2018). Further, although CbCR disclosures are privately reported to tax authorities, some have pointed to LuxLeaks and other recent whistleblowing events as evidence that CbCR information could be leaked to the public (Hanlon, 2018; Huesecken et al., 2018; O'Donovan et al., 2019). As increased public scrutiny could bring reputational costs and consumer backlash, CbCR could have real effects through managers' rational anticipation of the consequences for firm value. In future work, we will investigate whether there is a differential reaction to CbCR by firms with a higher public profile to evaluate the credibility of the reputational cost and public scrutiny channel.

Our first research design compares changes over time in economic activity (first difference) between firms affected by the CbCR mandate and those unaffected by the mandate (second difference). We use firms' individual subsidiaries as the units of observation to circumvent mechanical concerns of comparing consolidated firm-country outcomes of larger (treatment) firms to smaller (control) firms.[13] We focus these tests on unconsolidated subsidiaries in European countries, where such unconsolidated information is widely reported due to statutory requirements. We are unable to test subsidiaries located outside Europe due to relatively incomplete unconsolidated financial statement information for these affiliates, particularly including those located in tax havens.

In addition to examining all European countries (full sample), we also separately examine outcomes in groups of countries where one would have different expectations on the effect of the transparency reform. Specifically, we partition the sample into two groups. The first group includes European countries with preferential tax regimes according to a blacklist created by the Tax Justice Network, an independent, non-governmental organization. The Tax Justice Network produced this blacklist by strictly applying the EU's published tax haven blacklist criteria for identifying non-cooperative regimes (Lips and Cobham, 2017). These criteria consider a range of perceived harmful and abusive tax practices beyond tax rates, such as a lack of tax transparency or information sharing, not implementing the minimum recommendations of the Base Erosion and Profits Shifting initiative, and facilitating offshore structures aimed at attracting profits without real economic activity in the jurisdiction (Council of the European Union, 2016). The preferential tax regimes of these countries are considered to facilitate aggressive tax planning (Switzerland,

[13] An individual subsidiary's treatment status is a function if its ultimate corporate parents' 2016 revenues and both relatively large and small multinational firms can have large or small subsidiaries. Also, studying individual subsidiaries allows us to separately examine corporate activities in different countries.

Cyprus, Ireland, Luxembourg, Malta, and the Netherlands). The second group includes Europe's four largest economies based on GDP (Germany, France, Italy, and the United Kingdom).

Focusing on Europe allows us to estimate the effect of private CbCR disclosures in the economic area in which the CbCR mandate was introduced. Studying investment and employment in the subset of European countries with preferential tax regimes versus large economies with more stringent tax laws allows us to shed light on the relative "winners" and "losers" within Europe following increased tax transparency. We exploit time series data over the period 2012-2018. The post-CbCR period is therefore three years, which is a reasonable window over which to expect to see real responses (e.g., Lester, 2019). We test several specifications based on the following model.

$$Outcome_{i,t} = \sum_{t=1}^{T} \gamma_t Year_t \ * Treated_i + \sum_{t=1}^{T} \beta_t Year_t \ + Firm\ FE$$

We define all variables in Appendix A. $Outcome_{i,t}$ is the outcome of interest of subsidiary *i* in year *t*. We focus our outcomes on measures typically studied as proxies for investment that are also choice variables reported in the CbCR disclosures: fixed tangible assets and employment.[14] We take the logarithm of each measure to mitigate the influence of outliers. $Treated_i$ is an indicator variable taking on the value of one if the subsidiary belongs to a firm that reported consolidated revenues of at least €750 million in fiscal year 2016. Firm (i.e., parent or MNE) fixed effects control for time-invariant characteristics such as country and industry as well as size or the MNE's propensity to engage in tax avoidance; these firm fixed effects absorb the baseline effect of *Treated*. Because time-varying firm characteristics may also be impacted by treatment, thus

[14] Our analyses assume that numbers reported in the separate entity financial statements as collected by BvD reflect real activities, consistent with other studies (e.g., Huizinga and Laeven, 2008; Badertscher et al., 2013; Shroff et al., 2014; Markle, 2016; De Simone, 2016; De Simone et al., 2017; Joshi, 2020). Further, Fuest et al. (2021) compare figures from BvD to those reported on CbCR disclosures, providing evidence that the financial figures reflect real activities reported in these disclosures.

introducing bias (Angrist and Pischke 2009), we do not include these as controls in our main tests. However, results are robust to the inclusion of MNE-level controls for investment at the consolidated level (cash, revenue, total assets) and subsidiary-level country-year and industry-year fixed effects (untabulated).

By interacting yearly indicator variables (excluding 2015 as the baseline year) with a *Treated* indicator variable, our DiD research design also presents evidence on pre-treatment differences in trends in the outcome variables between treated and untreated firms, thus addressing the parallel trends assumption for valid DiD inferences. We additionally graph raw mean values in investment and employment before and after the CbCR mandate and discuss these analyses in our empirical results section below.

Regression Discontinuity Design

The DiD analysis provides evidence of changes in subsidiary-level economic activity. However, MNEs might also respond to CbCR by changing their organizational structure, potentially introducing downward bias to tests using individual subsidiaries as the unit of observation. We therefore also examine investment and employment outcomes after aggregating unconsolidated financial statement data across all subsidiaries located in the same country and belonging to the same MNE. By doing so, we capture an MNE's total economic activity in a given country and thus more explicitly proxy for amounts reported in the new CbCR disclosures. We also explicitly examine changes to the firm's organizational structure. However, in our setting where treatment is based on a firm size threshold, moving closer towards the firm (MNE) level as the unit of observation by construction introduces concerns about systematic differences across firms of different sizes in a DiD design. We thus exploit a regression discontinuity design around the €750 million revenue threshold for CbCR. This strategy mitigates concerns stemming from the

comparison of very large MNEs to small MNEs reporting less than €750 million in revenues, which might be systematically different groups of firms.

Because CbCR treatment is determined by the revenue threshold, consolidated revenues are the "forcing" or "running" variable in our tests. We employ a non-parametric estimation method that implicitly assumes that the distribution of characteristics of the treated firms are the same just below and above the threshold. As the EU-wide mandate of CbCR was released through Council Directive 2016/881 in May 2016 (i.e., before fiscal year end 2016), we first validate the assumption that firms did not manage their revenues in order to avoid treatment. In Figure 2, we explicitly test for revenue manipulation by inspecting whether there is a discontinuity in the density of firm observations around the threshold (McCrary, 2008). Overlapping 95 percent confidence intervals at both sides of the cut-off suggest that the distribution of firms around the threshold is smooth.[15] As a result, this estimation strategy provides for a quasi-random treatment of firms with respect to the CbCR mandate and identifies plausibly causal treatment effects by comparing outcomes of control firms just below the threshold with outcomes of treated firms just above the threshold (Lee and Lemieux, 2010; Cattaneo et al., 2018).

In RD analyses, the functional form of the relation between the running variable and the outcome variable is important to generating an unbiased estimate of the treatment effect. We therefore follow several recommendations from the literature when choosing the specific design of our RD tests (e.g., Imbens and Lemieux, 2008; Cattaneo et al. 2018). In particular, we run both local linear and third-order polynomial regressions, selecting optimal bandwidths that minimize

[15] In robustness tests, we exclude firms with revenue just below the threshold. In untabulated tests, we additionally validate that firms just below and just above the threshold are comparable by plotting polynomial mean-smoothed values of pre-treatment covariates along the running variable (consolidated revenues) separately from the left to the cut-off and from the cut-off to the right (see, e.g., Cattaneo et al. (2018)). Across all covariates, we fail to find a statistically significant discontinuity around the €750 million threshold, which also supports the validity of our identifying assumptions in the difference-in-differences analysis (Atanasov and Black, 2016).

the mean squared error according to Imbens and Kalyanaraman (2012).[16] We use a triangular kernel function to construct the local estimators, such that observations closer to the threshold receive greater weight (Lee and Lemieux, 2010). We test several specifications based on the following model.

$$Outcome_{i,t} = \alpha\, Treated_i + \sum_{j=1}^{P} \beta_j RV_i^{\,j} + \sum_{j=1}^{P} \gamma_j RV_i^{\,j} * Treated_i + Controls_i \gamma + FE$$

$Treated_i$ is as defined above in our description of the DiD design. RV_i is the running (or forcing) variable and is coded as the difference between a firm's consolidated revenues in 2016 and the threshold of €750 million.[17] P denotes the number of polynomials included (three for third-order polynomials and one for the local linear regressions). Most specifications do not include controls or fixed effects and thus rely on the RD identifying assumptions and its design implying unconfoundedness (Lee and Lemieux, 2010). In some specifications, we include pre-treatment control variables as of 2015 and year fixed, country, or industry effects.

We look at two types of outcome variables. First, we aggregate unconsolidated subsidiary-level figures to the firm-country-level. This aggregation better reflects the country-level activities disclosed by MNEs in CbCR disclosures and mitigates potential bias in subsidiary-level analyses caused by changes to organizational structures in response to CbCR. Here, $Outcome_{i,t}$ continues to be investment and employment. We examine the logarithm of these outcomes (i.e., growth) since the CbCR mandate became effective to further mitigate potential mechanical effects from size

[16] In untabulated robustness tests, we re-estimate the baseline specifications instead using bandwidths composed of 75 percent and 150 percent of the original, optimal minimized mean squared error bandwidth. Results using these alternative bandwidths generally support our main inferences and, in fact, are often stronger.

[17] We use consolidated revenue in 2016 as we are interested in firms' responses to the CbCR mandate in 2016 to 2018 conditional on knowing that they will be required to disclose their 2016 operations. In untabulated robustness tests, we use an instrumental variables approach to isolate the most exogenous portion of 2016 consolidated revenues, finding consistent results.

differences across treated and control firms (*Log. Growth Tan. Assets (uncons.)* and *Log. Growth Employees (uncons.)*).[18]

Second, we study several characteristics of an MNE's organizational structure newly reported to tax authorities after the CbCR mandate. We count the number of subsidiaries located in European countries with preferential tax regimes (*Log. Preferential Tax Regime Subsidiaries*). We also look at the number of all global tax haven subsidiaries. We classify a subsidiary as a tax haven entity if it is located in a country in any of the tax haven lists used in Bennedsen and Zeume (2018). We provide a list of tax haven countries in Appendix B. To further examine the effect of CbCR on the organizational structure of affected MNEs, we also look at the total number of the firm's majority-owned subsidiaries (*Log. Subsidiaries*) and a measure of organizational complexity (*Log. Org. Complexity*). Organizational complexity is the sum of the hierarchical subsidiary levels of majority-owned subsidiaries. For example, a firm (first tier) with one subsidiary one tier down from the parent (second tier) and two subsidiaries in the third tier has an organizational complexity measure of 9 (= 1*1+1*2+2*3). A firm (first tier) with four directly held subsidiaries (i.e., second tier) and no other subsidiaries also has an organizational complexity measure of 9 (= 1*1+4*2). For all measures, we compute the natural logarithms.[19]

Sample Selection

To analyze the effects of the CbCR regime on corporate transparency and economic activity of multinational firms both on an aggregate basis and on the level of a firm's subsidiaries in distinct countries, we access three different products of the Orbis database provided by BvD.

[18] This approach also mitigates the effect of outliers and facilitates interpretation of economic magnitudes. See Ciccone and Papaioannou (2009) and Schularick and Steger (2010).

[19] We take the natural logarithm of (1+*X*) to mitigate the effect of outliers and circumvent a significant loss of observations inherent to the logarithmic transformation of baseline values of zero. This approach models changes from zero to one subsidiary as a 100 percent increase and changes from one to zero as a 100 percent decrease. Results are robust to not adding one before taking the logarithm (untabulated).

We detail the sample construction process in Table 1. First, we download information on consolidated financial statements for firms with (i) at least €100 million in revenue in any of the years 2012 to 2018 and (ii) at least one subsidiary located in a country other than the firm's country of incorporation. These firms represent MNE parent entities. Based on BvD's database as of March 2020, this download yields 53,575 unique firms with annual consolidated financial information.

Second, we access historical versions of the Orbis database for the years 2012 to 2018 to link these unique MNE parent entities to their global subsidiaries in an iterative process through their hierarchical structure (i.e., the consolidated firm as the parent entity and each of its subsidiaries owned by at least 50 percent directly by the parent or by another, higher tier, subsidiary of the same parent) consistent with Olbert (2020). This approach allows us to track MNEs' global subsidiary ownership over time, including the existence of subsidiaries incorporated in tax haven countries, independent of whether financial information for these subsidiaries are available.[20] Because observing the existence of subsidiaries is not dependent on the availability of financial reports, we likely capture the majority of all controlled legal entities. Dutt et al. (2019) confirm the ownership data in Orbis mirrors what is reported by firms in their CbCR disclosures, which validates the reliability and quality of coverage of the Orbis ownership data. We restrict the sample to MNEs potentially falling under the scope of the EU's CbCR mandate. We identify 34,062 multinational firms as ultimate owners of 761,578 unique subsidiaries listed in the Orbis database

[20] BvD collects information on beneficial ownership status (both for shareholders and subsidiaries) through various sources, such as national official registers, annual reports of separate legal entities, private correspondence, telephone research, and M&A intelligence. See https://www.bvdinfo.com/en-us/our-products/data/international/orbis. The data should thus not be contaminated by non-compliance with disclosure rules in financial reports as documented for a sample of listed firms in the U.K. (Dyreng et al., 2016). Our approach is similar to that in recent studies using the Orbis data (Shroff et al., 2014; Beaver et al., 2019; Beuselinck et al., 2019), however we integrate more tiers of subsidiaries to better identify lower tier subsidiaries potentially located in tax havens. Manually constructing the corporate hierarchy is superior to using the database provider's designation of a subsidiary's ultimate parent as this designation often includes non-corporate entities with greater than 25 percent ownership such institutional investors, families, trusts, or individuals.

where the MNE parent firm is either located in the EU or has at least one subsidiary located in the EU. 341,697 of these unique subsidiaries are incorporated in Europe; we observe non-missing unconsolidated financial statement information required for our DiD regressions for 652,419 subsidiary-years without changes in ultimate ownership by the parent firm in the period 2012-2018. For our RD sample, we limit the sample to post-reform years 2016 to 2018, resulting in 63,899 firm-years and 87,354 firm-country-years with non-missing inputs to our regressions. In contrast to other CbCR studies (e.g., Joshi, 2020), we do not eliminate financial firms from the sample as they are also subject to the 2016 private CbCR mandate. Their inclusion could bias against finding an effect of the 2016 private CbCR mandate as they are previously subject to a public CbCR regime since 2013 (Joshi et al., 2020); nonetheless we confirm results are robust to excluding financial institutions from the sample (untabulated).

We match unconsolidated financial information for all firms' subsidiaries located in Europe. We download this information from the Orbis Generics Flatfile as of January 2020. We report the resulting numbers of subsidiary observations by year and by country for 2012 to 2018 in Table 2. Finally, we collect information on countries' annual gross domestic product from the WorldBank and the OECD and corporate income tax rates (CITs) from the European Commission.[21]

Descriptive Statistics

Table 3 describes variables used in the regressions for our different samples. To mitigate the impact of outliers when using a small set of observations in the local RD, we winsorize all financial variables at the 1 and 99 percent level, growth variables at the 2 and 98 percent level,

[21] These data are available at www.data.worldbank.org/, www.oecd.org/sdd/ oecdmaineconomicindicatorsmei.htm, and www.ec.europa.eu/taxation_customs/ business/economic-analysis-taxation/data-taxation_en, respectively.

and, following the tax avoidance literature, the ETR at 0 and 100. We multiply logarithmic growth by 100 to aid interpretation. The average subsidiary-year has €10.4 million tangible assets and 159 employees. Firm-country-year growth in tangible assets is approximately 3.88 percentage points on average, while growth in employment is approximately 6.54 percentage points on average. The average firm-year has 2.14 subsidiaries in European countries with preferential tax regimes, and 2.35 tax haven subsidiaries across the globe according to the classification of jurisdictions in Bennedsen and Zeume (2018). The average total number of subsidiaries is 34, and the average unlogged measure of organizational complexity is 114. Mean (median) ROA is 2.69 (4.29) percent and mean (median) GAAP effective tax rate is 35.17 (25.49) percentage points.

We also inspect summary statistics for observations reporting consolidated 2016 revenue within the bandwidth of +/- €250 million surrounding the €750 million threshold for CbCR (untabulated). Overall, firms in the full sample are similar on average to firms in the RD bandwidth, particularly with respect to the outcome variables of interest. Thus, results obtained within our RD framework could be representative of the average multinational firm.

5. Empirical Results

Economic Activity Using Unconsolidated Subsidiary Financial Accounts

Difference-in-Differences Time Series Analysis at the Subsidiary Level

We begin the empirical analysis with a DiD design to examine the effect of CbCR on the economic response of affected firms using unconsolidated financial information on their subsidiaries in specific European countries. Recall we are unable to test subsidiaries located outside Europe due to relatively incomplete unconsolidated financial statement information for these affiliates, particularly including those located in tax havens. We estimate differences in

tangible assets and employment (*Log. Tan. Assets (uncons.)* and *Log. Employees (uncons.)*) between subsidiaries belonging to treated versus control multinationals (based on their parent firms' 2016 revenues as in our main analysis), always relative to the year before the CbCR mandate became effective (2015).

To provide evidence on the validity of the parallel trends assumption for our DiD analysis, we first plot the mean values of raw tangible fixed assets and number of employees over time in Figure 3. Although the levels of these outcome variables are different between treatment and control firms, for the most part trends in the outcome variables are similar in the pre-treatment period. However, the mean values deviate in the post-treatment period for the sub-sample of European countries with preferential tax regimes, where mean tangible fixed assets (number of employees) increases from about €20 million (85) to about €35 million (110). Thus Figure 3 provides graphical evidence of parallel trends in addition to initial evidence of a differential response to CbCR by treated firms relative to control firms.

We report regression results of our DiD analysis in Table 4. Columns (1) and (2) present results for all European countries. Columns (3) and (4) present results for European countries with preferential tax regimes considered to facilitate aggressive tax planning: Switzerland, Cyprus, Ireland, Luxembourg, Malta, and the Netherlands. Columns (5) and (6) present results for the largest European economies of Germany, France, Italy, and the United Kingdom.

Results suggests that treated and control subsidiaries did not develop differently in their economic activities in the years leading up to the CbCR mandate, providing formal regression analysis evidence supportive of the parallel trends assumption. Further, subsidiaries of treated firms continuously increased their economic activity on average across all European countries following CbCR, leading to up to 7 (5) percent larger increases in tangible assets (number of

employees) from 2015 to 2018 relative to subsidiaries of control firms. Both the statistical and economic significance of estimates in Columns (3)-(6) suggest this growth is concentrated in European countries with preferential tax regimes, with effect sizes of 35 and 12 percent respectively. Though seemingly large, these economic magnitudes are plausible given the base amounts of subsidiary tangible assets and employees (see also Figure 3). As of 2015 in European countries with preferential tax regimes, the average (median) value of tangible assets was €23.5 (€0.81) million for treated subsidiaries and €6.8 (€0.35) million for control subsidiaries. The average (median) treated subsidiary had 89 (15) employees in these countries and the average (median) control subsidiary had 34 (10) employees. For these pre-CbCR differences to increase by 35 and 12 percent after CbCR, respectively, the average treated subsidiary would have increased tangible assets by €5.8 million and the number of employees by 6-7, conditional on control subsidiaries not changing their levels. Moderate growth over the same period by control subsidiaries, as well as evaluating differences at the median, would yield more moderate estimated changes in treated subsidiaries.

Regression Discontinuity at the Firm-Country Level

To more explicitly proxy for amounts reported in the new CbCR disclosures, we examine investment and employment outcomes after aggregating unconsolidated financial statement data across all subsidiaries located in the same country and belonging to the same MNE. To mitigate concerns about systematic differences between firms above versus below the €750 million CbCR threshold in a DiD analysis, we instead exploit a RD design. This approach compares outcomes of firms just above the €750 million revenue threshold to those of firms just below the threshold.

As suggested by Lee and Lemieux (2010), we begin the evaluation of RD results by graphically examining discontinuities in outcome variables. Figure 4 presents these results. All

panels plot average values of the outcome variable for evenly spaced bins of 2016 consolidated revenue along with the 90 percent confidence interval, as well as fitted linear trends. In Panels (1)-(4), we observe increases in *Log. Growth Tan. Assets (uncons.),* and *Log. Growth Employees (uncons.)* for firms just above the CbCR threshold across all countries in Europe and in European countries with preferential tax regimes. In contrast, the largest economies show no apparent discontinuity in tangible assets (Panel (5)), and, if anything, a small increase in employment (Panel (6)). These results indicate firms increase tangible asset and employment investments across European subsidiaries following CbCR disclosure, with the effect particularly showing up in countries with preferential tax regimes, consistent with our DiD results.

We present results of RD regression analysis on firm-country-level outcomes in Table 5. Panel A presents results for *Log. Growth Tan. Assets (uncons.)*, and Panel B presents results for *Log. Growth Employees (uncons.)*. As before, columns (1)-(2) report results for subsidiaries located in all European countries, columns (3)-(4) report results for subsidiaries in European countries with preferential tax regimes, and Columns (5)-(6) report results for subsidiaries in the four largest European economies. We report results using a parsimonious local linear regression in columns (1), (3), and (5). Columns (2), (4), and (6) include firm-country unconsolidated total assets and revenue measured as controls as well as year fixed effects.

In Panel A, we find no evidence for an impact of CbCR on investments in tangible assets across all European countries. However, when we restrict the sample to European countries with preferential tax regimes in Columns (3) and (4), we estimate positive and significant coefficients across both specifications (26.80 and 21.56 percent). In contrast, when we restrict the sample to the largest economies in Europe in Columns (5) and (6), we estimate insignificant coefficients close to zero across both specifications. Although these magnitudes appear large, we note that

these growth rates apply to a small base. Within our RD sample, operations in European countries with preferential tax regimes had median tangible assets of €328 million. Our results suggest CbCR firms increase investment by approximately €71,000 more than other firms following CbCR.

In Panel B, we estimate positive coefficients across all six specifications when looking at employment growth, but document substantial heterogeneity in treatment effects. The magnitude of the statistically significant coefficients of around 15 percent in European countries with preferential tax regimes (Columns (3) and (4)) is about twice that of all European countries (Columns (1) and (2)); the estimated coefficients for the largest economies are small and insignificant (Columns (5) and (6)). Using the RD sample median number of employees in European countries with preferential tax regimes (31), these growth rates represent fewer than five additional full-time equivalents. These results suggest affected firms increase real economic activities through tangible asset investments and additional employment in subsidiaries located in European countries with preferential tax regimes rather than those in the largest European economies.[22]

Organizational Structure and Complexity

Finally, we study whether firms respond to CbCR by altering organizational structures. In particular, firms could liquidate obsolete entities and close tax haven subsidiaries, which are likely to be perceived as lacking economic substance to mitigate the effects of increased scrutiny. As these tests are conducted at the firm-level, we again rely on RD for these analyses to mitigate the influence of the stark differences in firm size across treated and control firms.

[22] These inferences do not change if we instead use local polynomial regressions (untabulated). The weaker results for tangible assets across all countries compared to the DiD estimates in Table 4 could be attributable to the different estimation technique as well as different samples (years and bandwidths).

We retrieve annual ownership information from BvD. BvD collects this information for legal entities in worldwide via shareholder and subsidiary data obtained through commercial trade registers, annual financial reports, other legal documentation for each separate legal entity available in the database, and even telephone research and M&A intelligence. As these data are collected both before and after the CbCR mandate, they should not be affected by public firms' non-compliance regarding subsidiary disclosure (Dyreng et al., 2016). Because we download this information for all firms each year and construct business groups based on direct ownership linkages, we are able to observe the existence of a host of subsidiaries – including those located in tax havens – and link them to parent firms.[23] Information on the existence of such tax haven subsidiaries is typically not reported directly to tax authorities, except for cases in which legal entities that file tax returns with domestic authorities and belong to the same parent firm as the tax haven subsidiaries also engage in direct intrafirm transactions with these subsidiaries.

As before, we begin the RD analysis by graphically examining discontinuities in outcome variables in Figure 5. All panels plot average values of the outcome variable for evenly spaced bins of 2016 consolidated revenue along with the 90 percent confidence interval, as well as fitted linear trends. Across all four panels, we observe discontinuities at the CbCR threshold. These results indicate a decline in the number of subsidiaries located in European countries with preferential tax regimes (Panel (1)), any tax haven worldwide (Panel (2)), and any country worldwide (Panel (3)), as well as a decline in overall organizational complexity (Panel (4)).

We present results of the regression analysis in Table 6. Panel A presents results for *Log. Preferential Tax Regime Subsidiary*, Panel B presents results for *Log. Tax Haven (any list),* Panel

[23] Although we are able to observe the existence of tax haven subsidiaries globally, unconsolidated affiliate-level financial statement information is not always well-populated in BvD for entities located outside of Europe. We therefore focus tests using such unconsolidated financial statement data on Europe, where coverage is relatively complete.

C presents results for *Log. Subsidiaries*, and Panel D presents results for *Log. Org. Complexity*. Columns (1)-(2) use non-parametric local linear regressions, and columns (3)-(5) use non-parametric local third-order polynomial regressions. Columns (2) and (4) add firm- and country-level controls and year fixed effects. To hold tax planning opportunities and public scrutiny constant, pre-treatment controls include the MNE's total assets, ETR, leverage, intangibility, profitability, and indicators for public listing status and the inclusion in a brand awareness list. Column (5) adds multinational parent firm country and industry fixed effects. All columns use mean-squared-error optimal bandwidths according to the procedure from Calonico et al. (2014).

Results generally indicate reductions in the number of subsidiaries and organizational complexity. In terms of economic magnitudes, the results presented in Table 6 suggest the average firm in the bandwidth just above the CbCR disclosure threshold closed 10 to 17 percent of subsidiaries in countries with preferential tax regimes in Europe and 11 to 24 percent of tax haven subsidiaries worldwide. Overall, these results provide some indication that even private CbCR disclosure deters tax haven operations. However, the magnitudes of significant coefficients for the total number of subsidiaries appears larger than that estimated in the respective panel for the number of tax haven subsidiaries.[24] These results are consistent with firms closing down subsidiaries other than those in tax havens in response to CbCR. Combined with reduced organizational complexity and anecdotal evidence from tax executives, these results suggest the "unwinding" of obsolete entities and a simplification of legal entity charts in response to CbCR.[25]

Taking all results together, our evidence is consistent with firms strategically responding to CbCR to mitigate potentially adverse impacts of additional regulatory scrutiny after the

[24] Results are robust to excluding the 2018 or U.S.-based MNE parents, suggesting they are not driven by the TCJA.
[25] We thank participants at the February 2020 International Tax Policy Forum Member Meeting for their helpful comments.

disclosure mandate. Our results suggest affected firms respond to CbCR by making investments in Europe, where CbCR reports were first required, while simultaneously closing extraneous operations – including those in European countries with preferential tax regimes and tax havens. Investment in Europe is consistent with the goal of better substantiating tax avoidance activities to European tax authorities, who are the primary initial recipients of the private disclosures. Notably, these investment and employment externalities of CbCR positively impact those countries within the EU that were likely most positively impacted by MNE tax avoidance activities targeted by the tax transparency initiative, while not providing positive spillovers for countries that were perceived to be most negatively impacted by MNE tax avoidance. Meanwhile, closing extraneous operations in the same European countries with preferential tax regimes experiencing the largest increases in incremental investment and tax havens, while also reducing organizational complexity, is consistent with the goal of reducing (at least the appearance of) aggressive tax practices. The overall effect of these responses could be a reduction in tax avoidance as documented by Joshi (2020) and Hugger (2020).[26] Our simultaneous examination of real investment and organizational changes in response to CbCR is novel, and results are consistent with the idea that tax aggressiveness and firm complexity do not necessarily capture the same construct (Balakrishnan et al., 2019).

6. Falsification Tests and Additional Validation

[26] Alternatively, our results could indicate inferences in these studies are primarily attributable to CbCR-induced changes in the location of assets, employment, and income. For example, a Hines and Rice (1994) income shifting model would estimate reduced income shifting following CbCR if CbCR induces increases in assets and employment in jurisdictions with preferential tax regimes. Similarly, Hugger (2020) finds higher ETRs but no change in tax payments, suggesting the ETR results potentially indicate a change in real activities (i.e., a denominator effect) rather than a reduction in tax avoidance.

We conduct several additional tests to validate our results. We report results of these tests using our DiD design to examine investment and employment outcomes in Table 7. In Table 7, Panel A we present for comparison purposes a baseline DiD analysis that uses a single post-CbCR indicator *Post,* which is equal to one in 2016, 2017, and 2018. We report results of these tests using RD to examine changes in organizational structure in Table 8.

We begin with several falsification tests. First, we use the true €750 million threshold but use 2013 as the year of treatment (Table 7, Panel B) or revenues measured in 2013 as the running variable (Table 8, Column (1)). Across all specifications, we document statistically insignificant estimates near zero. Second, we select €375 as an alternative threshold for CbCR in the year of implementation in Table 7, Panel C and Table 8, Column (2).[27] We do not observe results consistent our main findings. Third, for the DiD analysis, we examine whether firms that did not exceed the €750 million threshold until 2018 exhibit any response to CbCR prior to 2018 (Table 7, Panel D). We do not find a statistically significant anticipatory effect in the direction of our results. For the RD analysis, we use the €750 million threshold based on revenues in 2016 but examine outcome variables measured in 2015, one year before disclosures had to be made the first time (Table 8, Column (3). Across all outcome variables, we do not observe any statistically significant effect.

Finally, although the formal test reported in Figure 2 suggests no manipulation of the forcing variable of our RD analysis in 2016, we conduct a formal test in Table 8 to determine if a systematic (non-)assignment of firms to the treatment group is a threat to our identification

[27] In untabulated tests, we also use a larger placebo threshold of €1,500 million for the RD to address concerns that other events occurring around the same time as CbCR (e.g., OECD/G20 BEPS, European Commission's illegal state aid investigations, LuxLeaks) more heavily impact larger firms with more aggressive tax planning strategies and therefore (at least partially) contribute to the effects documented in our study. We do not find a significant discontinuity between "treated" and control firms using this larger threshold.

approach.[28] Specifically, we replicate our main RD analysis after excluding observations just below the threshold, as these observations may have manipulated revenues to fall just below the CbCR threshold. Inferences remain unchanged across all outcomes (Column (4)).

7. Conclusions

This study examines the real effects of a country-by-country reporting requirement implemented in the EU in 2016. Using both a difference-in-differences and a regression discontinuity design, we find evidence that firms allocate real economic activities to European countries with preferential tax regimes. We further find evidence consistent with firms subject to CbCR disclosures significantly reducing their number of subsidiaries worldwide – including those located in European countries with preferential tax regimes and worldwide tax havens – and organizational complexity following implementation of CbCR relative to firms not required to disclose. Our results are robust to an array of sensitivity analyses and falsification tests. We acknowledge there could be heterogenous effects over time as well as across different types of firms. We look forward to future research that can leverage additional years of data and larger samples to examine the dynamics and cross-sectional drivers of the corporate responses to CbCR.

Our study bridges research on the consequences of mandatory private disclosure. We provide evidence on the real effects of private disclosures to tax authorities made by a large number of multinational corporations. By investigating externalities of these tax disclosures, we extend the tax avoidance literature. We interpret our results as indicative of firms substantiating their tax avoidance by increasing economic activities in jurisdictions with preferential tax regimes. At the

[28] This test is particularly motivated by the evidence in Hugger (2020), which suggests some bunching below the threshold for private firms, particularly in later reform years. We inspect a (untabulated) histogram of observations closely around the threshold and observe a relatively large fraction of observations exactly at the threshold (i.e., treated firms). Yet, we also note a larger fraction of firms within the bandwidth of €10 million below the threshold compared to the bandwidth of €10 million above the threshold.

same time, firms take steps to reduce the appearance of overly aggressive tax avoidance through complicated organizational structures. Our results suggest increased monitoring by tax authorities may not achieve intended results. Increased transparency may reduce MNE tax avoidance perceived to negatively impact jurisdictions with fewer tax preferences, but potentially at the same time incentivizing investment in jurisdictions with relatively preferential tax regimes. Thus, our study has clear policy implications.

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Appendix A: Variable Definitions

Variable	Definition
Unconsolidated Subsidiary-Level Economic Activity Variables	
Log. Tan. Assets (uncons.)	Natural logarithm of a subsidiary's unconsolidated tangible fixed assets.
Log. Employees (uncons.)	Natural logarithm of a subsidiary's unconsolidated number of employees.
Treated	Binary variable equal to one if the consolidated revenue of the MNE parent firm owning the subsidiary was at least EUR 750 million in 2016.
Unconsolidated Firm-Country-Level Economic Activity Variables	
Log. Growth Tan. Assets (uncons.)	Natural logarithm of growth (i.e., %) since 2015 in the sum of a firm's subsidiaries' unconsolidated tangible fixed assets in a given country.
Log. Growth Employees (uncons.)	Natural logarithm of growth (i.e., %) since 2015 in the sum of a firm's subsidiaries' unconsolidated number of employees in a given country.
Organizational Structure Variables	
Log. Preferential Tax Regime Subsidiaries	Natural lograithm of the absolute number of haven subsidiaries of the firm located in a European country with a preferential tax regime, (See Appendix B).
Log. Tax Havens (any list)	Natural lograithm of the absolute number of tax haven subsidiaries of the firm according to any of the classifications used in Bennedsen and Zeume (2018), (See Appendix B).
Log. Subsidiaries	Natural lograithm of the total number of worldwide subsidiaries of a multinational parent firm with direct equity ownership links above 50%.
Log. Org. Complexity	Natural lograithm of the sum of each MNE's parent firm and subsidiary's hierarchical level in the organizational structure (i.e., 6 if a firm has one parent entity and one level 2 subsidiary and another level 3 subsidiary directly owned by the level 2 subsidiary).
Running Variables for Regression Discontinuity Design	
Running Variable (Sub.)	Consolidated revenue of the MNE parent firm of a subsidiary-country-year observation in 2016 less EUR 750 million.
Running Variable	Consolidated revenue of the multinational firm in 2016 less EUR 750 million.
Firm-level Control Variables (2015)	
Log. Total Assets	Natural logarithm of the firm's consolidated total assets in 2015.
ETR	The firm's consolidated GAAP effective tax rate in 2015, measured by dividing total tax expense by earnings before taxation.
Leverage	The firm's consolidated long-term debt scaled by total assets in 2015
Intangible Ratio	The firm's consolidated fixed intangible assets scaled by total assets in 2015.
ROA	The firm's consolidated return on assets measured as earnings before taxes scaled by total assets in 2015.
Publicly Listed	Indicator variable equal to one if a firm was pubilcly listed in 2015.
Brand Awareness	Indicator variable equal to one if a firm's name appeared in the Global 500 list of valuable consumer brands published by Brand Finance ® in February 2016.
Log. Total Assets (uncons.)	Natural logarithm of the sum of MNE's subsidiaries' unconsolidated total assets in a given country in 2015.
Log. Revenue (uncons.)	Natural logarithm of the sum of MNE's subsidiaries' unconsolidated revenues in a given country in 2015.
Log. GDP	Natural logarithm of total GDP of the MNE's or subsidiaries' country of incorporation in 2015.
CIT	Corporate income tax rate of the firm's country of incorporation.

Appendix B: Classification of Tax Haven Countries

	Country	Tax Haven (any list)	Preferential Tax Regime (Europe)	Big 8	Dot Havens
AD	Andorra	x			x
AG	Antigua and Barbuda	x			x
AI	Anguilla	x			x
AW	Aruba	x			x
BB	Barbados	x			x
BH	Bahrain	x			x
BM	Bermuda	x			x
BS	Bahamas	x			x
BZ	Belize	x			x
CH	Switzerland		x	x	
CR	Costa Rica	x			x
CY	Cyprus	x	x		
DM	Dominica	x			x
GD	Grenada	x			x
GI	Gibraltar	x			x
HK	Hong Kong	x		x	
IE	Ireland	x	x	x	
JO	Jordan	x			x
KN	Saint Kitts and Nevis	x			x
KY	Cayman Islands	x			x
LB	Lebanon	x		x	
LC	Saint Lucia	x			x
LI	Liechtenstein	x			x
LR	Liberia	x		x	
LU	Luxembourg	x	x		
MC	Monaco	x			x
MH	Marshall Islands	x			x
MO	Macau	x			x
MT	Malta	x	x		
MU	Mauritius	x			x
MV	Maldives	x			x
NL	Netherlands		x		
NR	Nauru	x			x
PA	Panama	x		x	
PR	Puerto Rico			x	
SC	Seychelles	x			x
SG	Singapore	x		x	
SM	San Marino	x			x
TO	Tonga	x			x
VC	Saint Vincent and the Grenadines	x			x
VG	British Virgin Islands	x			x
VU	Vanuatu	x			x
WS	Samoa	x			x

Notes: This table lists the countries coded as tax havens or those with preferential tax regimes. The comprehensive tax haven list (*Tax Haven (any list)*) subsumes all countries listed in any of the categories in Bennedsen and Zeume (2018). We do not include countries labelled as tax havens according to Bennedsen and Zeume (2018) if no multinational firm in our sample has a subsidiary in the respective country. *Preferential Tax Regime (Europe)* refers to countries in the Europe blacklisted by the Tax Justice Network. *Big 8* refers to the "big seven" tax havens in Hines and Rice (1994) plus Puerto Rico. *Dot Haven* are tax haven countries that are not European countries or *Big 8* havens.

Figure 1: Example of Country-by-Country Disclosure

Table 1. Overview of allocation of income, taxes and business activities by tax jurisdiction

Name of the MNE Group:
Fiscal Year concerned:
Currency used:

Tax jurisdiction	Revenues			Profit (loss) before income tax	Income tax paid (on cash basis)	Income tax accrued — current year	Stated capital	Accumulated earnings	Number of employees	Tangible assets other than cash and cash equivalents
	Unrelated party	Related party	Total							

Table 2 List of all the Constituent Entities of the MNE Group included in each aggregation per tax jurisdiction

Name of the MNE Group:
Fiscal Year concerned:

Tax Jurisdiction	Constituent Entities Resident in the Tax Jurisdiction	Tax Jurisdiction of Organisation or Incorporation if Different from Tax Jurisdiction of Residence	Main Business Activity(ies)												
			Research and Development	Holding or Managing Intellectual Property	Purchasing or Procurement	Manufacturing or Production	Sales, Marketing or Distribution	Administrative, Management or Support Services	Provision of Services to Unrelated Parties	Internal Group Finance	Regulated Financial Services	Insurance	Holding Shares or Other Equity instruments	Dormant	Other (1)
	1.														
	2.														
	3.														
	1.														
	2.														
	3.														

(1) Please specify the nature of the activity of the Constituent Entity in the "Additional information"

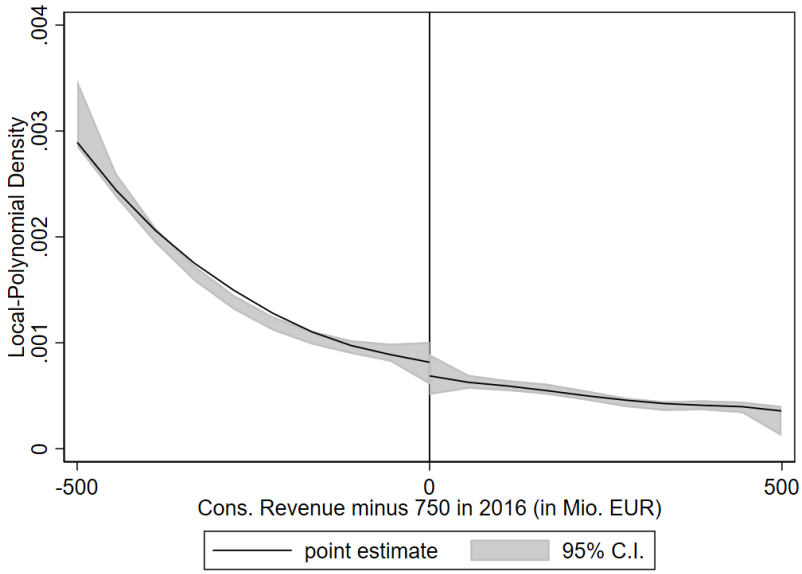
Table 3: Additional information

Name of the MNE Group:
Fiscal Year concerned:

Please include any further brief information or explanation you consider necessary or that would facilitate the understanding of the compulsory information provided in the country-by-country report

Notes: This figure depicts the template report firms are required to submit to local tax authorities under the CbCR mandate as of 1 January 2016 that was published as part of the European Council Directive 2016/881/EU. Source: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016L0881&from=EN.

Figure 2: Test of Manipulation of €750 million Consolidated 2016 Revenues Threshold

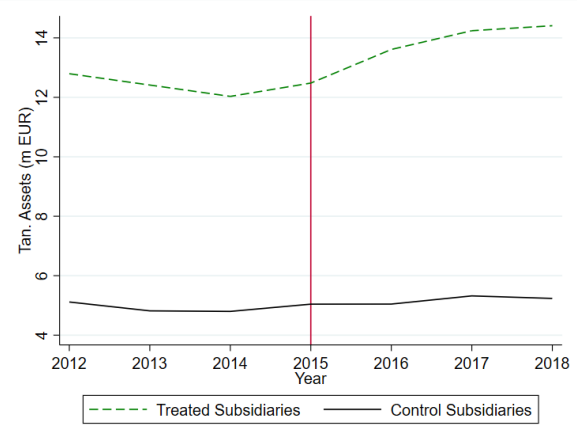


Notes: This graph plots point estimates and their 95% confidence intervals of local polynomial densities over the running variable (consolidated 2016 revenues) around the threshold of €750 million following McCrary (2008) and Cattaneo et al. (2018).

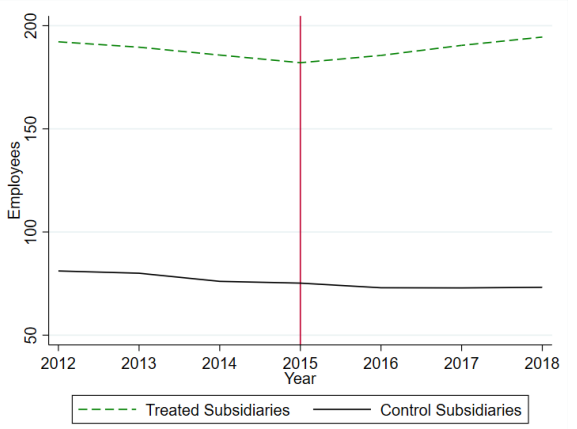
Figure 3: Fixed Tangible Assets and Employment for Subsidiaries of Treated versus Control MNEs

All European Countries

(1) *Fixed Tan. Assets (uncons)*

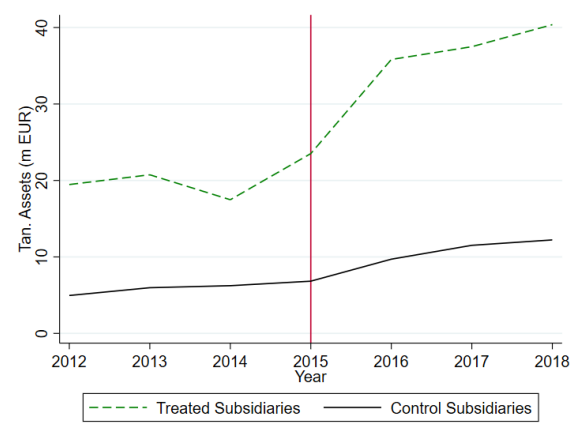


(2) *Employees (uncons)*

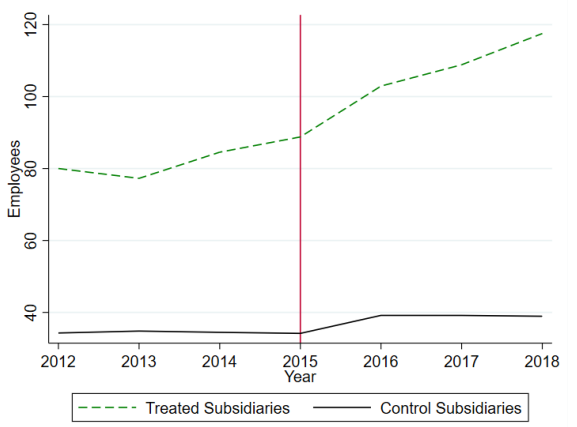


European Countries with Preferential Tax Regimes

(3) *Fixed Tan. Assets (uncons)*

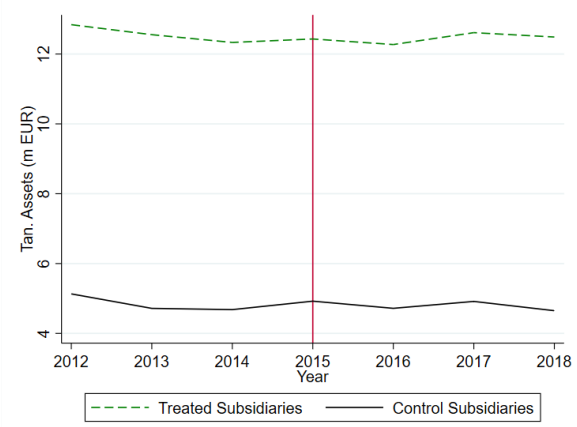


(4) *Employees (uncons)*

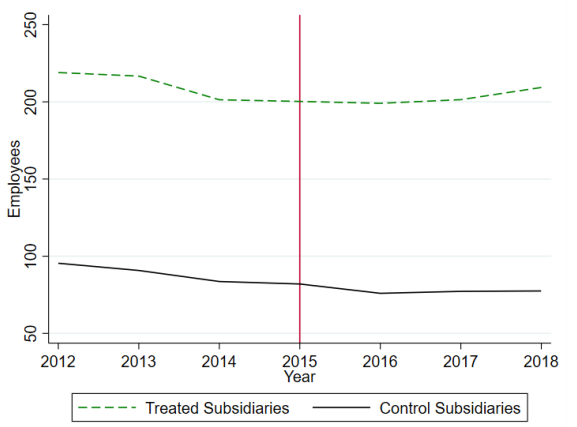


Italy, France, United Kingdom, and Germany

(5) *Fixed Tan. Assets (uncons)*



(6) *Employees (uncons)*

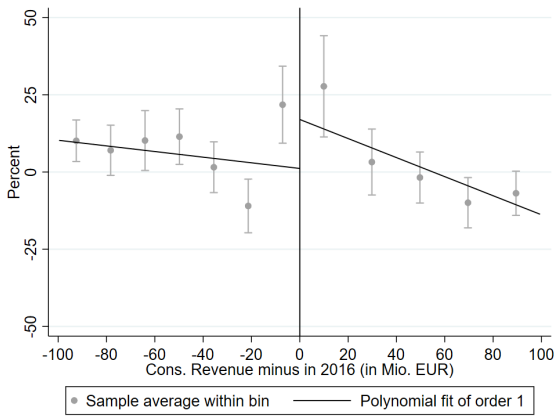


Notes: These graphs plot the mean values of raw absolute tangible fixed assets and number of employees of MNEs subsidiaries over time. The dashed green line depicts values for subsidiaries of treated CbCR MNEs (firms reporting more than €750 million in 2016 revenue). The solid black line depicts values for subsidiaries of control firms that reported revenues of or less than €750 million in 2016. Graphs (1)-(2) are based on the full sample of subsidiaries in Europe, graphs (3)-(4) are based on the sub-sample of European countries with preferential tax regimes (Cyprus, Ireland, Luxembourg, Malta, Netherlands, Switzerland), and graphs (5)-(6) are based on the sub-sample of the four largest European economies (France, Germany, Italy, United Kingdom)
.

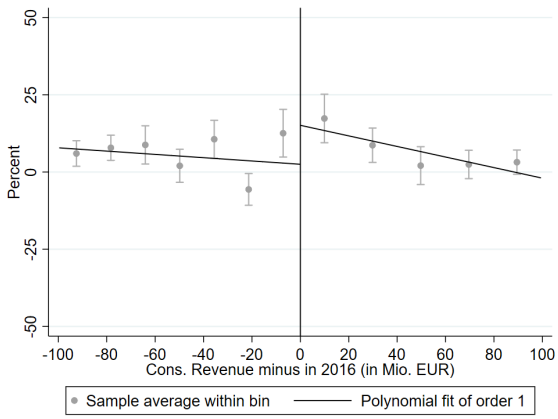
Figure 4: Unconsolidated Firm-Country-Level Economic Growth Discontinuities around €750 million Threshold

All European Countries

(1) *Log. Growth Tan. Assets (uncons.)*

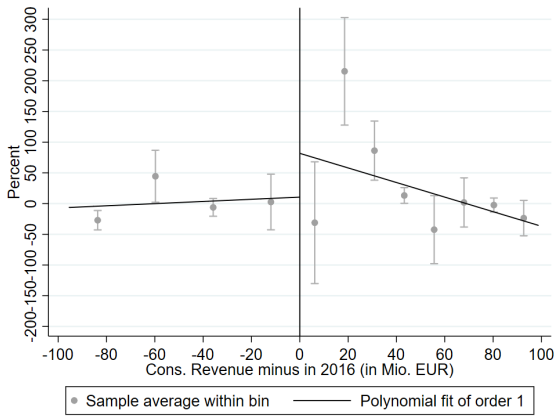


(2) *Log. Growth Employees (uncons.)*

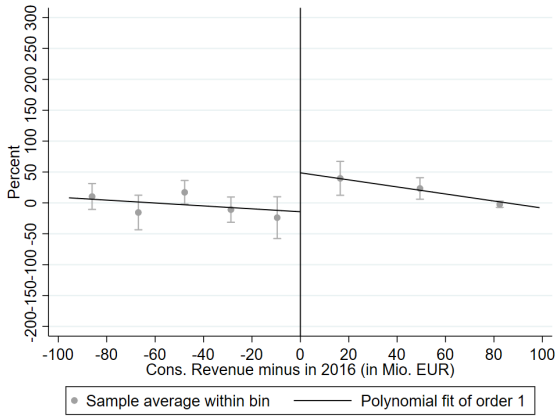


European Countries with Preferential Tax Regimes

(3) *Log. Growth Tan. Assets (uncons.)*

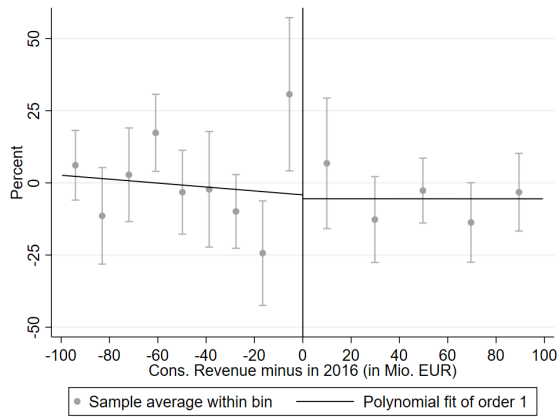


(4) *Log. Growth Employees (uncons.)*

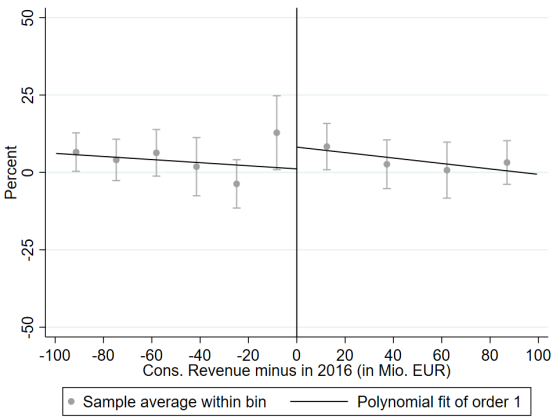


Italy, France, United Kingdom, and Germany

(5) *Log. Growth Tan. Assets (uncons.)*



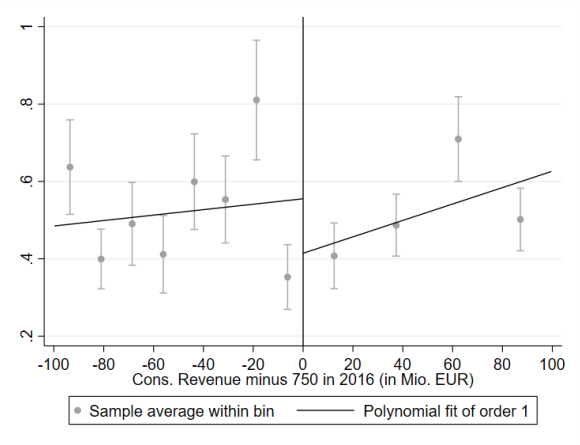
(6) *Log. Growth Employees (uncons.)*



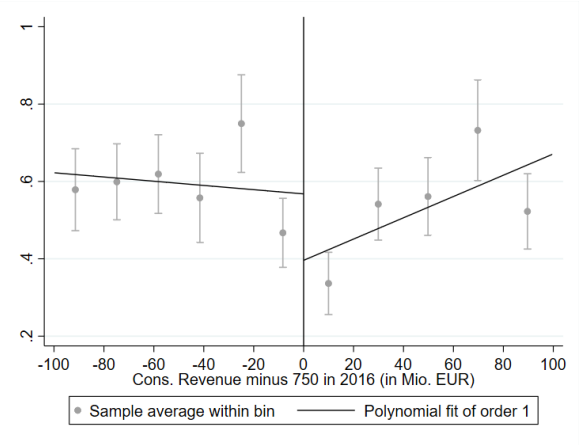
Notes: These graphs plot average values and their 90% confidence intervals of different firm-country-level outcome variables based on unconsolidated financial information of subsidiaries for evenly spaced bins of the firm's consolidated 2016 revenue. The graphs show linear trends. Graphs (1)-(2) are based on the full sample of subsidiaries in Europe, graphs (3)-(4) are based on the sub-sample of European countries with preferential tax regimes (Cyprus, Ireland, Luxembourg, Malta, Netherlands, Switzerland), and graphs (5)-(6) are based on the sub-sample of the four largest European economies (France, Germany, Italy, United Kingdom) .

Figure 5: Organizational Structure Discontinuities around €750 million Threshold

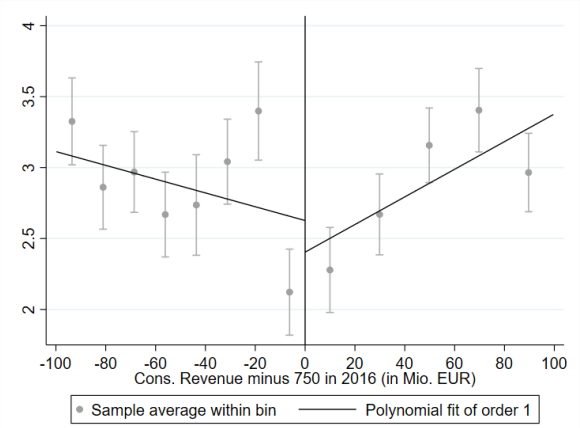
(1) *Log. Preferential Tax Regime Subsidiaries)*



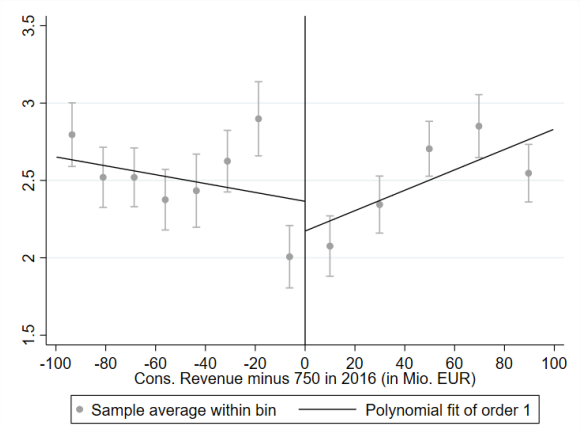
(2) *Log. Tax Havens (any list)*



(3) *Log. Subsidiaries*



(4) *Log. Org. Complexity*



Notes: These graphs plot average values and their 90% confidence intervals of different firm-level outcome variables based on their subsidiary ownership information for evenly spaced bins of the firm's consolidated 2016 revenue. The graphs show linear trends.

Table 1: Sample Construction

Panel A: Sample Selection Steps		Unique Firms (MNEs)		Unique Subsidiaries	
		Obs.	% Loss	Obs.	% Loss
(1)	*Firms with consolidated financial statements, at least EUR 100 million revenue in any year 2012-2018, at least one foreign subsidiary according to BvD Orbis database as of March 2020*	53,575			
(2)	*Matching historical subsidiary information to multinational firms identified as ultimate corporate owners incorporated in the EU or with at least one subsidiary in the EU*	34,062	36.42%	761,578	
(3)	*Subsidiaries located in Europe*			341,697	55.13%

Panel B: Regression Samples		
Difference-in-Differences Subsidiaries Sample (2012-2018)		Subsidiary-Year Obs.
(4)	*Non-missing unconsolidated financial information*	652,419
Regression Discontinuity Sample (2016-2018)		Firm-Country-Year Obs.
(5)	*Aggregating unconsolidated subsidiary information*	87,354
		Firm-Year Obs.
(6)	*Consolidated firm-level and ownership information*	63,899

Notes: This table presents the procedure to construct the final regression samples. Sample selection steps (1) and (2) rely on information on multinational firms with consolidated statements and their worldwide subsidiaries according to ownership information taken on an annual basis from the Bureau van Dijk Orbis database. Step (3) reports how many subsidiaries are located in Europe. Step (4) uses unconsolidated financial statement information in subsidiaries in Europe in the period 2012-2018. Step (5) uses this information on an aggregate basis by multinational firm and European country where one or more subsidiaires of that firm are incorporated. Step (6) uses information at the multinational firm-year level on multinationals from all over the globe that are potentially affected by CbCR due to being incorporated in the EU or having at least one subsidiary in the EU.

Table 2: European Subsidiary Observations by Year

Year	2012		2013		2014		2015		2016		2017		2018		Total	
Country	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
AT	2,542	3.2	2,479	2.9	2,568	2.7	3,145	3.2	3,191	3.1	3,286	3.2	2,731	3.2	19,942	3.1
BE	3,581	4.5	3,961	4.6	4,621	4.9	4,773	4.8	4,939	4.8	4,933	4.8	4,553	5.3	31,361	4.8
BG	367	0.5	443	0.5	510	0.5	537	0.5	543	0.5	514	0.5	668	0.8	3,582	0.5
CH	16	0.0	17	0.0	18	0.0	19	0.0	16	0.0	18	0.0	28	0.0	132	0.0
CY	21	0.0	30	0.0	43	0.0	40	0.0	29	0.0	20	0.0	8	0.0	191	0.0
CZ	1,807	2.3	1,781	2.0	1,961	2.1	2,158	2.2	2,154	2.1	2,146	2.1	1,519	1.8	13,526	2.1
DE	9,438	11.8	10,153	11.7	10,573	11.3	11,335	11.4	11,801	11.4	11,394	11.0	4,459	5.2	69,153	10.6
DK	1,963	2.5	2,078	2.4	2,064	2.2	2,228	2.2	2,528	2.5	2,603	2.5	2,590	3.0	16,054	2.5
EE	526	0.7	555	0.6	574	0.6	597	0.6	604	0.6	582	0.6	544	0.6	3,982	0.6
ES	6,646	8.3	6,679	7.7	6,988	7.5	7,182	7.2	7,479	7.3	7,599	7.3	5,695	6.6	48,268	7.4
FI	1,862	2.3	2,039	2.3	2,181	2.3	2,196	2.2	2,228	2.2	2,255	2.2	2,349	2.7	15,110	2.3
FR	11,900	14.9	12,256	14.1	14,139	15.1	14,929	15.0	14,139	13.7	14,238	13.7	11,422	13.3	93,023	14.3
GB	10,391	13.0	11,369	13.1	12,077	12.9	12,312	12.4	13,218	12.8	12,847	12.4	12,222	14.2	84,436	12.9
GR	314	0.4	383	0.4	382	0.4	391	0.4	393	0.4	363	0.4	601	0.7	2,827	0.4
HR	412	0.5	477	0.5	527	0.6	579	0.6	546	0.5	566	0.5	476	0.6	3,583	0.5
HU	799	1.0	831	1.0	967	1.0	1,124	1.1	1,011	1.0	1,140	1.1	1,109	1.3	6,981	1.1
IE	994	1.2	1,176	1.4	1,256	1.3	1,493	1.5	1,555	1.5	1,596	1.5	1,508	1.8	9,578	1.5
IS	87	0.1	114	0.1	118	0.1	127	0.1	115	0.1	96	0.1	92	0.1	749	0.1
IT	8,447	10.6	10,355	11.9	10,217	10.9	10,927	11.0	11,104	10.8	11,471	11.1	10,524	12.2	73,045	11.2
LT	328	0.4	361	0.4	365	0.4	377	0.4	394	0.4	390	0.4	340	0.4	2,555	0.4
LU	349	0.4	423	0.5	430	0.5	519	0.5	612	0.6	592	0.6	612	0.7	3,537	0.5
LV	396	0.5	444	0.5	579	0.6	654	0.7	611	0.6	611	0.6	565	0.7	3,860	0.6
MT	105	0.1	125	0.1	156	0.2	185	0.2	169	0.2	164	0.2	46	0.1	950	0.1
NL	3,142	3.9	3,559	4.1	3,811	4.1	4,174	4.2	5,901	5.7	5,916	5.7	4,040	4.7	30,543	4.7
NO	2,018	2.5	2,964	3.4	3,174	3.4	3,165	3.2	3,111	3.0	3,173	3.1	3,669	4.3	21,274	3.3
PL	3,052	3.8	3,285	3.8	3,598	3.8	3,764	3.8	3,869	3.8	3,907	3.8	3,282	3.8	24,757	3.8
PT	1,126	1.4	1,157	1.3	1,440	1.5	1,526	1.5	1,532	1.5	1,578	1.5	1,135	1.3	9,494	1.5
RO	1,533	1.9	1,483	1.7	1,759	1.9	1,892	1.9	1,910	1.9	1,972	1.9	1,853	2.2	12,402	1.9
SE	4,675	5.9	4,999	5.7	5,151	5.5	5,700	5.7	5,982	5.8	6,235	6.0	6,064	7.0	38,806	5.9
SI	295	0.4	306	0.4	358	0.4	364	0.4	357	0.3	387	0.4	339	0.4	2,406	0.4
SK	645	0.8	658	0.8	896	1.0	992	1.0	1,051	1.0	1,054	1.0	1,016	1.2	6,312	1.0
Total	79,777	100.0	86,940	100.0	93,501	100.0	99,404	100.0	103,092	100.0	103,646	100.0	86,059	100.0	652,419	100.0

Notes: This table presents the distribution of observations of firms by their subsidiaries' countries of incorporation and year in Europe conditional on these subsidiaries' unconsolidated financial information being available in the Orbis database. Country codes are ISO Alpha-2.

Table 3: Summary Statistics

	Obs.	Mean	SD	P1	P25	Median	P75	P99
Unconsolidated Subsidiary-Level Economic Activity Variables								
Log. Tan. Assets (uncons.)	652,419	13.08	3.02	5.86	11.02	13.22	15.32	19.24
Log. Employees (uncons.)	478,828	3.74	1.63	0.69	2.56	3.66	4.85	7.86
Treated	652,419	0.56	0.50	0.00	0.00	1.00	1.00	1.00
Unconsolidated Firm-Country-Level Economic Activity Variables								
Log. Growth Tan. Assets (uncons.)	87,354	3.88	99.71	-286.96	-26.95	-2.15	28.41	334.14
Log. Growth Employees (uncons.)	87,354	6.54	58.60	-184.15	-6.78	2.11	18.23	217.27
Organizational Structure Variables								
Log. Preferential Tax Regime Subsidiaries	63,899	0.42	0.81	0.00	0.00	0.00	0.69	3.58
Log. Tax Havens (any list)	63,899	0.42	0.81	0.00	0.00	0.00	0.69	3.58
Log. Subsidiaries	63,899	2.12	1.43	0.69	0.69	1.95	3.00	6.10
Log. Org. Complexity	63,899	2.41	2.09	0.00	0.00	2.48	3.85	7.40
Running Variables for Regression Discontinuity Design								
Running Variable (Sub.)	87,354	5898.66	18980.68	-746.36	-639.34	-54.10	3123.28	90347.66
Running Variable	63,899	801.05	8171.29	-749.89	-712.82	-636.99	-243.56	28242.52
Firm-level Control Variables (2015)								
Log. Total Assets	58,319	19.02	2.27	14.40	17.44	18.67	20.42	25.52
ETR	63,899	35.17	33.73	0.00	10.72	25.49	42.24	100.00
Leverage	53,100	15.12	17.46	0.00	0.67	9.61	22.66	81.63
Intangible Ratio	55,608	11.87	17.78	0.00	0.43	3.22	15.77	75.65
ROA	57,734	2.69	16.89	-88.26	0.37	4.29	9.23	43.69
Publicly Listed	62,366	38.84	48.74	0.00	0.00	0.00	100.00	100.00
Brand Awareness	63,899	2.44	15.41	0.00	0.00	0.00	0.00	100.00
Log. Revenue (uncons.)	80,142	15.75	5.27	0.00	15.36	17.04	18.45	22.26
Log. Total Assets (uncons.)	80,142	17.18	2.45	12.16	15.46	17.04	18.67	23.74
Log. GDP	62,075	27.88	1.32	23.71	26.95	28.24	28.71	30.53
CIT	62,357	26.84	7.31	8.50	20.00	27.00	31.29	40.00

Notes: This table presents summary statistics for all variables included in the regression analyses. All variables are defined in Appendix A. Unconsolidated subsidiary-level economic activity variables are used in the difference-in-differences tests over the period 2012-2018. The remaining variables are used in the regression discontinuity design over the period 2016-2018 and pre-treatment control variables as of 2015. Growth variables are computed as logarithmic growth and multiplied by 100 to allow an interpretation in percentage terms. *Sub.* indicates that the running variable is based on a multinational firm's consolidated revenues but it refers to multinational firms' subsidiary-level country-year as the unit of observation. *Uncons.* indicates that the financial information is based on subsidiaries' unconsolidated financial accounts.

Table 4: Difference-in-Differences Analysis of Subsidiary-Level Economic Activity

	(1)	(2)	(3)	(4)	(5)	(6)
	All Europe		Preferential Tax Regimes		DE, FR, IT, UK	
Unconsolidated:	*Log. Tan. Assets*	*Log. Employees*	*Log. Tan. Assets*	*Log. Employees*	*Log. Tan. Assets*	*Log. Employees*
Treated * 2012	-0.00	-0.01	-0.17*	0.06	-0.02	-0.02
	(0.02)	(0.02)	(0.09)	(0.04)	(0.03)	(0.03)
Treated * 2013	0.01	-0.00	-0.03	-0.00	-0.00	-0.01
	(0.02)	(0.01)	(0.06)	(0.03)	(0.03)	(0.02)
Treated * 2014	0.02	-0.01	-0.06	-0.02	0.03	-0.03**
	(0.02)	(0.01)	(0.06)	(0.03)	(0.02)	(0.01)
Treated * 2015	.	.	.	.	.	.
Treated * 2016	0.05***	0.03***	0.23***	0.11***	0.01	0.01
	(0.02)	(0.01)	(0.07)	(0.03)	(0.02)	(0.01)
Treated * 2017	0.06***	0.05***	0.34***	0.15***	-0.02	0.01
	(0.02)	(0.01)	(0.09)	(0.04)	(0.03)	(0.01)
Treated * 2018	0.07***	0.05***	0.35***	0.12***	-0.01	0.02
	(0.02)	(0.01)	(0.10)	(0.04)	(0.04)	(0.02)
Fixed Effects	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr
Obs.	652,419	576,232	44,250	38,299	318,988	292,480
Adj. R2	0.252	0.214	0.429	0.392	0.286	0.248

Notes: This table presents the results of estmating a differences-in-differences model based on a time series OLS regression. The outcome variables are the natural logarithm of a firm's individual subsidiary's unconsolidated fixed tangible assets and number of employees. The sample includes all European subsidiaries of all multinational firms potentially falling under the CbCR regime in Europe. In Columns (1) and (2), we use the full sample of subsidiary observations in all European countries. In Columns (3) and (4), we only include observations from European countries with preferential tax regmies (Switzerland, Cyprus, Ireland, Luxembourg, Malta, and the Netherlands). In Columns (5) and (6), we only include observations from the four largest European economies (Germany, France, Italy, and the United Kindom). *Treated* is an indicator variable taking on the value of 1 for firms reporting more than €750 million in 2016 revenue. The specifications include firm fixed effects as well as indicators for every year, and the interactions between *Treated* and each year. We omit the indicator for year 2015, which represents the relative base year. For parsimony, we only present the coefficients of interest, which represent the difference in outcome variables between treated and control firms in a given year and relative to 2015, controlling for all time invariant firm characteristics. Robust standard errors are reported in parentheses and are clustered at the multinational firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 5: Regression Discontinuity Analysis of Firm-Country-Level Economic Activity

	(1)	(2)	(3)	(4)	(5)	(6)
	All Europe		Preferential Tax Regimes		DE, FR, IT, UK	
Panel A	*Log. Growth Tan. Assets (uncons.)*					
RD estimate	-3.25	-2.00	26.80***	21.56**	-0.90	2.44
	(3.57)	(3.76)	(9.39)	(9.89)	(5.78)	(5.92)
Orig. Obs.	87,354	78,310	6,306	5,634	35,737	32,557
Bandwidth	415	415	994	994	346	346
Obs. in Bandwidth	14,994	13,566	3,294	2,867	5,157	4,756
Panel B	*Log. Growth Employees (uncons.)*					
RD estimate	6.68**	8.40***	13.49***	16.68***	1.98	5.43
	(3.01)	(3.07)	(5.01)	(5.27)	(3.76)	(3.68)
Orig. Obs.	87,354	78,310	6,306	5,634	35,737	32,557
Bandwidth	242	242	1,132	1,132	321	321
Obs. in Bandwidth	7,853	7,198	3,354	2,919	4,688	4,315
Polynomials	Linear	Linear	Linear	Linear	Linear	Linear
Controls	No	Firm, Sub.	No	Firm, Sub.	No	Firm, Sub.
Fixed Effects	No	Yr	No	Yr	No	Yr

Notes: This table presents results of estimating the effect of CbCR on firm-country-level economic activity based on unconsolidated financial information of subsidiaries located in Europe using a regression discontinuity design. We aggregate data of a multinational firm's subsidiaries in the same country in a given year. In Columns (1) and (2), we use the full sample of observations in all European countries. In Columns (3) and (4), we only include observations from European countries with preferential tax regmies (Switzerland, Cyprus, Ireland, Luxembourg, Malta, and the Netherlands). In Columns (5) and (6), we only include observations from the four largest European economies (Germany, France, Italy, and the United Kindom). The outcome variables are a firm's subsidiaries' natural logarithm of growth in tangible fixed assets (Panel A) and number of employees (Panel B). Columns (1), (3), and (5) use nonparametric local linear regressions with mean-squared-error optimal bandwidths following Calonico et al. (2014) without controls and Columns (2), (4), and (6) add controls. We report bias-corrected standard errors in parentheses following Calonico et al. (2014). ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 6: Regression Discontinuity Analysis of MNEs' Organizational Structures

	(1)	(2)	(3)	(4)	(5)
Panel A	*Log. Preferential Tax Regime Subsidiaries*				
RD estimate	-0.14***	-0.10**	-0.16***	-0.13**	-0.17**
	(0.04)	(0.05)	(0.05)	(0.06)	(0.07)
Orig. Obs.	63,899	52,159	63,899	52,159	52,159
Bandwidth	197	197	458	458	458
Obs. in Bandwidth	3,916	3,318	10,850	9,175	9,237
Panel B	*Log. Tax Havens (any list)*				
RD estimate	-0.17***	-0.11***	-0.18***	-0.22***	-0.24***
	(0.04)	(0.04)	(0.06)	(0.06)	(0.07)
Orig. Obs.	63,899	52,159	63,899	52,159	52,159
Bandwidth	245	245	389	389	389
Obs. in Bandwidth	4,893	4,162	8,526	7,225	7,279
Panel C	*Log. Subsidiaries*				
RD estimate	-0.18**	-0.16**	-0.37***	-0.30**	-0.44***
	(0.08)	(0.08)	(0.13)	(0.14)	(0.15)
Orig. Obs.	63,899	52,159	63,899	52,159	52,159
Bandwidth	235	235	300	300	300
Obs. in Bandwidth	4,686	3,982	6,118	5,212	5,246
Panel D	*Log. Org. Complexity*				
RD estimate	-0.19*	-0.17	-0.47**	-0.42**	-0.62***
	(0.11)	(0.11)	(0.20)	(0.21)	(0.23)
Orig. Obs.	63,899	52,159	63,899	52,159	52,159
Bandwidth	248	248	305	305	305
Obs. in Bandwidth	4,960	4,217	6,246	5,323	5,357
Polynomials	Linear	Linear	3rd-order	3rd-order	3rd-order
Controls	No	Firm, Ctry	No	Firm, Ctry	Firm
Fixed Effects	No	Yr	No	Yr	Yr, Ctry, Ind

Notes: This table presents results of estimating the effect of CbCR on multinational firms' organizational structures using a regression discontinuity design. The outcome variables are the natural logarithm of the number of subsidiaries a firm has in a preferential tax regime country in Europe (Panel A) and the natural logarithm of a firm's number of subsidiaries in tax havens according to any classification used in Bennedsen and Zeume (2018) (Panel B). In Panel C, the outcome variable is the natural logarithm of a firm's total number of majority-owned subsidiaries. In Panel D, the outcome variable is the natural logarithm of the sum of hierarchical subsidiary levels of majority-owned subsidiaries. Columns (1) to (2) use nonparametric local linear regressions while Columns (3) to (5) use nonparametric local third-order polynomial regressions with mean-squared-error optimal bandwidths following Calonico et al. (2014). In Column (5), we use optimal bandwidths of the preceding model and include country and industry fixed effects (based on the multinational parent firm's country of incorporation and main NACE section) in addition to firm controls and year fixed effects. We report bias-corrected standard errors in parentheses following Calonico et al. (2014). ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 7: Robustness: Difference-in-Differences Analysis of Subsidiary-Level Economic Activity

	(1)	(2)	(3)	(4)	(5)	(6)
	All Europe		Preferential Tax Regimes		DE, FR, IT, UK	
Unconsolidated:	*Log. Tan. Assets*	*Log. Employees*	*Log. Tan. Assets*	*Log. Employees*	*Log. Tan. Assets*	*Log. Employees*
Panel A:	*Baseline Result*					
Treated * Post	0.05***	0.05***	0.35***	0.12***	-0.01	0.03**
	(0.02)	(0.01)	(0.07)	(0.03)	(0.03)	(0.01)
Fixed Effects	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr
Obs.	652,419	576,232	44,250	38,299	318,988	292,480
Adj. R2	0.252	0.214	0.429	0.392	0.286	0.248
Panel B:	*Placebo event year: 2013*					
Treated * Post	0.03	0.02	0.05	-0.03	0.03	0.03
	(0.02)	(0.01)	(0.06)	(0.03)	(0.02)	(0.02)
Fixed Effects	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr
Obs.	359,622	305,000	21,520	23,015	179,973	154,726
Adj. R2	0.248	0.207	0.472	0.383	0.283	0.240
Panel C:	*Placebo threshold: EUR 375 million*					
Treated * Post	0.02	-0.01	0.14	-0.01	-0.04	-0.07***
	(0.03)	(0.02)	(0.12)	(0.05)	(0.04)	(0.02)
Fixed Effects	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr
Obs.	289,674	248,398	16,888	13,743	135,670	121,637
Adj. R2	0.329	0.273	0.528	0.542	0.372	0.332
Panel D:	*Anticipation test (First-time treated in 2018)*					
Treated * Post	0.01	-0.02	-0.08	-0.08*	0.05	-0.04
	(0.04)	(0.02)	(0.13)	(0.05)	(0.05)	(0.03)
Fixed Effects	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr
Obs.	566,360	497,265	38,030	34,446	280,371	254,523
Adj. R2	0.251	0.212	0.430	0.387	0.286	0.246

Notes: This table presents the results of falsification tests using the differences-in-differences model based on Table 4. For parsimony, we use a single post-reform period indicator instead of the individual year indicators. Panel (A) replicates the baseline result and thus presents the average difference in outcome variables between treated and control variables in 2016 to 2018 relative to 2012 to 2015 (pre versus post CbCR). The sample includes all European subsidiaries of all multinational firms potentially falling under the CbCR regime in Europe. Panel (B) uses 2013 as the falsified reform year and only uses observations on outcome variables before 2016. Panel (C) uses a falisified size threshold of €375 million (50 percent of the actual threshold) to determine the treatment indicator and only uses observations from untreated firms. In Panel (D) the treatment indicator takes on the value of one if a firm reports above €750 in revenue for the first time in 2018. Panel (D) only uses observations on outcome variables before 2018. The outcome variables are the natural logarithm of a firm's indidiviual subsidiary's unconsolidated fixed tangible assets and number of employees. In Columns (1) and (2), we use the full sample with subsidiary observations in all European countries. In Columns (3) and (4), we only include observations from European countries with preferential tax regmies (Switzerland, Cyprus, Ireland, Luxembourg, Malta, and the Netherlands). In Columns (5) and (6), we only include observations from the four largest European economies (Germany, France, Italy, and the United Kindom). Robust standard errors are reported in parentheses and are clustered at the multinational firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 8: Robustness: Regression Discontinuity Analysis of MNEs' Organizational Structures

	(1)	(2)	(3)	(4)
	Falsification Tests			Manipulation Test
	RV in 2013	RV 375	Outcomes in 2015	No Firms RV [-10;0]
Panel A	*Log. Preferential Tax Regime Subsidiaries*			
RD estimate	-0.06	0.07**	0.01	-0.26***
	(0.05)	(0.03)	(0.07)	(0.06)
Obs. right	48,082	63,899	21,138	63,778
Bandwidth	319	191	308	152
Obs. in Bandwidth	4,981	10,570	2,107	2,813
Panel B	*Log. Tax Havens (any list)*			
RD estimate	-0.03	-0.01	-0.12	-0.24***
	(0.05)	(0.03)	(0.08)	(0.04)
Obs. right	48,082	63,899	21,138	63,778
Bandwidth	251	109	266	247
Obs. in Bandwidth	3,743	5,434	1,772	4,831
Panel C	*Log. Subsidiaries*			
RD estimate	-0.01	-0.10	-0.07	-0.32***
	(0.10)	(0.06)	(0.15)	(0.08)
Obs. right	48,082	63,899	21,138	63,778
Bandwidth	233	119	289	243
Obs. in Bandwidth	3,448	6,012	1,948	4,737
Panel D	*Log. Org. Complexity*			
RD estimate	-0.03	-0.11	-0.03	-0.38***
	(0.15)	(0.09)	(0.22)	(0.12)
Obs. right	48,082	63,899	21,138	63,778
Bandwidth	228	122	302	250
Obs. in Bandwidth	3,374	6,181	2,055	4,860
Polynomials	Linear	Linear	Linear	Linear
Controls	No	No	No	No
Fixed Effects	No	No	No	No

Notes: This table presents the results of different falsification and robustness tests using the regression discontinuity design. Columns (1)-(3) report falsification tests obtained by replicating the baseline regression discontinuity design specifications presented in Column (1) of Table 6. The main results from the models based on local linear nonparametric regressions are reestimated when defining the year 2013 as the placebo event date for the €750 million threshold (Column (1)), when using a placebo threshold of €375 million in 2016 consolidated revenue as the threshold for treatment (Column (2)), and when using placebo outcome variables as of fiscal year 2015 (Column (3)). Column (4) presents the results of excluding firms reporting €740-750 million in 2016 revenue, i.e. with values of the running variable between -10 and 0. We report bias-corrected standard errors in parentheses following Calonico et al. (2014). ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.