

Real Effects of Private Country-by-Country Disclosure

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This version: 29 August 2019

Abstract

We investigate the effects of mandatory private Country-by-Country (CbC) disclosure to tax authorities on economic activity. Using rich data on the operations of multinational firms, we exploit the threshold-based application of this 2016 disclosure rule in a regression discontinuity design. We find evidence that firms affected by the disclosure mandate reduce ownership in tax haven subsidiaries relative to unaffected firms and thereby increase transparency in their previously opaque organizational structure. We also document that affected firms invest less in aggregate employment on average relative to unaffected firms but do not appear to alter consolidated tax payments. However, affected firms increasingly allocate revenue, employment, total assets, and, correspondingly, tax payments to subsidiaries in European low-tax countries. Collectively, our findings suggest that mandatory CbC disclosure curbs the most aggressive tax planning achieved through tax haven operations but has likely unintended adverse effects on other real economic activities.

An [Online Appendix](#) is available on the authors' websites.

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

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

Acknowledgements: We gratefully acknowledge helpful comments and suggestions from Stephen Glaeser, Peter Severin, Christoph Spengel, and Bridget Stomberg. We thank Sven-Eric Bärsch at Flick Gocke Schaumburg for valuable discussions regarding the institutional background of CbC disclosures and information exchange between tax authorities. We thank seminar participants at the University of Mannheim for their comments. Marcel Olbert acknowledges funding from the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) – Project-ID 403041268 – TRR 266.

1. Introduction

A large literature examines the effectiveness and consequences of regulations stipulating the amount, content, and format of disclosure. Despite widespread interest in this topic, there is scarce evidence on the real effects of disclosure regulation, particularly regarding *private* disclosures made to regulators but not made available to the public (Leuz and Wysocki 2016). We begin to fill that void by examining the real effects of private disclosures of international corporate activities to tax authorities. Specifically, we examine the corporate response to the 2016 country-by-country reporting (CbCR) requirement for multinational corporations active in the European Union (EU).

The EU adopted CbCR primarily in response to perceived harmful tax practices of multinational corporations (Financial Times 2016; OECD 2013). Although tax authorities previously received information about a multinational's operations within their own jurisdiction, they had only limited visibility outside their jurisdiction. In some jurisdictions, local reporting rules require this information to be publicly disclosed, but the aggregation of these data by country and across all tax jurisdictions was generally not available to tax authorities. Further, some information required by the reports (in particular for tax haven subsidiaries) was typically not available at all (OECD 2015b).¹ The intent of CbCR therefore is to provide tax authorities with indicators of country-level economic activity for every tax jurisdiction a multinational operates in to allow tax authorities to better assess of the tax practices of the firm (OECD 2015b). Starting in

¹ 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).

2016, multinational groups with a parent or subsidiary in an EU country and consolidated revenues greater than €750 million in the preceding fiscal year were required to report this country-level information to tax authorities on an annual basis, including a complete list of subsidiaries and revenues, pre-tax profits, cash income taxes paid, number of employees, and tangible assets, all aggregated by country. We examine these disclosed economic activities following the adoption of CbCR for EU multinationals subject to the reporting regime, relative to EU multinationals just below the revenue threshold.

If CbCR disclosures are informative to tax authorities, reporting firms face an increased risk that the tax authority will detect and challenge tax avoidance. If managers expect regulators and enforcement authorities to take action that potentially alter the firm's profits, the CbCR mandate enforces the disclosure of proprietary information (Dye 1985), thus firms could change behavior in response to the (private) disclosure of information already available to managers (Kanodia and Sapra 2016). Firms could reduce tax avoidance in response to CbCR. Evidence of reduced tax avoidance includes a reduction in the number of tax haven subsidiaries and increased consolidated tax payments. In response to higher expected corporate tax burdens, firms might also reduce consolidated investments in physical and human capital (see, e.g., Desai, Foley, and Hines 2004; Djankov et al. 2010; Feld and Heckemeyer 2011).

However, firms could instead respond to increased detection and enforcement risk by engaging in activities intended to better substantiate their tax avoidance. For example, firms could close tax haven subsidiaries, which are often located in relatively small economies that offer limited opportunities for investment and thus are likely to be perceived as lacking economic substance. At the same time, firms could increase revenues, tangible assets, and employment in non-haven low-tax jurisdictions to substantiate profits shifted to these jurisdictions (Grubert and

Slemrod 1998). These investments in non-haven low-tax jurisdictions could come at the expense of investments in high-tax jurisdictions. As a consequence, we would observe a shift in tax payments and real activities from high-tax jurisdictions to non-haven low-tax jurisdictions. Finally, we may observe no effect if CbCR does not provide incremental information to tax authorities.

Our empirical approach is a regression discontinuity design (RDD) using financial statement and ownership information from fiscal years 2016 and 2017 on multinational groups operating in the EU from Bureau van Dijk (BvD). We exploit the CbCR mandate's size-based threshold of €750 million, including firms with consolidated revenues above the threshold in the year prior to implementation in the treatment group, and firms with consolidated revenues below the threshold in the control group. Given that the rule in general and the threshold in particular were largely unexpected and chosen without any systematic considerations, this setting provides a natural testing ground for causal effects of mandatory disclosure by comparing outcomes of firms just above the threshold to those of firms just below (Angrist and Pischke 2009; Lee and Lemieux 2010; Leuz and Wysocki 2016). We validate this identifying assumption by conducting a formal test that firms do not appear to have manipulated the revenue threshold in the year of CbCR implementation (McCrary 2008). We also demonstrate that treatment and control firms share several common pre-treatment characteristics, despite being different in size (by construction).

We begin by examining the number of tax haven subsidiaries of firms just above versus just below the CbCR threshold, exploiting extensive data on firm's beneficial ownership status collected by BvD.² Both graphical evidence and regression analysis suggest a discontinuity in the

² Specifically, this 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, Hoopes, and Wilde 2016). 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>.

number and existence of tax haven subsidiaries around the €750 million consolidated revenues threshold. In particular, we find that affected firms closed down tax haven subsidiaries once subject to CbCR. The economic magnitude of our results suggests that affected firms close down at least one tax haven subsidiary, an economically meaningful effect given firms at the 75th percentile of this sample have, on average, only between one and two tax haven subsidiaries. Aggregated across approximately 1,700 firms in our sample, we estimate a closure of 850 to 5,100 tax haven subsidiaries by treated firms following CbCR. Tax haven operations arguably serve corporate tax avoidance strategies (Desai, Foley, and Hines 2006), but also could facilitate the obfuscation of other corporate activities such as expropriation (Bennedsen and Zeume 2018). Our results therefore suggest CbCR deters tax haven operations as intended but could also potentially trigger unintended effects in corporate behavior.

Next, we examine at the consolidated firm-year level other economic outcomes newly reported under the disclosure regime: growth in revenues, employees, tangible assets, and tax expense. Results suggest that affected firms' consolidated investments in employees grew 5 to 14 percentage points less relative to firms just below the CbCR threshold. Evidence of reduced economic activity is consistent with firms expecting a larger tax burden after CbCR due to higher tax detection and enforcement risk following CbCR. Reduced employment is also consistent with the closing of material operations, though we acknowledge tax haven subsidiaries are generally not considered to contain many employees. In stark contrast to the legislators' goal, we find weak evidence that CbCR (if anything) reduces corporate tax payments. We do not find evidence that CbCR impacted disclosing firms' growth in consolidated revenues or tangible assets.

Examining the same economic outcomes at the firm-country-year level using unconsolidated financial information of firms' subsidiaries, both the graphical evidence and the

RDD estimates generally suggest that CbCR firms shift revenues and employees into European countries with below-median corporate income tax rates. We find limited evidence of reduced investment in high-tax countries. We also examine subsidiary economic outcomes using a weighted-average tax rate faced by a firm's operations in all observable countries. By multiplying each subsidiary's corporate income tax rate by the subsidiary share of total revenue, employees, total assets or taxes paid, we obtain a firm-year measure of unconsolidated subsidiary economic activity that explicitly incorporates tax incentives. Declining values of the weighted tax rate indicate that a firm's subsidiaries are reporting relatively more revenue, employees, total assets, or taxes paid in European countries with relatively low tax rates. We document a decrease of 0.5 to 3 percentage points in the weighted tax rates for treated firms using revenue, employees, and total assets, and a decrease of 2.2 to 4.7 percentage points for treated firms using tax expense. These findings complement evidence that firms increased tax-motivated profit shifting following CbCR (Joshi 2019). Taken together, these results are consistent with firms compensating for closing tax haven subsidiaries by reallocating real economic activities to relatively low-tax non-haven European countries. This response, conjectured by Hanlon (2018), is a likely unintended consequence of the CbCR mandate and consistent with U.S. firms' responses to reduced tax benefits in Puerto Rico (Suarez Serrato 2018).

We follow the recommendations in the literature and conduct a number of tests to validate our identifying assumptions (Cattaneo, Idrobo, and Titiunik 2018; Jacob et al. 2012; Lee and Lemieux 2010). First, we show that our main findings are not sensitive to either narrowing or widening the bandwidths used in the primary specifications. Second, we conduct two falsification tests: (i) we set a placebo threshold of €1,000 million instead of €750 million, and (ii) we use consolidated revenue in fiscal year 2014, the year before the actual threshold was mentioned the

first time, as the running variable. Finally, we estimate the exogenous portion of 2016 consolidated revenues to identify treatment versus control observations. Results of these tests generally validate our approach and confirm inferences.

Although we exploit a setting that allows us to draw causal inferences with high internal validity and a battery of robustness tests support our main findings, we acknowledge that the estimates are, potentially, local average treatment effects (Leuz and Wysocki 2016). The size-based threshold of the CbCR mandate that we use for identification inhibits us from concluding, for instance, that very large multinational firms responded to CbCR to the same extent or would respond similarly to additional disclosure requirements (e.g., public CbCR) in the future. Given these concerns, we particularly caution readers when extrapolating the economic magnitudes of our results to other firms (Glaeser and Guay 2017; Leuz and Wysocki 2016). Nonetheless, that mandatory private CbCR leads to both reduced tax haven operations and real, potentially unintended economic consequences is an important implication for policymakers.

Our study contributes to the nascent literature on the real effects of disclosure (e.g., Chen, Hung, and Wang 2018; Christensen et al. 2017; Kanodia and Sapra 2016; Rauter 2019) by presenting rare causal evidence (Leuz and Wysocki 2016). Our study is unique in that we examine several economic outcomes of a private disclosure regime impacting a large number of multinational corporations. Notably, these private disclosures go solely to tax authorities, who have a vested interest in curbing perceived harmful tax practices by multinational firms. Although our study contributes to the tax avoidance literature by answering the call for more research on the effects of tax disclosures on firm decisions (Dyreng and Maydew 2018), our analysis extends beyond tax avoidance to address investment and employment responses, all of which are economically important to the regulating jurisdictions.

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 evidence that firms respond to private disclosures to tax authorities are consistent with prior work suggesting the tax authority may be a powerful monitor (e.g., Hoopes, Mescall, and Pittman 2012). However, our finding that firms respond to this increased monitoring by reducing only the more aggressive tax strategies through tax havens while simultaneously shifting investments in human capital to low-tax jurisdictions provides a more nuanced picture. Because firms might alter investments in response to changes in tax-motivated income shifting opportunities (e.g., Grubert and Slemrod 1998; Suarez Serrato 2018), our results suggest increased monitoring by high-tax jurisdictions may not result in less tax avoidance but in distorted investment decisions and unintended effects for fiscal revenue. This interpretation is consistent with evidence on unintended consequences of other private tax disclosures (Towery 2017) and of increased tax enforcement (De Simone, Stomberg, and Williams 2019). Our finding also suggests that real effects of taxation attenuate the complementarity of domestic and foreign investment (Desai, Foley, and Hines 2009; Suarez Serrato 2018).

Finally, our study should be of interest to tax authorities and policymakers worldwide. By providing evidence on the corporate response to new *private* disclosure regulation, we inform the debate on the benefits of increased reporting and transparency provided by multinationals to tax authorities worldwide. In particular, additional private mandatory reporting for intermediaries of cross-border transactions as recently required under an EU Directive effective July 2020 might have further consequences beyond increasing tax transparency and reducing tax avoidance. Our findings that firms respond to private tax authority disclosures also suggests making such disclosures public may not be necessary, as some proponents of public CbCR claim (European

Commission 2016a, 2016b; Transparency International 2016).³ Instead, our evidence is consistent with private disclosures providing incremental information to tax authorities, and with firms therefore responding to an increased detection and enforcement risk. However, the nature of the firms' response, in the form of increased investment in low-tax jurisdictions – presumably to justify tax-motivated income shifting – suggests that increased enforcement could pressure high-tax jurisdictions to enter into the “race to the bottom” by reducing their tax rates.

2. Background and Hypotheses

Country-by-Country Disclosures

CbC disclosures to tax authorities arose as a recommendation from the OECD/G20's Base Erosion and Profits Shifting (BEPS) initiative. This initiative, started in 2014, is a multinational approach to combatting perceived harmful tax practices of multinational corporations. 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 74 countries had adopted some form of CbCR as of 2017. 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 multinational groups whose parent is a tax resident of an EU country or if any of the groups' subsidiaries are incorporated in the EU. Additionally, the parent firm's consolidated revenues must exceed €750 million in the fiscal year preceding the reporting year, with the first reporting year being 2016 (Council of the European

³ See also Hanlon (2018) and Spengel (2018) for a discussion on the potential costs of public CbCR.

Union 2016). Firms 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. 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 CbC report published as part of European Council Directive 2016/881/EU (Council of the European Union 2016). The figures reported by country include revenues, profits before income taxes, taxes paid, number of employees, and tangible assets, among other items. Firms also have to disclose a full list of constituent subsidiaries, including their location and main business activities. Given tax authorities in all listed jurisdictions will gain access to these details through automatic exchange agreements, we focus our analysis on the effect of CbCR on real activities using proxies for the reported items (i.e., revenues, employment and investment in tangible assets, tax payments, and corporate activity through subsidiary presence). We are able to separately examine differential effects across high- versus low-tax countries and also examine the set of tax haven jurisdictions.

Related Literature and Predictions

Prior research generally provides evidence that public tax disclosures create incentives for firms to reduce behavior that could give rise to reputational risk.⁴ Dyreng, Hoopes, and Wilde

⁴ A broad literature examines real effects of financial reporting and disclosure regulation, for example finding reduced pollution following mandated CSR disclosures in China (Chen, Hung, and Wang 2018) and improved mining safety following the inclusion of (already public) mandated mine safety records in financial reports (H. B. Christensen et al. 2017). In the setting of extractive industries, Rauter (2019) 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

(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, Robinson, and Slemrod (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 a European law requiring public CbC disclosures.⁵ Collectively, these studies suggest that managers respond to increased public disclosures, while Dutt et al. (2018) do not document significant market reactions after the introduction of public CbC 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 real effects of private disclosures to tax authorities. In a closely related paper, Joshi (2019) uses a regression discontinuity design to examine the effects of the EU's CbCR regime on tax avoidance and income shifting. The study finds evidence of a reduction in publicly reported tax avoidance following required private tax disclosures, with larger declines for firms (i) with relatively low ten-year average ETRs, (ii) based in countries with higher tax enforcement spend as a percentage of GDP, and (iii) facing more public scrutiny measured using Google trends. However, changes in ETRs can reflect other changes in reported amounts, such as the level of pre-tax income. Thus, these results could be

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.

⁵ 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 aggregation of financial reporting by segment (Brown, Jorgensen, and Pope 2019) or geography (Akamah, Hope, and Thomas 2018; Hope, Ma, and Thomas 2013).

driven by financial reporting rather than changes to the underlying economics of the firms' tax avoidance following CbCR. Additional tests use a difference-in-differences design and find some evidence that the intercompany tax-motivated income shifting of subsidiaries of treatment firms declines following CbCR relative to the pre-CbCR period and subsidiaries of control firms. However, because tax-motivated income shifting is measured as the tax-driven deviation of reported profits from economic profits estimated using assets, labor, and productivity, a decline in estimated tax-motivated income shifting could be partially explained by increased investment or employment in relatively low-tax jurisdictions. We extend Joshi (2019) by examining the effect of private CbCR disclosures on the real economic activities included in those reports.

The direction of the effect of CbCR on the magnitude of these activities hinges on the informativeness of the disclosures to tax authorities. CbCR disclosures may not contain incremental, useful information to tax authorities for a few reasons. First, tax authorities already have access to corporate tax returns filed in their own jurisdiction and conduct regular tax audits through which they gain further insights into a firm's operations upon request. Second, tax authorities could obtain financial reports for other subsidiaries due to relatively expansive separate entity reporting requirements in the EU. Third, CbC disclosures do not reflect the current international transfer pricing rules, which rely on the arm's length standard and therefore do not strictly tie the location of reported profits to the location of the economic activities disclosed under CbCR. Thus CbCR may not help tax authorities assess transfer pricing arrangements (Hanlon 2018; Spengel 2018). If CbCR disclosures do not provide new information to tax authorities, we would not expect to see a change in firm behavior following CbCR, consistent with prior evidence that companies did not change their tax strategies following required private tax disclosures to U.S. tax authorities (Honaker and Sharma 2017; Towery 2017).

On the other hand, CbC disclosures may provide incremental information for several reasons. First, pre-CbCR disclosures to tax authorities only typically include information on consolidated operations for 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 firms outside the jurisdiction, CbCR newly provides local authorities with information on operations foreign countries. Second, although tax authorities could obtain separate entity financial reports for affiliated firms operating within the EU, these reports exclude partnerships and hybrid companies (often used in more aggressive tax planning strategies) and subsidiaries outside the EU. Further, the tax authorities bear the cost of determining ownership linkages and collecting and aggregating individual subsidiaries' reports, whereas CbCR provides all affiliate information aggregated on a country-level basis, thus reducing information acquisition costs to the taxing authority. Third, proponents of CbCR argue that the increased disclosures provide tax authorities more information to evaluate a firm's international tax and transfer pricing arrangements (Hanlon 2018), therefore potentially increasing enforcement effectiveness.⁶ Evidence from the U.S. suggests private disclosures to tax authorities can be incrementally informative: firms reduced the magnitude of unrecognized tax benefits reported publicly after rules requiring firms to privately disclose these tax positions to U.S. tax authorities on Schedule UTP (Towery 2017). Further, IRS attention to public reports decreased following private disclosures, consistent with these reports containing incremental information (Bozanic et al. 2017).

⁶ We acknowledge any increased information to tax authorities comes with trade-offs. The reporting requirement introduces compliance costs, along with potential political and reputational costs, and the risk of divulging proprietary information (Hoopes, Robinson, and Slemrod 2018).

We note that the actual informativeness of the disclosures to the tax authorities matters less than how informative companies perceive the disclosures to be. Companies could respond to CbCR even if the disclosures are not incrementally informative to tax authorities due to reputational risk. LuxLeaks and other recent whistleblowing events suggest a non-trivial probability that CbCR information could be leaked to the public (Huesecken, Overesch, and Tassius 2018; O'Donovan, Wagner, and Zeume 2019). In addition, the European Council has debated whether to make CbC disclosures available to the public, and there is still a possibility the mandate could be expanded to include public disclosures.

If CbCR disclosures are informative to tax authorities, reporting firms face an increased risk that the tax authority will be able to detect and enforce tax avoidance activities. In particular, tax authorities might challenge tax positions if firms allocate taxable income to subsidiaries in countries with relatively little economic activity. In response, companies may curb their use of tax avoidance strategies that were more difficult to detect or enforce prior to the disclosure. Alternatively, firms could respond to increased detection and enforcement risk by making efforts to better justify their tax avoidance strategies, in effect “doubling down” on the strategies targeted by the reporting regime. Taking these two potentially counter-vailing responses into account, we discuss in turn our predictions for the economic outcomes we examine in this study: (i) number of tax haven subsidiaries, (ii) consolidated firm-year investment, employment, and tax payments, and (iii) unconsolidated firm-country-year investment, employment, and tax payments.

The use of tax haven subsidiaries for tax avoidance is well-documented in the literature (e.g., Desai, Foley, and Hines 2006; Dyreng and Lindsey 2009). Therefore, a reduction in tax avoidance in response to CbCR would likely be achieved through a reduction in tax haven operations. Further, even if firms do not reduce tax avoidance in response to CbCR, prior work

establishes that tax haven usage is sensitive to public disclosure, particularly for firms with higher reputational costs (Dyreng, Hoopes, and Wilde 2016). We therefore expect CbCR firms to close tax haven subsidiaries following implementation of the new disclosure regime.

At the firm level, we examine consolidated revenue, investments in human and physical capital, and consolidated tax payments. A large literature documents a negative relation between taxes and investment (Djankov et al. 2010; Feld and Heckemeyer 2011; Giroud and Rauh 2019; Grubert and Mutti 2000; De Mooij and Ederveen 2003), suggesting investment could decline following increased detection and enforcement risk. Further, increased transparency to tax authorities could pressure companies to pay a “fair” amount of tax given the level of economic activity in a jurisdiction, whether the disclosures are made public or only available to tax authorities (Evers, Meier, and Spengel 2014). Consistent with this notion, several studies observe increased ETRs for firms providing new mandated (public or private) disclosures (e.g., Dyreng, Hoopes, and Wilde 2016; Joshi 2019; Overesch and Wolff 2019). If companies curb their tax avoidance behavior in response to CbCR, we expect to observe reduced investments in labor and capital and increased consolidated tax payments. However, if firms instead shore up their existing tax practices in response to expected increased enforcement efforts by tax authorities, we do not expect a decline in investments or an increase in tax payments at the consolidated level.

Predictions for changes in economic activity in response to CbCR at the firm-country-year level similarly differ depending on the corporate response. If firms reduce their tax avoidance, we expect to see reduced investment and employment across both high- and low-tax jurisdictions and higher tax payments primarily in high-tax jurisdictions. Alternatively, firms could respond to increased detection and enforcement risk arising from CbCR by increasing investment and employment (i.e., real economic activity) in non-haven but nonetheless low-tax jurisdictions to

justify their tax-efficient income reporting strategies. Although the arm's length principal governing intercompany transfer prices is not directly tied to the level of economic activity in a jurisdiction, physical assets and, in particular, human resources are increasingly being required by tax authorities to substantiate profits reported in low-tax jurisdictions (OECD 2015a). Several scholars have framed such auditing behavior by tax authorities as a move towards formulary apportionment in international corporate income taxation (e.g., Spengel 2018). Due to their limited size and a lack of available human capital, firms are less likely to engage in this increased investment behavior in relatively small "dot" tax havens. Nonetheless, a number of low-tax jurisdictions such as Ireland and Singapore are developing a reputation for providing available trained personnel along with tax incentives targeted at foreign direct investment (C. M. Christensen, Ojomo, and Dillon 2019; Irish Tech News 2019). Any strategic response by corporations – such as increasing investments in non-haven low-tax jurisdictions – would likely be inconsistent with the intended goals of CbCR.

To summarize, if firms reduce tax avoidance in response to CbCR, we expect firms to close tax haven subsidiaries, reduce consolidated investment and employment, and increase consolidated tax payments. If firms instead attempt to better substantiate tax avoidance, we expect firms to close tax haven subsidiaries and increase investment and employment in non-haven low-tax jurisdictions (potentially at the expense of decreased investment and employment in high-tax jurisdictions). As a consequence, we could observe a commensurate shift in tax payments, revenues, and real activities from high-tax jurisdiction to low-tax jurisdictions.

3. Data and Methodology

Regression Discontinuity Design

Our main identification strategy is a regression discontinuity design around the €750 million revenue threshold for CbCR. 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. Under the assumption that firms did not exercise control over the forcing variable to influence the treatment assignment, 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 (Cattaneo, Idrobo, and Titiunik 2018; Lee and Lemieux 2010).

We acknowledge that in regression discontinuity 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 regression discontinuity tests. In particular, we run both local linear and third-order polynomial regressions, selecting optimal bandwidths that minimize the mean squared error according to Imbens and Kalyanaraman (2012) and implemented by Calonico, Cattaneo, and Titiunik (2014). We use a triangular kernel function to construct the local estimators, thus observations closer to the threshold receive greater weight (Lee and Lemieux 2010). If the resulting bandwidths are sufficiently small and provide enough power, an advantage of our approach is that it does not rely on correctly specifying the functional form of tested outcomes as a function of consolidated revenues (Angrist and Pischke 2009). However, if our

bandwidths are too wide to justify this assumption, our approach of estimating both linear and polynomial models addresses the concern that we could misclassify a non-linearity at the threshold as a discontinuity. We test several specifications based on the following model.

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

$Outcome_{i,t}$ is the outcome of interest of firm i in year t ; we discuss our tested outcomes below. 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.⁷ P denotes the number of polynomials included (three for third-order polynomials and one for the local linear regressions). $Treated_i$ is an indicator variable taking on the value of one if a firm reported consolidated revenues of at least €750 million in fiscal year 2016. In our main test, we rely on the assumption of the validity of our RDD and do not include control variables except for year fixed effects (i.e., an indicator variable for years 2016 and 2017, respectively) to account for different dynamics in real effects since before the CbCR mandate in 2015. In additional tests, we include $Controls_i$, a vector of control variables, described in more detail below. We also include several fixed effects structures (FE), such as country fixed effects based on a firm's or a firm's subsidiaries' location of incorporation, and industry fixed effects based on a firm's two-digit NACE classification. While adding these covariates should not affect results if the model is correctly specified, this approach reduces small sample bias whenever the number of observations close to the threshold is small and observations from larger bandwidths are included (Imbens and Lemieux 2008). Further, adding covariates might add precision (Cattaneo, Idrobo, and Titiunik 2018; Frölich and Huber 2018).

⁷ We use consolidated revenue in 2016 as we are interested in firms' responses to the CbCR mandate in 2016 and 2017 conditional on knowing that they will be required to disclose their 2016 operations. In robustness tests, we use an instrumental variables approach to isolate the exogenous portion of 2016 consolidated revenues.

As our RDD is optimally as good as a randomized experiment, we always start our analysis with a visual inspection of the data to examine potentially causal discontinuities in outcome variables. This procedure also transparently lays out potential issues when assuming a specific functional form (Lee and Lemieux 2010). Below, we also validate several assumptions underlying our identification strategy in line with the recommendations in the economics and econometrics literature. In particular, we check the sharp RD identification assumption and show that all pre-treatment covariates are balanced by treatment status. In robustness tests, we further test the sensitivity of bandwidth choice, run two falsification tests, and instrument for the running variable.

Data Description: Outcomes

We examine several outcome variables across different units of observation. First, we study firms' tax haven observations by relying on Orbis ownership data. BvD collects this information 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 firm's non-compliance regarding subsidiary disclosure (Dyreng, Hoopes, and Wilde 2016). Because we download this information for all firms and construct business groups based on direct ownership linkages, we are able to link a host of subsidiaries – including those located in tax havens – to parent firms. Information on 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. In these cases, the firm would identify these subsidiaries in their transfer pricing documentation. For each firm, we count the number of subsidiaries located in tax havens in a given year. 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 test both the number of tax havens (*Tax Haven (any list)*) and the logarithm of the number of tax havens (*Log. Tax Haven (any list)*) as outcome variables. In addition, we conduct a separate test using the number of subsidiaries located in European tax havens (*Tax Haven (EU)*) according to the blacklist published by the Tax Justice Network.⁸

Second, we study firms' aggregate response in real economic activity using information from firms' consolidated financial statements. We choose as our outcomes of interest those activities newly required to be disclosed on a CbC basis per the CbCR template provided in Figure 1. In particular, we study revenue, number of employees, tangible assets defined as total assets less intangible assets and cash and cash equivalents, and taxes paid. To capture firms' investment responses and to avoid documenting mechanical effects from size differences when comparing firms with more and less than €750 million in consolidated revenue, we use the annual logarithmic change in these outcomes (i.e., growth) since the CbCR mandate became effective (*Log. Growth Revenue, Log. Growth Employees, Log. Growth Tangible Assets, Log. Growth Tax Expense*).⁹

Third, we examine same growth in economic activity outcomes in sample firms' subsidiaries. To do so, we use financial data from each subsidiary's unconsolidated financial accounts. We focus on subsidiaries located in Europe for two reasons. First, as discussed in prior work (De Simone 2016), BvD has greater coverage of subsidiary unconsolidated financial accounts in Europe due to greater and largely harmonized reporting requirements within Europe (i.e., the European Accounting Directives). Second, focusing on Europe allows us to estimate the effect of private CbC disclosures in the economic area in which the CbCR mandate was introduced.

⁸ The list is available at <http://datafortaxjustice.net/paradiselost/>.

⁹ This approach also mitigates the effect of outliers and facilitates interpretation of economic magnitudes. See Schularick and Steger (2010) and Ciccone and Papaioannou (2009).

We first aggregate revenues, employees, tangible assets, and taxes paid at the country-level by multinational firm (i.e., we sum up revenue, the number of employees, tangible fixed assets, and taxes paid for subsidiaries owned by the same parent firm and located in the same country-year). We then construct the logarithmic growth in these measures on a firm-country-year basis.

We also use a second approach to analyzing the effect of CbCR on subsidiary-level economic activities that directly incorporates tax incentives. We calculate a weighted-average tax rate by multiplying the subsidiary corporate income tax rate (CIT) by subsidiary revenue and dividing the sum of these values by the firm-year sum of a subsidiary revenues. We also construct analogous measures using employees, total assets, and taxes paid as the weights instead of revenues. We label these variables *Sub.-Revenue-weighted* (*Sub.-Empl.-weighted*, *Sub.-Total Assets-weighted CIT*,¹⁰ *Sub.-Tax Expense-weighted*) *CIT*. Smaller values indicate that a firm owns subsidiaries with relatively more revenue (employees, assets, or taxes paid) in European countries with relatively low tax rates.¹¹

Data Description: Controls

In some specifications, we include several pre-treatment firm, subsidiary, and macroeconomic country-level control variables. We provide a definition of all variables in Appendix A. For the firm-level analyses, our control variables in the additional tests account for several firm characteristics as of 2015 that are commonly identified as tax planning opportunities and might be drivers of tax haven operations (Desai, Foley, and Hines 2006). In particular, we

¹⁰ We use total assets instead of calculated tangible assets to avoid sample loss. Many subsidiaries do not disclose intangible assets and cash positions, which are required to calculate tangible assets from total assets.

¹¹ Consider a firm that owns two subsidiaries: (i) a German subsidiary with a corporate income tax rate of 30 percent and reporting 1,000 in unconsolidated revenue, and (ii) an Irish subsidiary with a corporate income tax rate of 12.5 percent and reporting 10,000 in unconsolidated revenue. In this case, *Sub.-Revenue-weighted CIT* takes on the value of 14.09 $((30*1,000)+(12.5*10,000))/11,000$. The measure decreases when a firm allocates revenues from Germany to Ireland.

include the logarithm of a firm's number of employees and tangible assets, the 3-year long term effective tax rate (Dyreg, Hanlon, and Maydew 2008), return on assets (ROA), long-term leverage, and the number of subsidiaries. We also include the (logarithmic) gross domestic product (GDP) and the corporate income tax rate of the country in which a firm is incorporated.

When testing economic activity outcomes at the firm-country-year level using the subsidiary-level information, we include (i) the consolidated number of employees, tangible assets, long-run effective tax rate, and number of subsidiaries, and (ii) the firm-country-year sum of the number of employees and total assets. In addition, we add fixed effects both for the firm's country of incorporation and the subsidiary location. These fixed effects control for any country-specific characteristics at the time of the disclosure mandate. We define all variables in Appendix A.

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, we access three different products of the Orbis database provided by Bureau van Dijk. 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. Based on Bureau van Dijk's database as of March 2019, this download yields 46,199 unique firms with annual consolidated financial information.

Second, we access historical versions of the Orbis database for the years 2012 to 2017 to link these unique firms to their global subsidiaries in an iterative process through 12 levels of hierarchical structure (i.e., the consolidated firm as the parent entity and a maximum of 11 tiers of subsidiaries). This approach allows us to track a firm's global subsidiary ownership over time,

including subsidiaries incorporated in tax haven countries, independent of whether financial information for these subsidiaries are available.¹² We identify 35,527 multinational firms as ultimate owners of 1,311,724 unique subsidiaries listed in the Orbis database. We then restrict the sample to firms (i.e., parent entities) with available subsidiary and financial information and either located in the EU or with at least one subsidiary located in the EU, thus being potentially covered by the EU's CbCR mandate. This sample selection step leaves us with 30,129 unique multinational firms that own 1,106,114 unique subsidiaries through by at least 50 percent equity stakes between each of the parent-subsidary relationships. Our final regression discontinuity sample includes 57,313 firm-years from 95 countries almost equally distributed over the years 2016 and 2017 when the CbC disclosure mandate was effective (see Table 2 for a detailed tabulation).

We match unconsolidated financial information for all firms' subsidiaries located in the EU. We download this information from the Orbis Generics Update as of July 2018. We report the resulting numbers of subsidiary observations for 2016 and 2017 in Table 3. In 2016, we observe 121,469 European subsidiaries ultimately owned by parent firms potentially falling under the CbCR mandate. Due to the reporting lag for unconsolidated statements of (often-smaller) subsidiaries, the number of observations is generally lower in 2017 than in 2016. Finally, we collect information on countries' annual gross domestic product from the OECD and corporate income tax rates (CITs) from the European Commission.¹³

¹² Our approach is similar to that in recent studies using the Orbis data (Beaver et al. 2019; Beuselinck et al. 2019; Shroff, Verdi, and Yu 2014), 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.

¹³ These data are available at <https://www.oecd.org/sdd/oecdmaineconomicindicatorsmei.htm> and https://ec.europa.eu/taxation_customs/business/economic-analysis-taxation/data-taxation_en, respectively.

Descriptive Statistics

Table 4 describes our sample of firm-year observations. We winsorize all variables at the 1 and 99 percent level. We report growth in percentage points (decimals) rather than logarithmic growth used in the regression to aid interpretation. Panel A reports results for the full sample. The average firm-year has 1.5 tax haven subsidiaries across the globe according to the classification of jurisdictions in (Bennedsen and Zeume 2018) and 1.4 “European” tax haven subsidiaries according to the blacklist published by the Tax Justice Network. On average, sample firms grow by 10 to 22 percentage points relative to the base year 2015, except for a general downward trend in tax expense by 7 percentage points. The weighted tax rate faced by the average (median) firm through its subsidiary operations is approximately 25 (24) percent, though some firms appear to have only operations in Ireland (one percentile at 12.5 percent). The total number of subsidiaries at the mean (median) is 116 (18), suggesting some skewness in our sample in terms of size. Mean (median) ROA is -0.02 (0.03) and mean (median) 3-year ETR is 19.17 (21.31) percentage points. Panel B reports results for firms within the bandwidth of +/- €250 million surrounding the €750 million consolidated revenue threshold for CbCR. Mean (median) number of tax havens jumps to 2.3 (2.0) globally and 1.5 (1.0) for European tax havens. Mean (median) ROA within this bandwidth is 0.06 (0.04). Overall, firms in the full sample reported in Panel A do not differ substantially on average from firms in the bandwidth reported in Panel B, particularly with respect to the outcome variables of interest. Thus results obtained within our RDD framework could be fairly representative of the average multinational firm.

For some tests of unconsolidated subsidiary effects, we aggregate unconsolidated subsidiary financial information by firm-country-year. Table 5 describes our sample of firm-country-year observations. As before, Panel A reports results for the full sample while Panel B

reports results for firm-country-years whose parent firms have consolidated sales within the bandwidth of +/- €250 million surrounding the €750 million sales threshold for CbCR. Comparing these panels, we observe that the two samples exhibit comparable growth patterns and share common size characteristics.

Test for Manipulation of the 2016 Consolidated Revenues 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), firms potentially had the opportunity to manage their revenues in order to avoid treatment. Such manipulation of the forcing variable assigning firms to treatment is therefore a threat to our identification approach. We explicitly test for revenue manipulation by inspecting whether there is a discontinuity in the density of firm observations around the threshold (McCrary 2008). Figure 2 plots the density of firm observations around the €750 million revenue threshold. Given the overlapping 95 percent confidence intervals at both sides of the cut-off, results suggest that the distribution of firms around the threshold is smooth. In particular, as firms had no incentive to manipulate revenues upwards, this test should not be contaminated by manipulation of both sides mechanically yielding a null result. We therefore conclude that firms exercising control over the forcing variable does not seem to pose a threat to our identification strategy. In robustness tests, we also use an instrumental variables approach to estimate the exogenous portion of 2016 consolidated revenues to use as the running variable.

Pre-Treatment Covariate Balance

RDD relies on the assumption that firms just below and just above the threshold are comparable. To verify this identifying assumption, Figure 3 tests for pre-treatment covariate balance around the cut-off (see, e.g., Cattaneo, Idrobo, and Titiunik 2018) by plotting a local 3rd

order polynomial smooth of the covariate values on the running variable (consolidated revenues) separately from the left to the cut-off and from the cut-off to the right. Across all covariates, we fail to find a statistically significant discontinuity around the €750 million threshold. Average values above the threshold are within the 95 percent confidence interval of the average values below the threshold. These tests suggest that treated firms just above and control firms just below the cutoff are fairly comparable and the RDD results should provide unbiased and consistent estimates even without including control variables (Frölich and Huber 2018). Nonetheless, we include these covariates as control variables in many specifications presented in our main results to address concerns regarding occasional discontinuities in these variables. In particular, there is a mechanical difference in size between treated and control firms once the bandwidth used for estimation gets larger.

4. Empirical Results

Tax Haven Operations

As suggested by Lee and Lemieux (2010) we begin by graphically examining discontinuities in the outcome variable. Figure 4 presents these results. In Panels (1) and (2), we use the logarithm of the number of tax havens per any haven list in Bennesen and Zeume (2018) as the proxy for corporate transparency. Panels (3) and (4) use the number of tax havens per any list (unlogged), and Panels (5) and (6) use the number of tax havens within Europe. All panels plot average values of the outcome variable for evenly spaced bins of 2016 consolidated revenue along with the 95 percent confidence interval. Panels (1), (3), and (5) additionally graph fitted linear trends. Panels (2), (4), and (6) instead graph fitted third-order polynomials. Across all panels, we observe a discontinuity in tax haven subsidiaries for firms just below versus just above the €750 million consolidated revenue threshold. Specifically, firms just above the threshold requiring CbC

disclosures in 2016 exhibit fewer tax haven subsidiaries relative to firms just below the threshold not subject to CbC disclosures.

We present results of estimating Equation (1) in Table 6. Panel A presents results for *Log. Tax Haven (any list)*, Panel B presents results for *Tax Haven (any list)*, and Panel C presents results for *Tax Haven (EU)*. Across all three panels, Columns (1)-(3) use non-parametric local linear regressions. Columns (4)-(6) use non-parametric local third-order polynomial regressions. Columns (1) and (4) do not include firm- or country-level controls. Columns (2) and (5) add firm- and country-level controls. All Columns include year fixed effects. Columns (3) and (6) add country and industry fixed effects. As discussed above, all columns use mean-squared-error optimal bandwidths according to the procedure from Calonico, Cattaneo, and Titiunik (2014).

Across all three measures of tax haven subsidiaries, we observe a negative and significant coefficient on the RD estimate in at least four out of six specifications. Results are strongest when we limit the outcome variable to the number of tax haven subsidiaries located in Europe, which is consistent with the CbC disclosure rule commencing in Europe and – in the absence of signatories to the multilateral information sharing agreement – primarily circulating to European tax authorities. In terms of economic magnitudes, the results presented in Table 6 suggest the average firm in the bandwidth just above the CbC disclosure threshold closed 0.6 to 3.1 tax haven subsidiaries worldwide, and 0.4 to 1.1 “European” tax haven subsidiaries. These figures are material given that firms at the 75th percentile of the sample within +/- €250 million of the reporting threshold have, on average, only between one and two tax haven subsidiaries. Further, across the around 1,700 firms within this bandwidth, these results indicate a closure of 850 to 5,100 tax haven

subsidiaries in aggregate across our sample. Thus, our results provide a strong indication that even private CbC disclosure deters tax haven operations.¹⁴

Consolidated Firm Economic Activity

Figure 4 presents results of graphically examining discontinuities in the growth of revenues (Panels (1) and (2)), employees (Panels (3) and (4)), tangible assets (Panels (5) and (6)), and tax expense (Panels (7) and (8)) at the consolidated firm-year level. As before, all panels plot average values of the outcome variable for evenly spaced bins of 2016 consolidated revenue along with the 95 percent confidence interval. Panels (1), (3), (5), and (7) additionally graph fitted linear trends. Panels (2), (4), (6) and (8) instead graph fitted third-order polynomials.

Visually examining results for *Log. Growth Revenue* in Panels (1) and (2), we observe a discontinuity at the threshold, but the sign of the discontinuity varies depending on whether we use a linear trend or third-order polynomial. In Panels (3) and (4), we observe a drop in *Log. Growth Employees* for firms just above the CbCR threshold, suggesting a decline in consolidated investments in human capital following CbC disclosure. However, the observed decline when using linear trends is relatively small. In Panels (5) and (6), we observe an increase in *Log. Growth Tangible Assets*. These results indicate firms increase their physical investments following CbC disclosure, and thus they are inconsistent with firms experiencing an increase in their global tax liability. In fact, they are more consistent with continued tax avoidance. Similarly, we find some weak graphical evidence of a decline in global tax burdens when using the third-order polynomial

¹⁴ Our results are robust to using a Kernel function that applies uniform weighting to all observations within the bandwidth (as opposed to the triangular Kernel used in the main specifications, which places more weight on observations closer to the threshold). Thus, our inferences are not driven by only a few observations close to the threshold, as some of the graphical evidence might suggest.

to fit trends in *Log. Growth Tax Expense* in Panel (8). Overall, our visual inspection of these outcomes yields mixed results.

We present results of regression analysis on these consolidated firm-level outcomes in Table 7. Panel A presents results for *Log. Growth Revenue*, Panel B presents results for *Log. Growth Employees*, Panel C presents results for *Log. Growth Tangible Assets*, and Panel D presents results for *Log. Growth Tax Expense*. As before, Columns (1)-(3) use non-parametric local linear regressions and Columns (4)-(6) use non-parametric local third-order polynomial regressions. The remaining columns vary by the inclusion of firm-level controls, country-level controls, or country fixed effects. All columns use mean-squared-error optimal bandwidths according to the procedure from Calonico, Cattaneo, and Titiunik (2014).

In Panel A, we find limited evidence of CbCR impacting revenue growth, consistent with the mixed evidence provided in Figure 5. Specifically, although we estimate negative coefficients on the RD variable in five out of six specifications, the coefficient is only statistically significant at conventional levels in specifications (2) and (5), where adding controls potentially increases efficiency and estimator precision. Based on these results, we refrain from concluding that CbCR materially impacted consolidated revenues for firms subject to the new disclosure rule.

In contrast, we find robust evidence that CbCR impacted investments in human capital in Panel B. We estimate a negative and significant coefficient on the RD variable in four out of six specifications. The estimated coefficient is negative but not significant in the remaining specifications including fixed effects.¹⁵ Across all specifications, we estimate that after CbCR, disclosing firms have employee growth rates that are 5 to 14 percentage points lower relative to

¹⁵ In our setting, adding country and industry fixed effects might negatively impact the power of our tests given the limited number of observations used in the nonparametric estimation around the threshold.

non-disclosing firms. Reduced investment is consistent with firms expecting higher tax detection and enforcement risk increasing global tax burdens. Further, although tax haven subsidiaries likely have few employees relative to non-haven operations, these results could be partially explained by the elimination of tax haven subsidiaries given results in Table 6.

In Panel C, we find limited evidence of CbCR impacting tangible asset growth. We estimate positive coefficients in four of the six specifications, and negative coefficients in the two specifications including controls but no country or industry fixed effects. The only statistically significant coefficients suggest an increase in tangible asset growth for firms subject to CbC after implementation of the disclosure regime. Given the overall mixed nature of these estimated coefficients across specifications, in particular when adding controls, we conclude that CbCR did not materially impact tangible asset growth.

In Panel D, we examine tax expense. In five out of six specifications, we estimate a negative coefficient on the RD variable. Two of these coefficients are statistically significant. Across these two, the point estimates indicate a 28 to 36 percentage point lower growth in tax expense for firms just above the threshold compared to firms below. Thus, contrary to the intent of CbCR, we find some evidence that tax burdens relatively *declined* for firms subject to CbC disclosures following the implementation of CbCR in Europe.

Economic Activity based on Unconsolidated Subsidiary Information

We next examine the effect of CbC disclosures on unconsolidated subsidiary economic outcomes in specific countries. Our first approach aggregates unconsolidated subsidiary information to the firm-country-year. Because observing different outcomes across relatively high-versus low-tax jurisdictions would yield different inferences than observing consistent outcomes

across tax incentives, we separately examine discontinuities by countries that are below (Panels (1), (3), (5), and (7)) versus at and above (Panels (2), (4), (6), and (8)) the subsidiary country median tax rate. Figure 6 presents results of graphically examining discontinuities in the growth of revenues (Panels (1) and (2)), employees (Panels (3) and (4)), tangible assets (Panels (5) and (6)), and tax expense (Panels (7) and (8)) at the firm-country-year level. All panels plot average values of the outcome variable for evenly spaced bins of 2016 consolidated revenue along with the 95 percent confidence interval, as well as fitted third-order polynomials.

In Panels (1) and (2), we observe a discontinuity in *Log. Growth Revenue* at the threshold in both low- and high-tax countries, inconsistent with predictions. In Panel (3), we observe an increase in *Log. Growth Employees* for low-tax firm-country-years of firms just above the CbCR threshold, suggesting increased investments in human capital in low-tax countries following CbC disclosure, consistent with firms attempting to better substantiate reporting tax-motivated profits in those jurisdictions. Panel (4) shows a corresponding reduction in investments in human capital in high-tax countries. In Panels (5) and (6), we observe a decrease in *Log. Growth Tangible Assets* for CbCR firm-country-years across both sets of countries. These results indicate firms decrease physical investments following CbC disclosure, and thus they are consistent with firms experiencing an increase in their global tax liability. In Panels (7) and (8), we observe a small increase in tax payment growth in low-tax countries but no change in high-tax countries.

We present results of regression analysis on firm-country-year outcomes using third-order polynomial regressions in Table 8. Panel A presents results for *Log. Growth Revenue*, Panel B presents results for *Log. Growth Employees*, Panel C presents results for *Log. Growth Tangible Assets*, and Panel D presents results for *Log. Growth Tax Expense*. Columns (1) and (3) report results for subsidiary countries with corporate income tax rates below the sample median, and

Columns (2) and (4) report results for subsidiary countries with corporate income tax rates at or above the sample median. The columns further vary in their inclusion of firm, subsidiary, and country level controls; and the inclusion of year, and country fixed effects (indicating both the subsidiary's and the parent firm's locations).

In Panel A, we find some evidence that CbCR positively impacted subsidiary revenue growth in low-tax countries. In both specifications, we estimate a large positive and significant coefficient on the treatment indicator. These results suggest that after CbCR, subsidiaries of firms subject to CbCR and located in low-tax countries increased revenue growth by 147 to 161 percentage points more relative to subsidiaries of non-affected parent firms. In contrast, we estimate positive but insignificant coefficients in high-tax countries. These results are consistent with continued tax avoidance in low-tax subsidiaries. However, recall that we did not observe a change in the growth rate of revenues at the consolidated level. Therefore, it is possible there are subsidiaries exhibiting reductions in revenue growth but we are unable to observe them in our sample, nor whether they are high- or low-tax subsidiaries.

In Panel B, we examine growth in number of employees. We estimate positive coefficients on the treatment indicator in low-tax countries in both specifications, but the estimated coefficient is only statistically significant in the specification without further controls. This specification indicates that subsidiaries of firms subject to CbCR and located in relatively low-tax jurisdictions increased growth in employees by 52 percentage points. In contrast, we estimate negative coefficients on the RD variable across all four specifications examining subsidiaries in high-tax countries, however none of the estimates are statistically significant. Given we observe a reduction in employment growth at the consolidated level, the lack of significance is likely due to low power and/or unobservable subsidiaries. Nonetheless, the pattern of results presented in Panel B is

consistent with firms increasing employment in low-tax jurisdictions (but not in high-tax jurisdictions) to better substantiate tax-motivated income shifting strategies.

In Panels C and D, we find no evidence of CbCR impacting firm-country-year growth in tangible assets or tax payments across any set of countries. However, we note that the estimated coefficient on the RD variable is always negative, despite not being significant at conventional levels. Inferences in Table 8 do not change if we instead use local linear regressions (untabulated). Additional untabulated tests suggest that subsidiaries of public firms and of firms with tax haven operations experience higher growth in revenues and employees.

Our second approach to examining the effects of CbCR on subsidiary-level real activity more explicitly incorporates tax incentives. We examine weighted averages of subsidiary corporate income tax rates, where the weights are the subsidiary's share of all observable subsidiary revenue, employees, total assets, or taxes paid. Our resulting firm-year measure of the weighted-average statutory tax rate declines as more revenues, employees, total assets, and tax paid are reported by a firm's subsidiaries in jurisdictions with relatively low tax rates, and vice versa. We interpret a decrease (increase) in these rates as an increase (decrease) in the tax-motivated allocation of real activity.

As before, we begin with a graphical examination of these outcome variables in Figure 7. Panels (1)-(2) plot average values of *Sub.-Revenue-weighted CIT*, Panels (3)-(4) plot *Sub.-Empl.-weighted CIT*, Panels (5) and (6) plot *Sub.-Total Assets-weighted CIT*, and Panels (7)-(8) plot *Sub.-Tax Expense-weighted CIT*. Panels (1), (3), (5) and (7) show linear trends, and Panels (2), (4), (6) and (8) show fitted third-order polynomials. Across all panels, we observe a sharp discontinuity at the CbCR threshold. In all cases, the weighted-average statutory income tax rate to the right of the €750 million threshold is far lower than the value to the left of the threshold. We therefore conclude

the graphical evidence suggests that firms subject to CbCR report greater revenues, allocate more employees and total assets, and pay more taxes in European jurisdictions with relatively low tax rates following implementation of the disclosure regime relative to firms not subject to CbCR.

We present the related regression analysis in Table 9. Panel (A) presents results for *Sub.-Revenue-weighted CIT*, Panel (B) presents results for *Sub.-Empl.-weighted CIT*, Panel (C) presents results for *Sub.-Total Assets-weighted CIT*, and Panel (D) presents results for *Sub.-Tax Expense-weighted CIT*. Columns in each panel vary in their use of local linear versus third-order polynomial regressions; the inclusion of firm, subsidiary, and country level controls; and the inclusion of year, country, and industry fixed effects. Although we do not find statistical significance across all specifications when including controls and fixed effects, we estimate a negative coefficient on the treatment indicator in 21 out of 24 specifications. The statistically significant estimates suggest that the average CIT weighted by economic indicators declines by 1 to 2.8 percentage points for firms operating through subsidiaries across Europe and subject to the CbCR relative to non-disclosing firms. Our inferences from these tests support the notion that firms did not decrease tax avoidance in response to CbCR, but rather they support their tax efficient strategies by reallocating economic factors to low-tax (but non-haven) jurisdictions.

5. Robustness Tests

We conduct several additional tests to further validate our research design and gauge the robustness of inferences. Please refer to our Online Appendix for supporting details and results.¹⁶

¹⁶ The [Online Appendix](#) is available on the authors' websites.

Sensitivity Regarding Bandwidth Selection

We conduct a number of tests to assess the sensitivity of our main results to bandwidth selection (Imbens and Kalyanaraman 2012). Sensitivity might be an issue when interpreting our results as the RDD estimates are based on a relatively small number of observations determined by the bandwidth (Angrist and Pischke 2009; Cattaneo, Idrobo, and Titiunik 2018). As stated above, throughout our main tests we use bandwidths that minimize the mean squared error according to Imbens and Kalyanaraman (2012) and implemented by Calonico, Cattaneo, and Titiunik (2014b). In Tables A.1 to A.3, we re-estimate the baseline specifications of our main results and instead use 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 using alternative bandwidths.

Falsification Tests

If our main tests provide true causal effects instead of spurious results, we should not be able to replicate the results when using different placebo threshold values for the running variable. We conduct these falsification tests in two ways (Tables A.4 to A.6). First, we select €1,000 million as an alternative threshold for CbCR in the year of implementation. We want a threshold that is close to the real threshold but that does not create significant overlap with firms included within our main analyses. Further, we want a threshold that is larger than the real threshold 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 and therefore (at least partially) contribute to the effects documented in our study. Second, we select the same €750 million threshold but use 2014 as the event year. We choose 2014 because it is close enough to the actual event year while being far enough before any possible anticipatory

actions taken by firms.¹⁷ As expected, we generally document statistically insignificant estimates. We find limited evidence of a statistically significant effect of the falsification events, likely due to the correlation between the actual and falsified running variable. In the few tests on tax-motivated shifting of economic activity where we estimate a significant coefficient on the RD variable, the sign of the estimated coefficient is opposite to our main results.

Instrumenting for 2016 Consolidated Revenues

Because manipulation of the forcing variable assigning firms to the treatment group is a threat to our identification approach, we use an instrumental variables approach to validate the robustness of our results. Similar to Berg (2015) and Iliev (2010), we estimate the running variable (2016 consolidated revenues less €750 million) as a function of 2013 consolidated revenues less €750 million in the first stage. We include country and industry fixed effects. We then use the fitted 2016 value as an alternative running variable in our regression discontinuity tests, thus relying only on the predicted exogenous portion of 2016 revenues to identify treatment versus control firms (Table A.7). Inferences remain unchanged.

Difference-in-Differences Time Series Analysis

Our main results are based on the RDD that exploits discontinuities around the CbCR threshold at a given point in time rather than changes in firm-level outcomes over time. We therefore also investigate whether our results are consistent with changes in treated firms' outcomes relative to control firms over the period 2012 to 2017. We plot average the values of our tax haven variables for treated and control groups (within a range of € 175 million in consolidated

¹⁷ To the best of our knowledge, the exact threshold of €750 million was first mentioned in the 2015 BEPS Action 13 report by the OECD (OECD 2015b) published on 05 October 2015. In the respective 2014 discussion draft, no such threshold was mentioned, see <http://www.oecd.org/ctp/transfer-pricing/discussion-draft-transfer-pricing-documentation.pdf>.

2016 revenues above and below the cutoff) in Figure A.3 in the Online Appendix. Consistent with our main results, we observe a decline (or slower growth) in tax haven subsidiaries for treated firms relative to control firms after 2015. With the exception of European tax havens, treated firms also have lower average values in the tax haven variables than control firms in 2016 and 2017. However, we refrain from conducting a formal difference-in-differences regression analysis because these graphs also demonstrate a lack of clean parallel pre-treatment trends for treated and control firms.

6. Conclusions

We examine the real effects of a country-by-country reporting requirement implemented in the EU in 2016 using a regression discontinuity design. We test the impact of CbCR on the number tax haven operations; consolidated revenues, employment, investment, and tax expense; and these same economic outcomes at the unconsolidated subsidiary level. We find robust evidence that firms subject to CbC disclosures significantly reduced their number of tax haven subsidiaries following implementation of CbCR relative to firms not required to disclose. At the consolidated level, we find evidence of reduced employment growth for CbCR firms. At the unconsolidated level, we find some evidence of increased revenues and employment growth, but only in low-tax jurisdictions and that real economic activity together with tax payments are increasingly shifted to European low-tax countries. Our results are robust to an array of sensitivity analyses and falsification tests.

Our study bridges research on the consequences of mandatory private disclosure. Using a research design that allows causal inferences, we provide evidence on the real effects of private disclosures to tax authorities made by a large number of multinational corporations. By investigating the investment and employment responses by these multinationals to tax disclosures,

we extend the tax avoidance literature. Our results suggest increased monitoring by high-tax jurisdictions may not reduce overall tax avoidance. Rather, firms appear to reduce only the most aggressive tax avoidance accomplished via tax haven operations while simultaneously taking actions to better substantiate tax avoidance accomplished in non-haven low-tax jurisdictions. Thus, our study has clear policy implications.

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Appendix A: Variable Definitions

Variable	Definition
<i>Running Variable</i>	Consolidated revenue in fiscal year 2016 less €750 million.
Tax Haven Variables	
<i>Log. Tax Haven (any list)</i>	Natural logarithm of the number of tax haven subsidiaries of the firm according to any of the classifications used in Bennedsen and Zeume (2018).
<i>Tax Haven (any list)</i>	Absolute number of tax haven subsidiaries of the firm according to any of the classifications used in Bennedsen and Zeume (2018).
<i>Tax Haven (EU)</i>	Absolute number of European tax haven subsidiaries of the firm according to the blacklist of taxjustice.net.
<i>Indicator Tax Haven (any list)</i>	Indicator variable taking on the value of one if a firm has non-zero tax haven subsidiaries according to any of the classifications used in Bennedsen and Zeume (2018) .
Consolidated Economic Activity Variables	
<i>Log. Growth Revenue</i>	Natural logarithm of growth since 2015 in consolidated revenue.
<i>Log. Growth Employees</i>	Natural logarithm of growth since 2015 in the consolidated number of employees.
<i>Log. Growth Tangible Assets</i>	Natural logarithm of growth since 2015 in consolidated total assets less intangible assets and cash.
<i>Log. Growth Tax Expense</i>	Natural logarithm of growth since 2015 in consolidated total tax expense.
Tax-motivated Shifting of Economic Activity Proxy Variables	
<i>Sub.-Revenue-weighted CIT</i>	The sum of the product of any unconsolidated subsidiary's revenue and the corporate income tax rate, scaled by the total sum of a firm's subsidiaries' unconsolidated revenues (as available in the Orbis database).
<i>Sub.-Empl.-weighted CIT</i>	The sum of the product of any unconsolidated subsidiary's number of employees and the corporate income tax rate, scaled by the total sum of a firm's subsidiaries' unconsolidated number of employees (as available in the Orbis database).
<i>Sub.-Total Assets-weighted CIT</i>	The sum of the product of any unconsolidated subsidiary's total assets and the corporate income tax rate, scaled by the total sum of a firm's subsidiaries' unconsolidated total assets (as available in the Orbis database).
<i>Sub.-Tax Expense-weighted CIT</i>	The sum of the product of any unconsolidated subsidiary's total tax expense and the corporate income tax rate, scaled by the total sum of a firm's subsidiaries' unconsolidated total tax expense (as available in the Orbis database).
Consolidated Firm Control Variables	
<i>Log. Employees</i>	Natural logarithm of the consolidated number of employees in fiscal year 2015.
<i>Log. Tangible Assets</i>	Natural logarithm of consolidated total assets less intangible assets and cash in fiscal year 2015.
<i>ROA</i>	Consolidated return on assets measured as net income over total assets in fiscal year 2015.
<i>3-year ETR</i>	Consolidated three-year long-run effective tax rate in fiscal year 2015 according to Dyreng et al. (2008).
<i>Long-term Leverage</i>	Consolidated long-term debt over total assets in fiscal year 2015.
<i>Number Subsidiaries</i>	Natural logarithm of the number of subsidiaries in fiscal year 2015 according to the Orbis database.
Country Control Variables	
<i>Log. GDP</i>	Natural logarithm of total GDP of firm's country in a given year.
<i>Corporate Income Tax Rate</i>	Corporate income tax rate applicable in firm's country in a given year.
Subsidiary Economic Activity Variables (unconsolidated, aggregated at the firm-country-year level)	
<i>Log. Growth Revenue</i>	Natural logarithm of growth since 2015 in the unconsolidated number of employees.
<i>Log. Growth Employees</i>	Natural logarithm of growth since 2015 in unconsolidated total compensation expenses.
<i>Log. Growth Tangible Assets</i>	Natural logarithm of growth since 2015 in unconsolidated total assets less intangible assets and cash.
<i>Log. Growth Tax Expense</i>	Natural logarithm of growth since 2015 in unconsolidated total tax expense.
Subsidiary Control Variables (unconsolidated, aggregated at the firm-country-year level)	
<i>Log. Employees</i>	Natural logarithm of the unconsolidated number of employees in fiscal year 2015.
<i>Log. Total Assets</i>	Natural logarithm of unconsolidated total assets in fiscal year 2015.

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
	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>.

Table 1: Sample Construction

Sample Selection Step (Unique firm and subsidiary observations)	Unique Firms		Unique Subsidiaries	
	Obs.	% Loss	Obs.	% Loss
(1) <i>Firms with consolidated financial statements, at least € 100 million revenue in any year 2012-2018, at least one foreign subsidiary according to BvD Orbis database as of March 2019</i>	46,199			
(2) <i>Matching historical subsidiary information to multinational firms identified as ultimate corporate owners</i>	35,527	23.10%	1,311,724	
(3) <i>Multinational firms incorporated in the EU or with at least one subsidiary in the EU</i>	30,129	15.19%	1,106,114	15.67%
Regression discontinuity sample (2016-2017)	Firm-Years		Subsidiary-Years	
(4) <i>Observations with available financial information in final regression analysis</i>	57,313		150,093	
Aggregated Firm-Country-Years based on Unconsolidated Subsidiary Information				
65,469				

Notes: This table presents the procedure to construct the final regression sample based on financial and ownership information on multinational firms with consolidated statements and their worldwide subsidiaries taken from the Bureau van Dijk Orbis database.

Table 2: Firm Observations by Country and Year

Country	2016		2017		Total		Country	2016		2017		Total	
	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%
AD	1	0.0	1	0.0	2	0.0	KY	90	0.3	106	0.4	196	0.3
AE	10	0.0	11	0.0	21	0.0	LI	1	0.0	1	0.0	2	0.0
AI	1	0.0	1	0.0	2	0.0	LK	5	0.0	5	0.0	10	0.0
AR	4	0.0	4	0.0	8	0.0	LT	115	0.4	115	0.4	230	0.4
AT	327	1.1	327	1.1	654	1.1	LU	189	0.7	189	0.7	378	0.7
AU	325	1.1	325	1.1	650	1.1	LV	103	0.4	103	0.4	206	0.4
BA	2	0.0	2	0.0	4	0.0	MA	6	0.0	7	0.0	13	0.0
BD	1	0.0	1	0.0	2	0.0	ME	0	0.0	1	0.0	1	0.0
BE	726	2.5	726	2.5	1,452	2.5	MK	4	0.0	5	0.0	9	0.0
BG	21	0.1	21	0.1	42	0.1	MN	0	0.0	1	0.0	1	0.0
BH	1	0.0	2	0.0	3	0.0	MT	27	0.1	27	0.1	54	0.1
BM	105	0.4	102	0.4	207	0.4	MU	11	0.0	10	0.0	21	0.0
BR	51	0.2	49	0.2	100	0.2	MX	12	0.0	11	0.0	23	0.0
BS	1	0.0	1	0.0	2	0.0	MY	72	0.3	66	0.2	138	0.2
BW	1	0.0	0	0.0	1	0.0	NG	4	0.0	4	0.0	8	0.0
CA	288	1.0	295	1.0	583	1.0	NL	1,102	3.9	1,102	3.8	2,204	3.8
CH	201	0.7	201	0.7	402	0.7	NO	888	3.1	888	3.1	1,776	3.1
CL	14	0.0	13	0.0	27	0.0	NZ	37	0.1	41	0.1	78	0.1
CN	256	0.9	296	1.0	552	1.0	OM	2	0.0	2	0.0	4	0.0
CO	3	0.0	3	0.0	6	0.0	PA	3	0.0	3	0.0	6	0.0
CW	3	0.0	3	0.0	6	0.0	PE	3	0.0	3	0.0	6	0.0
CY	76	0.3	76	0.3	152	0.3	PG	0	0.0	1	0.0	1	0.0
CZ	48	0.2	48	0.2	96	0.2	PH	11	0.0	11	0.0	22	0.0
DE	2,222	7.8	2,222	7.7	4,444	7.8	PK	4	0.0	4	0.0	8	0.0
DK	888	3.1	888	3.1	1,776	3.1	PL	386	1.3	386	1.3	772	1.3
EE	12	0.0	12	0.0	24	0.0	PS	2	0.0	2	0.0	4	0.0
EG	12	0.0	13	0.0	25	0.0	PT	327	1.1	327	1.1	654	1.1
ES	1,587	5.5	1,587	5.5	3,174	5.5	QA	5	0.0	5	0.0	10	0.0
FI	1,192	4.2	1,192	4.2	2,384	4.2	RO	23	0.1	23	0.1	46	0.1
FR	1,622	5.7	1,622	5.7	3,244	5.7	RS	6	0.0	6	0.0	12	0.0
GB	4,700	16.4	4,700	16.4	9,400	16.4	RU	143	0.5	143	0.5	286	0.5
GI	5	0.0	4	0.0	9	0.0	SA	15	0.1	15	0.1	30	0.1
GR	266	0.9	266	0.9	532	0.9	SE	2,249	7.9	2,249	7.8	4,498	7.8
HK	24	0.1	27	0.1	51	0.1	SG	214	0.7	229	0.8	443	0.8
HR	56	0.2	56	0.2	112	0.2	SI	19	0.1	19	0.1	38	0.1
HU	73	0.3	73	0.3	146	0.3	SK	119	0.4	119	0.4	238	0.4
ID	9	0.0	11	0.0	20	0.0	SZ	1	0.0	1	0.0	2	0.0
IE	427	1.5	427	1.5	854	1.5	TH	44	0.2	44	0.2	88	0.2
IL	113	0.4	107	0.4	220	0.4	TN	4	0.0	5	0.0	9	0.0
IN	441	1.5	456	1.6	897	1.6	TR	49	0.2	48	0.2	97	0.2
IS	85	0.3	85	0.3	170	0.3	TW	226	0.8	215	0.7	441	0.8
IT	3,179	11.1	3,179	11.1	6,358	11.1	US	1,628	5.7	1,627	5.7	3,255	5.7
JM	3	0.0	3	0.0	6	0.0	UY	2	0.0	1	0.0	3	0.0
JO	1	0.0	1	0.0	2	0.0	VE	3	0.0	1	0.0	4	0.0
JP	780	2.7	761	2.7	1,541	2.7	VN	5	0.0	3	0.0	8	0.0
KE	1	0.0	0	0.0	1	0.0	ZA	66	0.2	76	0.3	142	0.2
KR	217	0.8	224	0.8	441	0.8	ZW	1	0.0	0	0.0	1	0.0
KW	16	0.1	16	0.1	32	0.1	Total	28,623	100.0	28,690	100.0	57,313	100.0

Notes: This table presents the distribution of observations of firms by country of incorporation and years after the CbCR mandate. The sample consists of firms with available consolidated financial accounts in the Orbis database and that are potentially affected by the European Commission's CbCR mandate because they are either incorporated in the European Union or have at least one subsidiary in the European Union according to the Orbis database.

Table 3: Subsidiary Observations by Country and Year

Country	2016		2017		Total		2016		2017		Total	
	Individual Subsidiary-Year Observations						Firm-Country Subsidiary-Year Observations					
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
AT	1,916	1.6	416	1.5	2,332	1.6	1,639	3.2	608	3.5	2,247	3.3
BE	5,500	4.5	1,498	5.2	6,998	4.7	2,210	4.3	896	5.2	3,106	4.6
BG	785	0.6	740	2.6	1,525	1.0	433	0.9	415	2.4	848	1.2
CH	15	0.0	2	0.0	17	0.0	28	0.1	14	0.1	42	0.1
CY	18	0.0	2	0.0	20	0.0	17	0.0	2	0.0	19	0.0
CZ	2,467	2.0	230	0.8	2,697	1.8	1,300	2.6	169	1.0	1,469	2.2
DE	6,547	5.4	888	3.1	7,435	5.0	4,501	8.8	1,044	6.0	5,545	8.1
DK	1,562	1.3	860	3.0	2,422	1.6	1,758	3.5	1,050	6.1	2,808	4.1
EE	867	0.7	303	1.1	1,170	0.8	663	1.3	285	1.6	948	1.4
ES	9,235	7.6	660	2.3	9,895	6.6	3,084	6.1	435	2.5	3,519	5.2
FI	3,663	3.0	2,073	7.2	5,736	3.8	1,712	3.4	1,111	6.4	2,823	4.1
FR	19,498	16.1	3,498	12.2	22,996	15.3	3,689	7.2	1,125	6.5	4,814	7.1
GB	20,622	17.0	8,166	28.5	28,788	19.2	7,105	14.0	3,877	22.4	10,982	16.1
GR	339	0.3	33	0.1	372	0.2	260	0.5	32	0.2	292	0.4
HR	716	0.6	33	0.1	749	0.5	423	0.8	24	0.1	447	0.7
HU	1,454	1.2	58	0.2	1,512	1.0	906	1.8	56	0.3	962	1.4
IE	1,932	1.6	407	1.4	2,339	1.6	1,358	2.7	414	2.4	1,772	2.6
IS	181	0.1	38	0.1	219	0.1	113	0.2	31	0.2	144	0.2
IT	13,952	11.5	3,151	11.0	17,103	11.4	4,262	8.4	1,480	8.6	5,742	8.4
LT	385	0.3	83	0.3	468	0.3	252	0.5	68	0.4	320	0.5
LU	606	0.5	113	0.4	719	0.5	548	1.1	129	0.7	677	1.0
LV	850	0.7	688	2.4	1,538	1.0	508	1.0	421	2.4	929	1.4
MT	120	0.1	5	0.0	125	0.1	69	0.1	4	0.0	73	0.1
NL	1,430	1.2	328	1.1	1,758	1.2	3,318	6.5	1,110	6.4	4,428	6.5
NO	5,739	4.7	99	0.3	5,838	3.9	1,688	3.3	72	0.4	1,760	2.6
PL	4,077	3.4	546	1.9	4,623	3.1	2,048	4.0	379	2.2	2,427	3.6
PT	3,042	2.5	284	1.0	3,326	2.2	1,263	2.5	215	1.2	1,478	2.2
RO	2,423	2.0	10	0.0	2,433	1.6	1,343	2.6	4	0.0	1,347	2.0
SE	9,313	7.7	2,193	7.7	11,506	7.7	2,968	5.8	1,022	5.9	3,990	5.8
SI	420	0.3	0	0.0	420	0.3	325	0.6	0	0.0	325	0.5
SK	1,595	1.3	1,144	4.0	2,739	1.8	961	1.9	730	4.2	1,691	2.5
TR	200	0.2	75	0.3	275	0.2	169	0.3	66	0.4	235	0.3
Total	121,469	100.0	28,624	100.0	150,093	100.0	50,921	100.0	17,288	100.0	68,209	100.0

Notes: This table presents the distribution of observations of firms' subsidiaries with available unconsolidated financial accounts in the Orbis database by country of incorporation and year after the CbCR mandate. As subsidiary information is aggregated at the country-year level, the table presents observations based on a multinational firm's economic presence based on its subsidiaries in each country.

Table 4: Summary Statistics (Consolidated Firm-Level)

Panel A:	Full Sample							
	Obs.	Mean	SD	P1	P25	Median	P75	P99
<i>Running Variable</i>	52,712	101.89	2722.70	-749.95	-728.94	-673.30	-415.31	18181.99
Tax Haven Variables								
<i>Log. Tax Haven (any list)</i>	57,313	0.32	0.74	0.00	0.00	0.00	0.00	3.40
<i>Tax Haven (any list)</i>	57,313	1.54	9.61	0.00	0.00	0.00	0.00	29.00
<i>Tax Haven (EU)</i>	57,313	1.37	8.46	0.00	0.00	0.00	0.00	25.00
<i>Indicator Tax Haven (any list)</i>	57,313	0.22	0.42	0.00	0.00	0.00	0.00	1.00
Economic Activity Variables								
<i>% Growth Revenue</i>	47,807	0.22	1.16	-0.88	-0.08	0.04	0.17	9.71
<i>% Growth Employees</i>	39,416	0.10	0.44	-0.72	-0.04	0.02	0.13	3.15
<i>% Growth Tangible Assets</i>	47,474	0.12	0.44	-0.68	-0.06	0.04	0.18	2.78
<i>% Growth Tax Expense</i>	44,717	-0.07	4.88	-26.40	-0.74	-0.09	0.41	26.04
Profit Shifting Proxy Variables								
<i>Sub.-Revenue-weighted CIT</i>	22,980	24.53	5.51	12.50	20.00	23.48	29.79	34.43
<i>Sub.-Empl.-weighted CIT</i>	24,008	24.62	5.41	12.50	20.00	24.78	30.07	34.43
<i>Sub.-Total Assets-weighted CIT</i>	26,130	24.32	5.34	12.50	20.00	23.05	29.33	34.43
<i>Sub.-Tax Expense-weighted CIT</i>	20,675	25.18	45.15	10.00	20.00	24.44	30.17	36.91
Firm Control Variables								
<i>Log. Employees</i>	43,492	12.65	2.30	6.91	11.25	12.58	14.10	18.20
<i>Log. Tangible Assets</i>	51,258	18.21	2.21	13.09	16.77	18.03	19.60	23.88
<i>ROA</i>	52,329	-0.02	4.04	-1.07	-0.00	0.03	0.07	0.48
<i>3-year ETR</i>	43,019	19.17	44.84	-190.95	3.83	21.31	31.80	229.17
<i>Long-term Leverage</i>	48,538	0.15	0.36	0.00	0.00	0.08	0.22	0.87
<i>Number Subsidiaries</i>	57,104	116.69	295.88	2.00	7.00	18.00	72.00	1949.00
Country Control Variables								
<i>Log. GDP</i>	46,607	13.93	1.10	10.79	13.06	14.62	14.81	15.18
<i>Corporate Income Tax Rate</i>	46,122	25.80	6.04	12.50	20.00	25.00	30.17	38.00
Panel B:	Within Bandwidth of +/- 250 million							
	Obs.	Mean	SD	P1	P25	Median	P75	P99
<i>Running Variable</i>	3,528	-41.45	140.35	-246.60	-164.57	-62.06	72.50	237.55
Tax Haven Variables								
<i>Log. Tax Haven (any list)</i>	3,528	0.56	0.86	0.00	0.00	0.00	1.10	3.71
<i>Tax Haven (any list)</i>	3,528	2.28	8.23	0.00	0.00	0.00	2.00	40.00
<i>Tax Haven (EU)</i>	3,528	1.45	4.67	0.00	0.00	0.00	1.00	17.00
<i>Indicator Tax Haven (any list)</i>	3,528	0.39	0.49	0.00	0.00	0.00	1.00	1.00
Economic Activity Variables								
<i>% Growth Revenue</i>	3,273	0.12	0.52	-0.56	-0.04	0.05	0.17	1.47
<i>% Growth Employees</i>	2,666	0.11	0.40	-0.47	-0.02	0.04	0.13	2.23
<i>% Growth Tangible Assets</i>	3,234	0.12	0.33	-0.43	-0.03	0.07	0.19	1.55
<i>% Growth Tax Expense</i>	3,235	-0.11	4.29	-23.00	-0.55	-0.02	0.39	16.88
Profit Shifting Proxy Variables								
<i>Sub.-Revenue-weighted CIT</i>	1,693	24.64	5.31	12.50	20.00	24.94	29.48	34.43
<i>Sub.-Empl.-weighted CIT</i>	1,820	24.59	5.20	12.50	20.00	25.00	29.57	34.43
<i>Sub.-Total Assets-weighted CIT</i>	1,862	24.65	5.03	12.50	20.00	24.94	29.08	34.43
<i>Sub.-Tax Expense-weighted CIT</i>	1,559	25.31	8.56	10.00	20.00	25.00	30.00	38.71
Firm Control Variables								
<i>Log. Employees</i>	2,890	14.50	1.20	10.40	13.98	14.67	15.21	16.95
<i>Log. Tangible Assets</i>	3,402	20.06	0.85	18.21	19.57	19.97	20.49	22.73
<i>ROA</i>	3,419	0.06	0.99	-0.20	0.01	0.04	0.07	0.32
<i>3-year ETR</i>	3,097	22.24	43.64	-183.60	11.36	23.88	34.15	219.93
<i>Long-term Leverage</i>	3,382	0.17	0.20	0.00	0.01	0.11	0.26	0.81
<i>Number Subsidiaries</i>	3,526	154.31	348.94	3.00	23.00	47.00	102.00	2123.00
Country Control Variables								
<i>Log. GDP</i>	2,313	14.03	1.10	10.79	13.15	14.62	14.81	15.18
<i>Corporate Income Tax Rate</i>	2,234	26.78	5.78	12.50	22.00	28.00	30.17	38.00

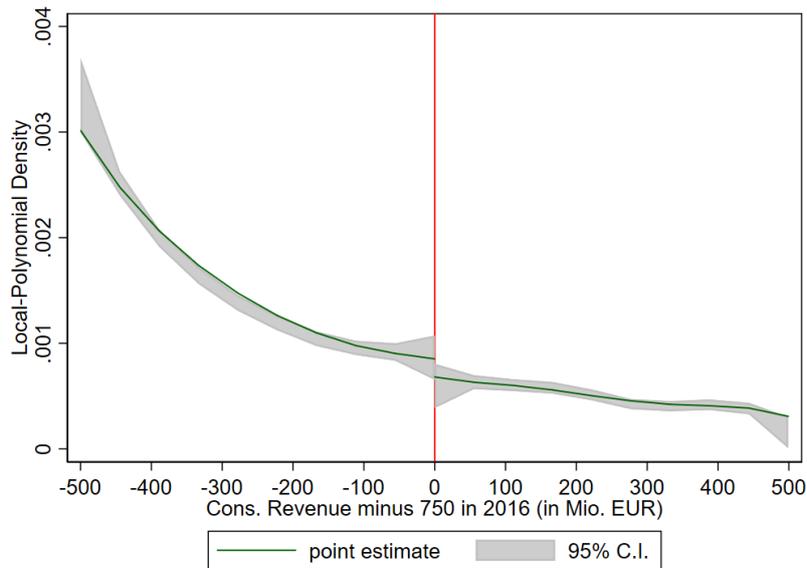
Notes: This table presents summary statistics for all variables included in the firm-level analysis. Panel A presents statistics for all observations. Panel B presents statistics for observations that fall within the bandwidth of €500 to €1,000 million in consolidated 2016 revenues. All variables are defined in Appendix A.

Table 5: Summary Statistics (Firm-Country-Year-Level Based on Unconsolidated Subsidiary Information)

Panel A:		Full Sample						
	Obs.	Mean	SD	P1	P25	Median	P75	P99
<i>Running Variable</i>	65,469	2487.35	5585.65	-749.78	-682.24	-274.69	2358.50	18181.99
Subsidiary Economic Activity Variables								
<i>% Growth Revenue</i>	49,604	0.25	2.23	-1.00	-0.20	0.00	0.14	19.01
<i>% Growth Employees</i>	49,830	0.05	1.13	-1.00	-0.16	0.00	0.08	8.86
<i>% Growth Tangible Assets</i>	55,024	0.19	1.54	-1.00	-0.22	-0.00	0.17	12.24
<i>% Growth Tax Expense</i>	45,456	0.34	5.57	-20.08	-0.89	-0.16	0.32	39.93
Subsidiary Control Variables								
<i>Log. Employees</i>	68,209	14.21	5.98	0.00	13.58	15.80	17.75	22.33
<i>Log. Total Assets</i>	68,209	2.91	2.41	0.00	0.00	2.89	4.82	8.11
Panel B:		Within Bandwidth of +/- 250 million						
	Obs.	Mean	SD	P1	P25	Median	P75	P99
<i>Running Variable</i>	5,749	-33.40	142.78	-244.15	-160.28	-56.21	84.41	237.77
Subsidiary Economic Activity Variables								
<i>% Growth Revenue</i>	4,030	0.20	1.88	-1.00	-0.16	0.01	0.15	9.50
<i>% Growth Employees</i>	4,228	0.05	1.06	-1.00	-0.13	0.00	0.08	6.67
<i>% Growth Tangible Assets</i>	4,632	0.19	1.42	-1.00	-0.19	0.01	0.20	8.13
<i>% Growth Tax Expense</i>	3,785	0.36	5.63	-20.08	-0.84	-0.12	0.36	39.53
Subsidiary Control Variables								
<i>Log. Employees</i>	5,749	14.12	6.08	0.00	13.71	15.73	17.70	21.64
<i>Log. Total Assets</i>	5,749	2.92	2.36	0.00	0.00	2.94	4.74	7.82

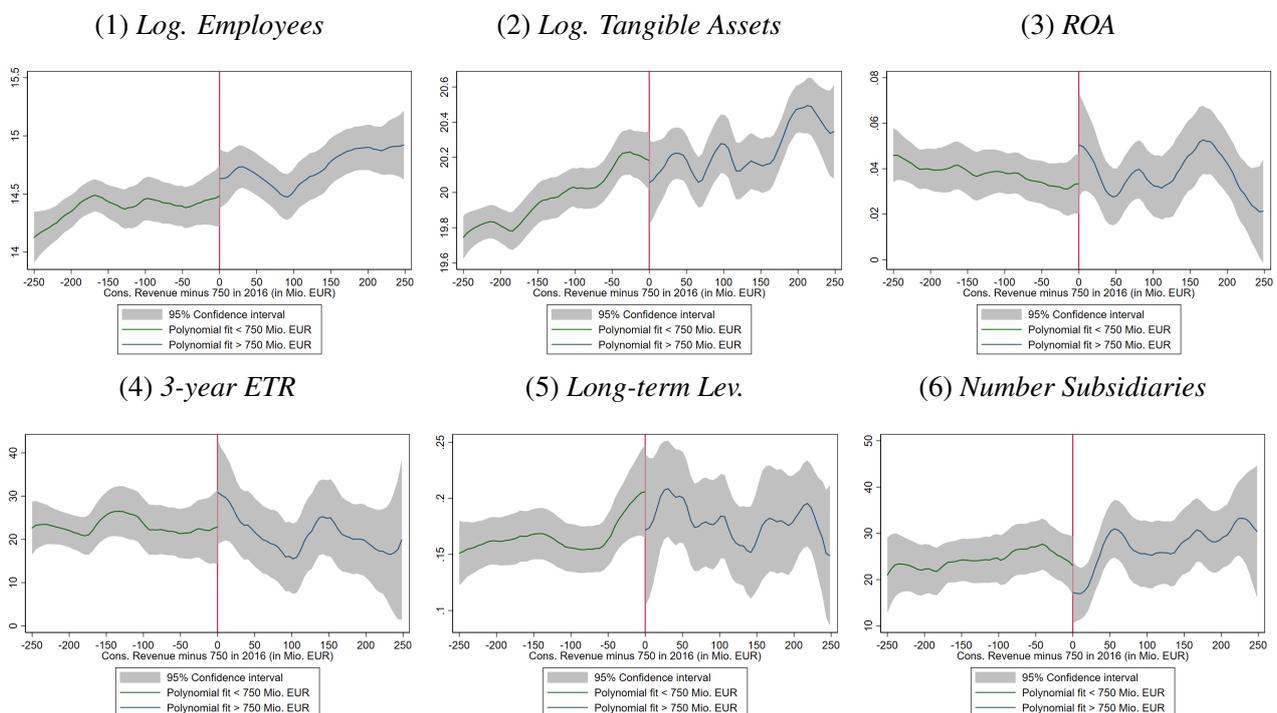
Notes: This table presents summary statistics for all variables included in the firm-country-year-level analysis based on unconsolidated subsidiary information. Panel A presents statistics for all observations. Panel B presents statistics for observations of firms that fall within the bandwidth of €500 to €1,000 million in consolidated 2016 revenues. All variables are defined in Appendix A.

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



Notes: This graph plots point estimates and the 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).

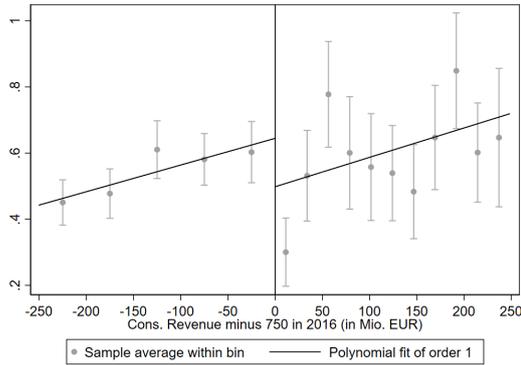
Figure 3: Pre-Treatment Firm-Level Covariate Balance around Cutoff



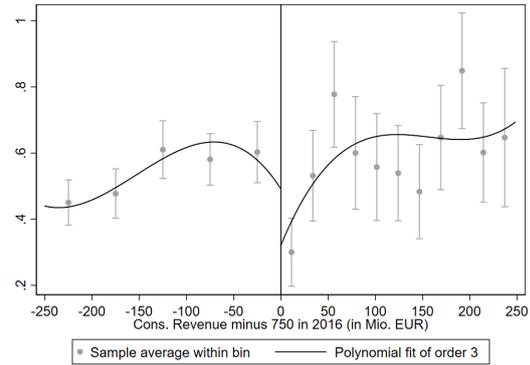
Notes: These graphs plot first-order polynomial fitted values and their the 95% confidence intervals of different firm-level pre-treatment covariates over a firm's consolidated 2016 revenue to the left and to the right of the €750 million cutoff.

Figure 4: Tax Haven Subsidiary Discontinuities around €750 million Threshold

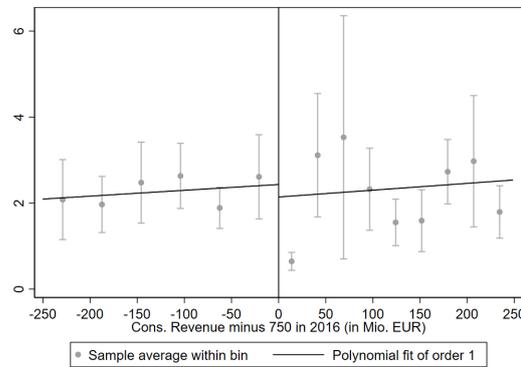
(1) *Log. Tax Haven (any list)*



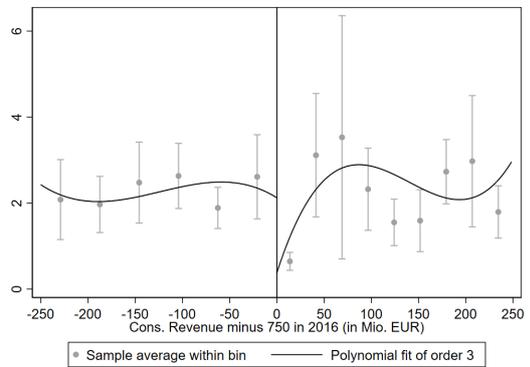
(2) *Log. Tax Haven (any list)*



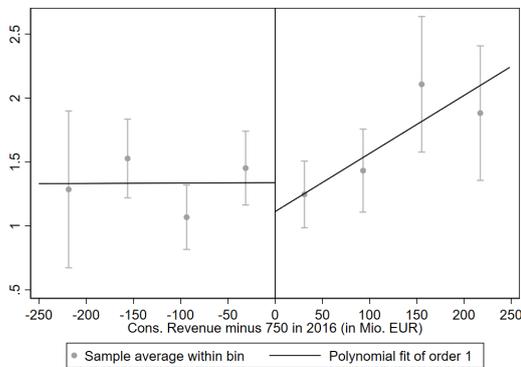
(3) *Tax Haven (any list)*



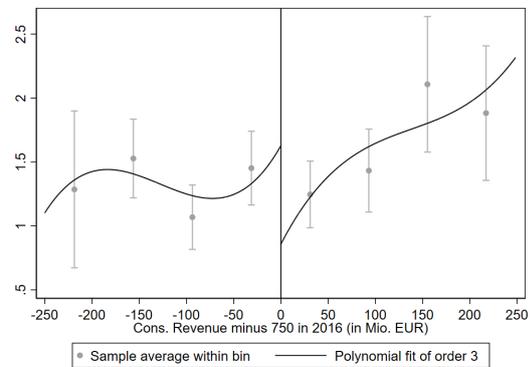
(4) *Tax Haven (any list)*



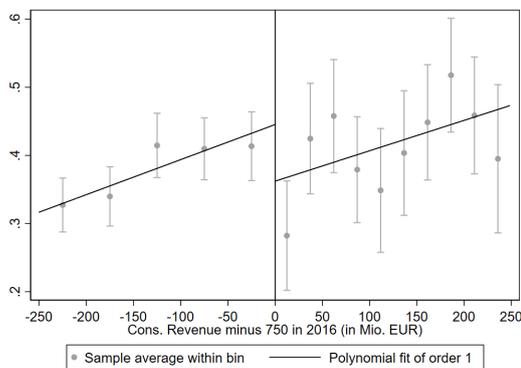
(5) *Tax Haven (EU)*



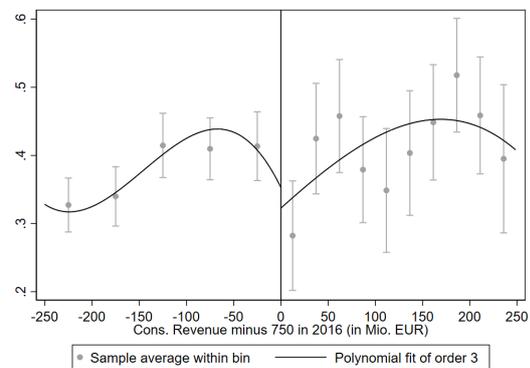
(6) *Tax Haven (EU)*



(7) *Indicator Tax Haven (any list)*



(8) *Indicator Tax Haven (any list)*



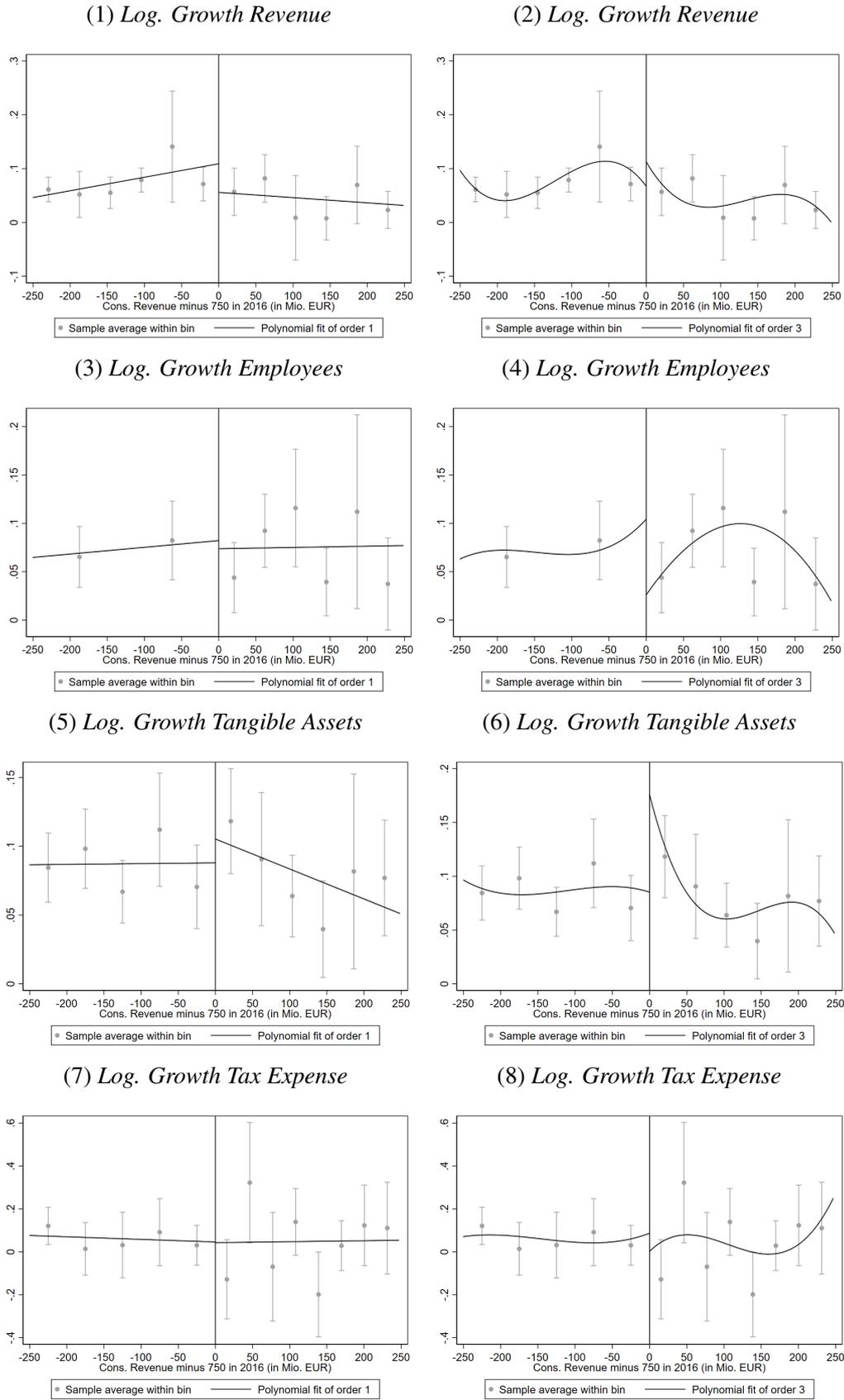
Notes: These graphs plot average values and their 95% confidence intervals of tax haven subsidiaries for evenly spaced bins of firm's consolidated 2016 revenues. The figures on the left show fitted linear trends. The figures on the right show third order polynomials of a smoothed data distribution.

Table 6: Effects of CbCR on Tax Haven Subsidiaries

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A		<i>Log. Tax Haven (any list)</i>				
RD estimate	-0.144** (0.056)	-0.124* (0.070)	-0.186*** (0.068)	-0.387*** (0.081)	-0.150* (0.088)	-0.260*** (0.092)
Orig. Obs.	52,712	26,232	26,232	52,712	26,232	26,232
Bandwidth	179	167	167	224	320	320
Obs. in Bandwidth	2,469	1,078	1,647	3,179	2,298	3,441
Panel B		<i>Tax Haven (any list)</i>				
RD estimate	-0.677 (0.450)	-0.722** (0.330)	-1.791*** (0.463)	-3.062*** (0.603)	-0.805* (0.424)	-2.515*** (0.767)
Orig. Obs.	52,712	26,232	26,232	52,712	26,232	52,712
Bandwidth	185	138	138	253	234	234
Obs. in Bandwidth	2,557	884	1,347	3,570	1,576	2,401
Panel C		<i>Tax Haven (EU)</i>				
RD estimate	-0.425* (0.224)	-1.016*** (0.300)	-0.876*** (0.296)	-0.836** (0.334)	-0.969** (0.402)	-1.117** (0.528)
Orig. Obs.	52,712	26,232	26,232	52,712	26,232	26,232
Bandwidth	168	135	135	223	201	201
Obs. in Bandwidth	2,304	862	1,323	3,168	1,328	2,019
Panel D		<i>Indicator Tax Haven (any list)</i>				
RD estimate	-0.087*** (0.032)	-0.100* (0.055)	-0.054 (0.052)	-0.066 (0.050)	-0.092 (0.066)	-0.100 (0.065)
Orig. Obs.	52,712	26,232	26,232	52,712	26,232	26,232
Bandwidth	219	139	139	283	328	328
Obs. in Bandwidth	3,113	894	1,359	4,032	2,372	3,539
Polynomials	Linear	Linear	Linear	3rd-order	3rd-order	3rd-order
Controls	No	Firm, Ctry	Firm	No	Firm, Ctry	Firm
Fixed Effects	Yr	Yr	Yr, Ctry, Ind	Yr	Yr	Yr, Ctry, Ind

Notes: This table presents results of estimating the effect of CbCR on tax haven subsidiaries using an RDD. The outcome variables are the natural logarithm of a firm's number of subsidiaries in tax havens according to any classification used in Bennedsen and Zeume (2018) (Panel A), the respective absolute number (Panel B), and the absolute number of subsidiaries in tax havens in Europe as labeled by Tax Justice Network (Panel C). In Panel D, the outcome variable is binary indicating whether a firm has a presence in any of the tax havens used in Panels A and B. Columns (1) to (3) use nonparametric local linear regressions while Columns (4) to (6) use nonparametric local third-order polynomial regressions with mean-squared-error optimal bandwidths following Calonico et al. (2014). In Columns (3) and (6), we use optimal bandwidths of the preceding models and include firm-country and firm-industry fixed effects 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.

Figure 5: Consolidated Firm Economic Activity Discontinuities around €750 million Threshold



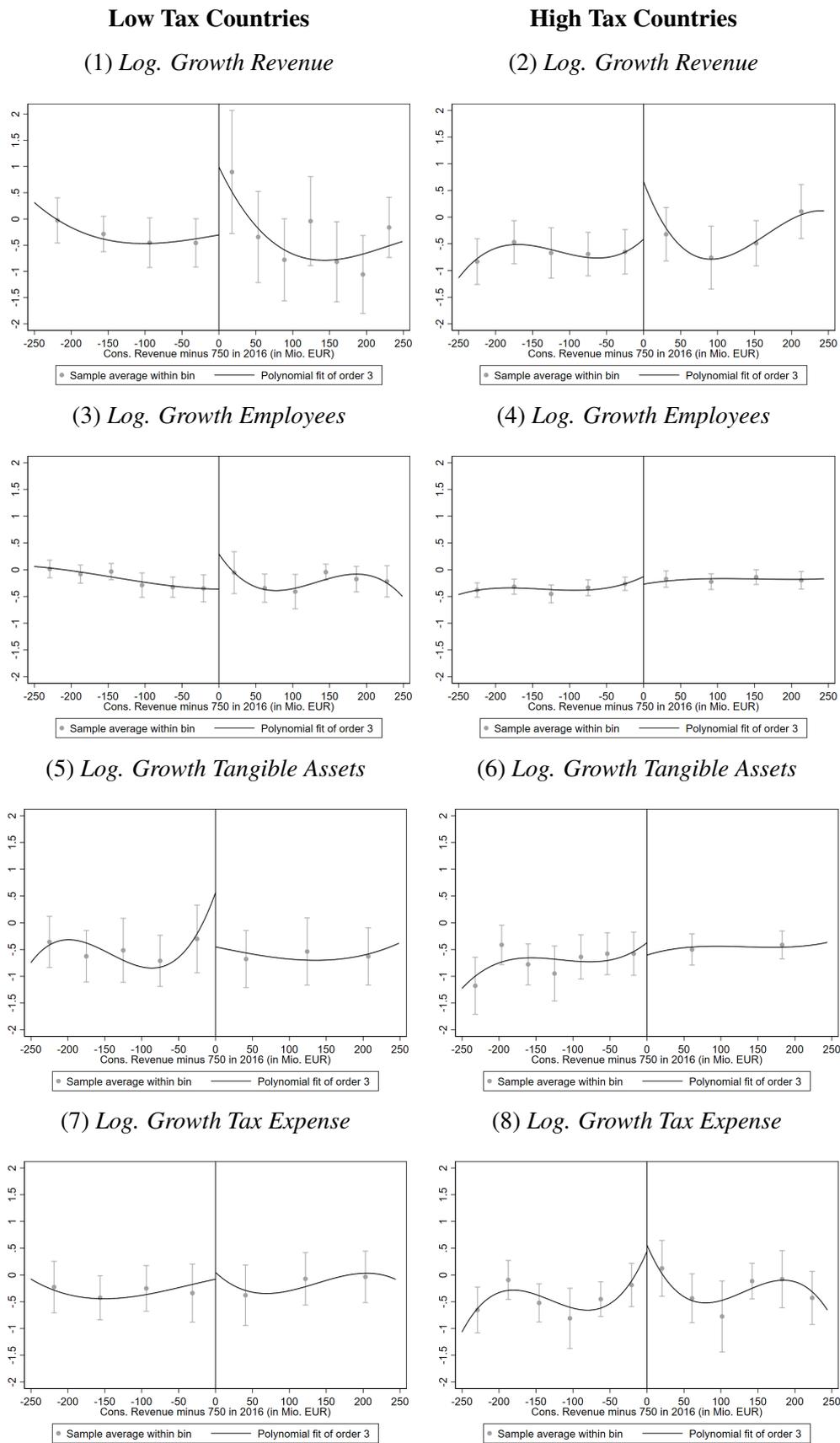
Notes: These graphs plot average values and their 95% confidence intervals of different consolidated firm-level outcome variables for evenly spaced bins of consolidated 2016 revenues. The figures on the left show fitted linear trends. The figures on the right show third order polynomials of a smoothed data distribution.

Table 7: Effects of CbCR on Consolidated Firm Economic Activity

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
	<i>Log. Growth Revenue</i>					
RD estimate	-0.031 (0.030)	-0.061* (0.035)	-0.001 (0.027)	0.010 (0.037)	-0.109** (0.050)	-0.069 (0.045)
Orig. Obs.	47,518	24,870	24,870	47,518	24,870	24,870
Bandwidth	199	156	156	318	269	269
Obs. in Bandwidth	2,547	926	1,454	4,324	1,717	2,659
Panel B						
	<i>Log. Growth Employees</i>					
RD estimate	-0.050* (0.028)	-0.142** (0.058)	-0.015 (0.042)	-0.105** (0.046)	-0.128* (0.076)	-0.048 (0.060)
Orig. Obs.	38,655	24,349	24,349	38,655	24,349	24,349
Bandwidth	190	132	132	253	292	292
Obs. in Bandwidth	1,980	758	1,184	2,699	1,840	2,838
Panel C						
	<i>Log. Growth Tangible Assets</i>					
RD estimate	0.039 (0.025)	-0.016 (0.030)	0.060* (0.032)	0.074** (0.034)	-0.014 (0.037)	0.046 (0.036)
Orig. Obs.	46,325	24,772	24,772	46,325	24,772	24,772
Bandwidth	229	152	152	370	368	368
Obs. in Bandwidth	2,964	901	1,413	5,137	2,577	3,917
Panel D						
	<i>Log. Growth Tax Expense</i>					
RD estimate	-0.010 (0.085)	-0.285** (0.139)	-0.088 (0.131)	0.020 (0.123)	-0.362* (0.217)	-0.152 (0.161)
Orig. Obs.	34,206	18,912	18,912	34,206	18,912	18,912
Bandwidth	346	182	182	465	337	337
Obs. in Bandwidth	3,851	891	1,382	5,804	1,874	2,834
Polynomials	Linear	Linear	Linear	3rd-order	3rd-order	3rd-order
Controls	No	Firm, Ctry	Firm	No	Firm, Ctry	Firm
Fixed Effects	Yr	Yr	Yr, Ctry, Ind	Yr	Yr	Yr, Ctry, Ind

Notes: This table presents results of estimating the effect of CbCR on consolidated firm-level economic activity using an RDD. The outcome variables are a firm's natural logarithm of growth in revenue (Panel A), in the number of employees (Panel B), in tangible assets (Panel C), and in tax expenses (Panel D), respectively. Columns (1) to (3) use nonparametric local linear regressions while Columns (4) to (6) use nonparametric local third-order polynomial regressions with mean-squared-error optimal bandwidths following Calonico et al. (2014). In Columns (3) and (6), we use optimal bandwidths and include firm-country and firm-industry fixed effects in addition to firm controls and a year fixed effect. 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.

Figure 6: Firm-Country-Year Economic Activity based on Unconsolidated Subsidiary Information Discontinuities around €750 million Threshold



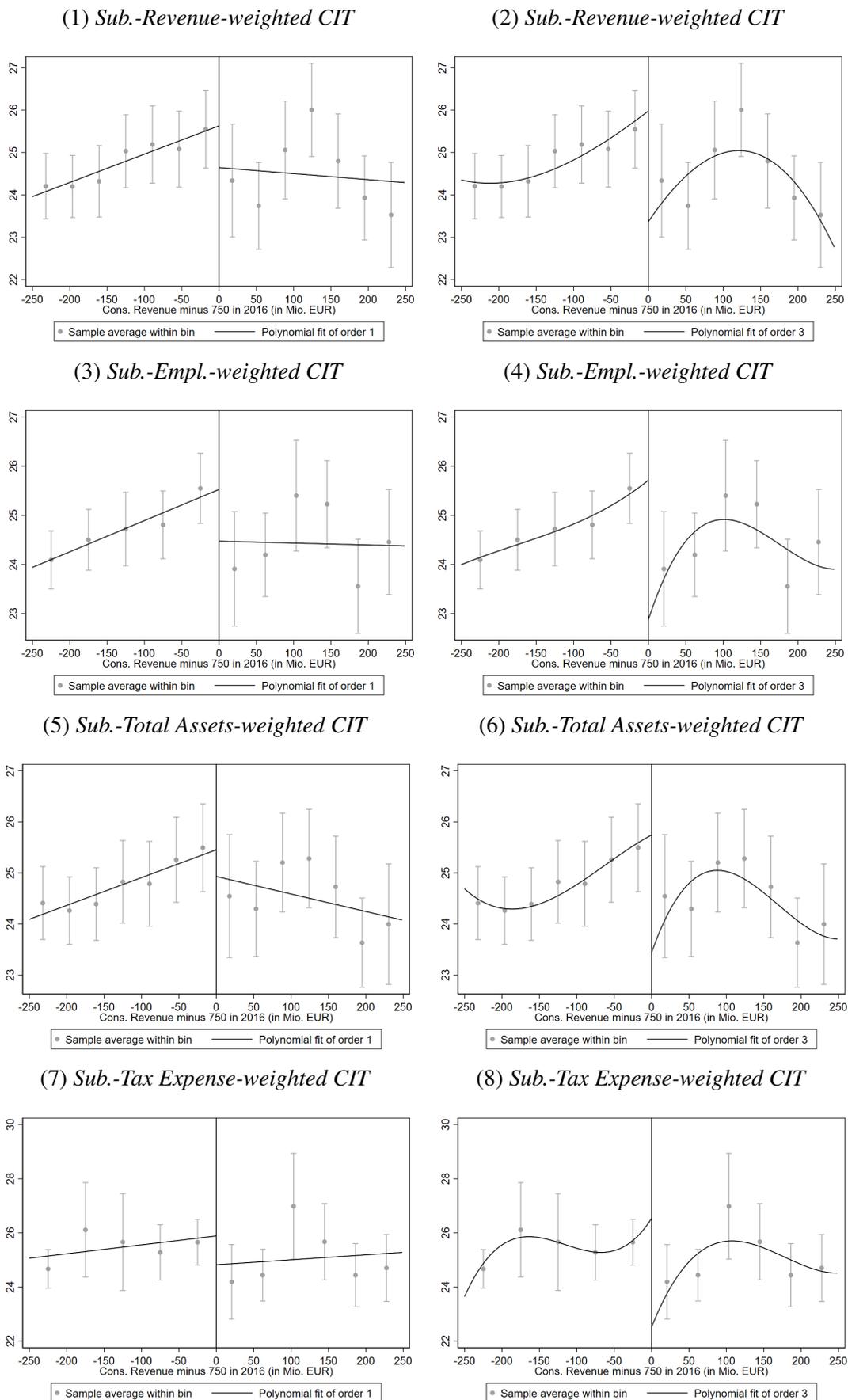
Notes: These graphs plot average values and their 95% confidence intervals of different unconsolidated outcome variables based on subsidiary information and aggregated at the firm-country-year level for evenly spaced bins of consolidated 2016 revenue. The figures show third order polynomials of a smoothed data distribution. The sample is split according to the median of subsidiary countries' corporate income tax rates with results for subsidiaries located in (relatively) low tax countries depicted on the left and subsidiaries located in (relatively) high tax countries depicted on the right.

Table 8: Effects of CbCR on Firm-Country-Year Economic Activity based on Unconsolidated Subsidiary Information

	(1)	(2)	(3)	(4)
Sample	Low Tax	High Tax	Low Tax	High Tax
Panel A				
	<i>Log. Growth Revenue</i>			
RD estimate	1.472* (0.799)	0.755 (0.556)	1.611** (0.805)	0.563 (0.609)
Orig. Obs.	21,254	35,670	21,254	35,670
Bandwidth	415	414	415	414
Obs. in Bandwidth	3,169	5,678	2,670	4,874
Panel B				
	<i>Log. Growth Employees</i>			
RD estimate	0.520* (0.287)	-0.191 (0.227)	0.448 (0.296)	-0.293 (0.210)
Orig. Obs.	21,254	35,670	21,254	35,670
Bandwidth	372	385	372	385
Obs. in Bandwidth	2,763	5,196	2,326	4,457
Panel C				
	<i>Log. Growth Tangible Assets</i>			
RD estimate	-0.568 (0.815)	-0.222 (0.471)	-0.257 (0.904)	0.077 (0.431)
Orig. Obs.	21,254	35,670	21,254	35,670
Bandwidth	386	389	386	389
Obs. in Bandwidth	2,891	5,263	2,440	4,518
Panel D				
	<i>Log. Growth Tax Expense</i>			
RD estimate	-0.410 (0.495)	0.041 (0.528)	-0.426 (0.556)	-0.765 (0.561)
Orig. Obs.	18,253	30,197	18,253	30,197
Bandwidth	530	360	530	360
Obs. in Bandwidth	3,759	4,103	3,155	3,510
Polynomials	3rd-order	3rd-order	3rd-order	3rd-order
Controls	No	No	Firm, Sub.	Firm, Sub.
Fixed Effects	Yr	Yr	Yr, Ctry, Ctry	Yr, Ctry, Ctry

Notes: This table presents the results of estimating the effect of CbCR on firm-country-year economic activity based on unconsolidated subsidiary information using an RDD and splitting the sample based on the subsidiaries' countries' median 2016 corporate income tax rate in 2016 (low tax sample in odd-numbered columns, high tax sample in even-numbered columns). The outcome variables are a firm-country-years' natural logarithm of growth in revenue (Panel A), number of employees (Panel B), tangible assets (Panel C), and tax expenses (Panel D), respectively. All columns use nonparametric local third-order polynomial regressions. Columns (1) and (2) include year fixed effects. Columns (3) and (4) include controls as well as year, subsidiary-country, and firm-country fixed effects. In Columns (1) and (2), we calculate mean-squared-error optimal bandwidths following Calonico et al. (2014). In Columns (3) and (4), we use the same bandwidths, respectively. 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.

Figure 7: Tax-Motivated Shifting of Unconsolidated Subsidiary Economic Activity Discontinuities around €750 million Threshold



Notes: These graphs plot average values and their 95% confidence intervals of different outcome variables based on the sum of the product of any firm's unconsolidated subsidiary's economic activity information and the corporate income tax rate, scaled by the total sum of a firm's subsidiaries' unconsolidated economic activity information for evenly spaced bins of 2016 consolidated revenue. The figures on the left show fitted linear trends. The figures on the right show third order polynomials of a smoothed data distribution.

Table 9: Effects of CbCR on Tax-Motivated Shifting of Unconsolidated Subsidiary Economic Activity

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
	<i>Sub.-Revenue-weighted CIT</i>					
RD estimate	-2.417*** (0.621)	-0.962* (0.509)	-0.199 (0.601)	-2.580*** (0.882)	-0.788 (0.715)	-0.661 (0.897)
Orig. Obs.	21,793	11,212	11,212	21,793	11,212	11,212
Bandwidth	162	209	209	326	356	356
Obs. in Bandwidth	1,037	701	1,117	2,315	1,300	2,055
Panel B						
	<i>Sub.-Empl.-weighted CIT</i>					
RD estimate	-2.364*** (0.625)	-0.514 (0.572)	0.163 (0.559)	-2.778*** (0.889)	-0.443 (0.841)	-0.331 (0.793)
Orig. Obs.	22,682	11,524	11,524	22,682	11,524	11,524
Bandwidth	159	204	204	328	404	404
Obs. in Bandwidth	1,093	702	1,152	2,484	1,565	2,555
Panel C						
	<i>Sub.-Total Assets-weighted CIT</i>					
RD estimate	-1.855*** (0.595)	-0.753 (0.477)	0.045 (0.575)	-2.349*** (0.877)	-0.333 (0.616)	0.193 (0.755)
Orig. Obs.	24,581	11,943	11,943	24,581	11,943	11,943
Bandwidth	171	184	184	330	389	389
Obs. in Bandwidth	1,232	638	1,046	2,553	1,490	2,465
Panel D						
	<i>Sub.-Tax Expense-weighted CIT</i>					
RD estimate	-2.821** (1.188)	-2.278* (1.298)	-0.266 (1.581)	-3.589* (1.848)	-4.715** (2.257)	-1.395 (1.916)
Orig. Obs.	19,613	10,445	10,445	19,613	10,445	10,445
Bandwidth	96	127	127	186	215	215
Obs. in Bandwidth	578	356	560	1,157	690	1,074
Polynomials	Linear	Linear	Linear	3rd-order	3rd-order	Linear
Controls	No	Firm, Ctry	Firm	No	Firm, Ctry	Firm
Fixed Effects	Yr	Yr	Yr, Ctry, Ind	Yr	Yr	Yr, Ctry, Ind

Notes: This table presents the results of estimating the effect of CbCR on the tax-motivated shifting of unconsolidated economic activity using an RDD. The outcome variables are proxies for a firm's tax-motivated shifting behavior. The different measures are calculated as the sum of the product of each firm-country-year (subsidiary) unconsolidated revenue (Panel A), number of employees (Panel B), total assets (Panel C), or tax expense (Panel D) and the local corporate income tax rate divided by the total sum of the firm's subsidiaries revenues, number of employees, total assets, or tax expenses, respectively. Columns (1) to (3) use nonparametric local linear regressions while Columns (4) to (6) use nonparametric local third-order polynomial regressions with mean-squared-error optimal bandwidths following Calonico et al. (2014). In Columns (3) and (6), we use optimal bandwidths and include firm-country and firm-industry fixed effects in addition to firm controls and a year fixed effect. 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.