

A Service of



Leibniz-Informationszentrum Wirtschaft Leibniz Information Centre for Economics

Müller, Raphael; Voget, Johannes; Zental, Jan

Article

The effects of mandatory private disclosure on public disclosure: Evidence from CbCR

Schmalenbach Journal of Business Research (SBUR)

Provided in Cooperation with: Schmalenbach-Gesellschaft für Betriebswirtschaft e.V.

Suggested Citation: Müller, Raphael; Voget, Johannes; Zental, Jan (2024) : The effects of mandatory private disclosure on public disclosure: Evidence from CbCR, Schmalenbach Journal of Business Research (SBUR), ISSN 2366-6153, Springer, Heidelberg, Vol. 76, Iss. 4, pp. 533-571, https://doi.org/10.1007/s41471-024-00194-2

This Version is available at: https://hdl.handle.net/10419/312600

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.



https://creativecommons.org/licenses/by/4.0/

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.





ORIGINAL ARTICLE



The Effects of Mandatory Private Disclosure On Public Disclosure—Evidence from CbCR

Raphael Müller · Johannes Voget · Jan Zental

Received: 17 October 2023 / Accepted: 3 October 2024 / Published online: 7 November 2024 © The Author(s) 2024, corrected publication 2024

Abstract We analyze the effect of increased mandatory private disclosure to fiscal authorities on voluntary public disclosure decisions. We exploit the introduction of Country-by-Country Reporting (CbCR), which requires large multinational corporations to report detailed geographic segment information to fiscal authorities to prevent income shifting. Using both difference-in-differences and regression discontinuity designs in our empirical approach, we investigate how multinational corporations respond to CbCR in their public disclosure of geographic information in financial statements and the narrative part of annual reports. We find that firms subject to CbCR decrease their disclosure of qualitative and sensitive geographic information. This effect is particularly pronounced for firms potentially subject to higher scrutiny by tax authorities and for firms with a stronger international presence. Our results suggest that private and public disclosure of geographic information are substitutes in the context of the mandatory private reporting requirement under CbCR.

Keywords CbCR \cdot Mandatory Private Disclosure \cdot Voluntary Public Disclosure \cdot Tax Avoidance

JEL Classification H26 · M41 · M48

Raphael Müller E-Mail: raphael.mueller@uni-mannheim.de

Johannes Voget E-Mail: voget@uni-mannheim.de

Raphael Müller · Johannes Voget · ⊠ Jan Zental University of Mannheim, Mannheim, Deutschland E-Mail: jan.zental@uni-mannheim.de

1 Introduction

Profit shifting by multinational corporations is viewed as a pervasive problem (Tørsløv and Wier 2023; Clausing 2016). Profit shifting erodes the tax base, reducing tax revenue and contributing to the fiscal constraints faced by many governments. Additionally, it undermines the political legitimacy and credibility of the existing international framework. Therefore, the Organisation for Economic Co-operation and Development (OECD) is actively engaged in reducing profit shifting. One major initiative of the OECD's Base Erosion and Profit Shifting (BEPS) project is CbCR (OECD 2015). Under CbCR, companies above a certain revenue threshold are required to file detailed country-level information, which is shared among fiscal authorities upon request.

Firms are subject to several information reporting regimes, each creating specific reporting incentives depending on the intended users of the information (e.g., investors, fiscal authorities). Still, the information demanded by different stakeholders may overlap to a certain extent (Müller et al. 2020). Prior literature has established that firms' mandatory disclosures to selected stakeholders influence public disclosure decisions (Bozanic et al. 2017; Towery 2017). However, it is not clear how increased mandatory private tax reporting regulations such as CbCR affect the public disclosure decisions of firms. In this context, our study aims to answer the following research question: Did the introduction of CbCR change the public disclosure choices of the affected multinational corporations?

Theory predicts that firms weigh the costs and benefits of voluntarily disclosing tax-related information to investors and other stakeholders (Healy and Palepu 2001). Whether private disclosure requirements effectively change public disclosure decisions is ambiguous because firms will only react if they assume that investors and other stakeholders will find the public information useful and that those benefits will outweigh the costs of the fiscal authority and competitors using the information. More specifically, stricter private tax reporting might reduce proprietary costs associated with that information. If the fiscal authority already has the information as a result of the confidential disclosure, the public disclosure of the information may be less costly. Thus, both sets of disclosure would be complements from the firm's perspective if firms increase voluntary public disclosure of information that is valuable for investors (Kays 2022). Alternatively, firms may decrease voluntary public disclosure if CbCR increases the risk that stakeholders exert pressure on fiscal authorities to investigate further if stakeholders are discontent with the firm's geographic distribution of profits. Voluntary public disclosure may also decrease to avoid the risk of unwarranted attention from fiscal authorities if discrepancies between private CbCR and voluntary public disclosure arise.1 This would suggest that private and public disclosure are substitutes from the firm's perspective (Hope et al. 2013).

¹ Firms may also decrease their voluntary public disclosure if investor demand for information decreases due to better monitoring of firms by fiscal authorities after CbCR, thereby mitigating information asymmetries between the firm and its shareholders.

This study uses the introduction of CbCR in several countries as an exogenous shock to answer the question whether firms adjust their voluntary disclosure in annual reports. It aims to improve our understanding of how private disclosure requirements may affect public disclosure decisions. Our main identification strategy is based on a difference-in-differences (DiD) design that exploits the applicability of CbCR at the revenue threshold. If CbCR alters the costs of public disclosure for the reported information, one would expect changes in disclosure that relate to firms' geographic activities or earnings. We also exploit local variations in disclosure around the revenue threshold through a regression discontinuity design (RDD).

We construct our dataset based on three main sources. We first draw a worldwide selection of financial data for listed multinational corporations from Bureau van Dijk's (BvD) Orbis database. Second, we use archival data on these firms' segment reporting from the Bloomberg database to analyze changes in their disclosed geographic segments by financial item. Third, we employ textual analysis methods to exploit the rich set of qualitative disclosure contained in the text of annual reports². We obtain the annual reports from Perfect Information's "Filings Expert" database and the SEC's EDGAR database.³ This approach enables us to exploit the information contained in annual reports' narrative sections (Lewis and Young 2019; Loughran and McDonald 2016). The resulting sample covers 4253 firms in the years 2010 to 2020 with 25,950 total observations.

We provide evidence that firms significantly changed their disclosure practices towards less voluntary information provision on their geographic activities and earnings after the introduction of mandatory CbCR. We further find that quantitative disclosure of sensitive geographic information decreased. Similarly, we document a decrease in qualitative country disclosure in annual reports. We find the first effect to be more pronounced for firms located in jurisdictions with higher potential scrutiny by fiscal authorities. Moreover, the decrease in qualitative geographic disclosure is stronger for firms which are more international. Hence, our main results suggest that, in the context of geographic information provision, voluntary public disclosure and mandatory private disclosure are substitutes from the firm's perspective.

Most studies on the interaction of mandatory and voluntary disclosure consider settings in which both types of disclosures are public. Bischof and Daske (2013), for example, confirm, in the context of stress-testing banks' capital buffers, the prediction by Einhorn (2005) that initial mandatory disclosure lowers the threshold for future voluntary disclosures. Furthermore, disclosure theory suggests that firms may increase voluntary disclosure to investors when they have higher-quality internal information (Verrecchia 1990). Mandating additional disclosure can force firms to improve their internal information environment and to process all available information more effectively (see, e.g. Samuels (2021) for related evidence).

² We refer to qualitative disclosure as any textual information provided in the annual report. This also includes sections on management discussion and analysis. In many accounting regimes, these management reports are not required to be audited, although in some regimes, the auditor may have to positively confirm that there are no discrepancies between the financial report and the management report.

³ For more information, see https://www.perfectinfo.com/filings-expert (accessed on 1 June 2021).

However, which of these existing insights carry over to the case when mandatory disclosure is private, not public, is an open question. Evidence on the setting with mandatory private disclosure is scarce and we contribute to this emerging literature. So far, the few studies on the interaction between private and public disclosure sets have mostly focused on empirical settings in the United States (US) (Bozanic et al. 2017; Towery 2017; Hope et al. 2013). We extend this literature by examining the disclosure responses of a large, international sample of firms with respect to geographic information, which exhibits very different characteristics compared to other disclosure items.

Bozanic et al. (2017) find that, following mandatory private disclosure in the form of Schedule UTP, firms significantly increased the quantity of voluntary taxrelated disclosures, consistent with lower tax-related proprietary costs of disclosure. Extrapolating this pattern to the private CbCR setting would imply that voluntary geographic information disclosure increases once mandatory private disclosure to fiscal authorities is introduced. However, our results reveal the opposite pattern after CbCR introduction. This shows that an increase in voluntary disclosure in response to mandatory private disclosure to the fiscal authority cannot be taken for granted. Instead, the relationship between mandatory private disclosure and public voluntary disclosure can even invert under certain circumstances. This is the case in our setting, in which the characteristics of the disclosure content differ from previous analyses in important aspects. Besides the proprietary cost of disclosure to fiscal authorities, there are two other sources of substantial proprietary costs of geographic disclosure: leakage of valuable information to competitors and reputational concerns related to stakeholder discontent with the firm's geographic distribution of profits or investment. Furthermore, full CbCR being available to the fiscal authority may have positive feedback effects on the latter type of proprietary costs related to public scrutiny, because the public expects the fiscal authority to use its information and investigate further if already the publicly disclosed geographic information reveals conspicuous spatial disparities in profitability.

In a related study, Chi et al. (2023) find that multinational corporations are more likely to issue voluntary effective tax rate (ETR) forecasts after CbCR adoptions with the interpretation that the tax-related internal information environment improves following CbCR compliance. At first glance, this seems contradictory to our results. However, as discussed above, the difference in outcomes is due to the difference in characteristics of the disclosure content. Disclosure of geographic information potentially incurs substantial proprietary costs related to informing competitors and public scrutiny. Voluntary ETR forecasts may not incur these costs as they are frequently not disaggregated at the segment levels. Moreover, non-investing stakeholders with an interest in ETRs generally focus on the realized ETRs in annual accounts instead of the forecasts.

Two studies examine corporate disclosure responses to public tax disclosure regulations (Brown et al. 2019; Kays 2022). In contrast, we investigate the effect of a confidential reporting regime on public disclosure decisions. It is important to keep in mind that CbCR alters only the amount of information available to fiscal authorities, not to other parties. By analyzing the public disclosure responses to increased private disclosure, we also address the call for more research on the effects of tax-related disclosure regulation (Dyreng and Maydew 2018; Hanlon and Heitzman 2010).

2 Institutional Background and Related Literature

2.1 Country-by-Country Reporting and Disclosure of Geographic Activities

The revelation of aggressive tax planning strategies and offshore activities of multinational corporations has moved tax planning into the focus of public attention and created the perception that multinational corporations circumvent existing tax regulations at the expense of the public budgets. Consequently, ensuring tax transparency has become a primary regulatory concern for policymakers around the world. Following its mandate to develop binding policy instruments against BEPS, the OECD proposed a new transfer pricing documentation framework, including a comprehensive CbCR and information exchange system to enhance transparency for fiscal authorities (Action 13). The OECD argues that CbCR should equip fiscal authorities with the information necessary to identify potential transfer pricing risks associated with tax planning strategies (OECD 2015). Unlike other existing CbCR frameworks for banks or the extractive industry, the reports are not made publicly available and are exchanged upon request among fiscal authorities only. The OECD issued detailed guidelines and model rules to harmonize the implementation of CbCR across participating countries. So far, over 100 jurisdictions have adopted the CbCR framework, including a significant fraction of the world's major offshore financial centers (i.e., tax havens).⁴ Most countries opted to apply CbCR regulation as of the fiscal year 2016.

The obligation to file a CbC report applies to all multinational corporate groups whose ultimate parent is resident for tax purposes in a country with CbCR legislation in place or which has at least one subsidiary or permanent establishment located in such a country. Multinational corporate groups are exempt from the CbCR filing obligation if the consolidated group revenues in the preceding fiscal year remain below a certain revenue threshold. While governments may set their own thresholds, most legislators adopted a threshold roughly equivalent to \notin 750 million. Given the widespread adoption of CbCR, most multinational corporate groups that exceed the revenue threshold are likely to incur a reporting obligation in at least one country.

The CbC reports consist of three tables. In the first table, multinational corporate groups have to report financial items—aggregated on a country level. These items include, among others, (un-)related party revenues, total revenues, profit before income taxes, income tax paid, and tangible assets. The second table contains a list of all constituent entities of the group by country of residence and their primary business activities. The third table allows multinational corporate groups to explain and specify the financial figures and activities from the previous tables to facilitate

⁴ The OECD summarizes the current status of implementation for participating countries. See https:// www.oecd.org/tax/automatic-exchange/country-specific-information-on-country-by-country-reportingimplementation.htm (accessed on 3 January 2023).

the interpretation of the disclosed information for fiscal authorities. Companies may also voluntarily disclose additional qualitative information to avoid ambiguity, for example, by motivating legitimate operations in a tax haven country.

The content of the confidential CbC reports, i.e., the detailed geographic breakdown of financial items and international activities, goes far beyond the normal public disclosure requirements of large firms under IFRS or US GAAP. In fact, geographic reporting only plays a minor role in financial statements. Both standards require companies to report sales and assets in the notes of the financial statements for each material country in which they operate. The disclosure of additional financial items, such as earnings before taxes or income taxes, is voluntary. Since the standards lack a clear definition of materiality, companies frequently report their home country and aggregate all foreign operations into regions or simply in "foreign area" (Akamah et al. 2018). Thus, while companies might decide to disclose more granulated information on geographic activities and earnings, they are not required to report on a country-by-country basis. In addition to geographic segment reporting, European firms need to disclose a list of all subsidiaries in the notes. Similarly, US firms must disclose a list of all significant subsidiaries, including their locations in Exhibit 21 (Dyreng et al. 2020). However, no financial items are required to be reported.

Public disclosure of geographic information in annual reports is not limited to accounting figures in financial statements. Most of the other sections of annual reports are narrative in nature and allow managers to convey contextual information about developments that are relevant for future value creation or affect business fundamentals but are not well-captured by the accounting measures. This information could include discussions about firms' foreign business activities, ongoing litigations, or compliance with regulatory requirements. The disclosure of additional content in annual reports is subject to many country-specific regulations and is usually not harmonized across firms. Still, most jurisdictions require firms to include some qualitative "management report" on their business model and the risk environment of the firms to provide a contextual, narrative basis for the backward-looking financial figures. The management reports cover various topics, and managers have considerable discretion in selecting the content and type of information. Beyond these legal provisions, firms often include supplementary information on growth opportunities and risk exposure in foreign markets.

2.2 Effects of Private Tax Reporting On Public Disclosure Decisions

The financial reporting standards define the minimum level of public information disclosure concerning geographic segmentation. Beyond these reporting requirements, managers will assess the costs and benefits of disclosing additional information to their investors and other stakeholders (Healy and Palepu 2001). Several explicit costs may have impeded managers from voluntarily disclosing more information about geographic activities and performance. First, the cost of preparing the information may have hindered disclosing geographic information in the past. While the costs of preparing such reports may not be substantial, the cost of complying with CbCR was a major concern firms raised against the CbC requirement (Spengel 2018). However, after the introduction of CbCR, the cost of publicly disclosing this information (at least partially) is substantially reduced. This would tend to increase firms' voluntary disclosure of geographic information as a response to mandatory private CbCR.

The assumption that mandatory disclosure may spur firms to produce new (and potentially beneficial) information is consistent with the results of Shroff (2017). The author finds that after changes in GAAP, the firm's investments change, as the act of complying with GAAP presents the manager with more information that helps inform investment.

Another reason why companies were hesitant to disclose geographic information prior to CbCR could be that they expected fiscal authorities to access and use the information from the public financial disclosures.⁵ Hope et al. (2013), for instance, show that firms opting for disclosing less geographic earnings in their segment report have lower effective tax rates (ETRs). The authors conclude that firms with low ETRs reduce voluntary disclosure to disguise their tax planning behavior from fiscal authorities. Similarly, Deng et al. (2021) document that tax-avoiding firms are less likely to disclose segment-level tax information. The introduction of a private CbCR makes these considerations obsolete, as fiscal authorities now have very detailed information at their disposal. Hence, firms might be more inclined to disclose this information publicly in their annual reports after CbCR. The firm's voluntary public information provision and its mandatory private disclosure would then be complements, the same pattern as in Bozanic et al. (2017).

Yet, disclosing geographic information might still be prohibitively costly for some firms. For instance, information about the profitability of operations in foreign markets might be helpful to competitors. In support of the idea that firms expect competitors to learn from their corporate disclosures, Leung and Verriest (2019) show that companies tend to hide information about operations in economically attractive regions and regions with low market entry barriers. These competitorrelated proprietary concerns could lead to firms being unwilling to disclose the information, despite having the information compiled already.

In addition to proprietary costs of geographic disclosure remaining high—due to proprietary information leaking to competitors or due to concerns about public scrutiny—there are three reasons for which mandatory private CbCR can have a substitutive effect on firms' voluntary public provision of geographic information. First, the country-level numbers in the private CbCR may not add up to the same geographic proportions that one would expect based on the geographic segment information disclosed before CbCR—either because firms have responded to CbCR by shifting input factors (De Simone and Olbert 2022), or also because firms consolidate country-level information differently for private CbCR and for public disclosure. By reducing the level of detail in their voluntary geographic information, firms can cloud shifts in the proportions of geographic segments which are directly related to the introduction of CbCR, thereby lowering the risk of unwarranted attention from fiscal authorities and other stakeholders. In a related setting, Towery (2017) examines whether firms adjust their reserves for uncertain tax benefits in

⁵ For the US, Bozanic et al. (2017) show that the IRS indeed downloaded firms' financial disclosures as an additional source of information.

financial reports following the private reporting requirements under Schedule UTP. Her results indicate that firms changed their financial reporting for uncertain tax positions to avoid the disclosure of additional information to the IRS.⁶

Second, it is common knowledge that the fiscal authorities have access to the full CbCR information. Hence, the public, the media, or politicians may exert pressure on fiscal authorities to investigate further once they suspect a discrepancy between the firms' public geographic disclosure and the deemed actual firm behavior (Müller et al. 2024). After CbCR, firms consequently reduce voluntary geographic reporting to counteract the increased risk from public scrutiny.

Third, investors may perceive fiscal authorities as de facto the largest minority shareholders of firms due to their tax claim on firm profits. The authorities' monitoring of firms benefits regular shareholders as it inhibits not only tax avoidance activities but also related opportunities for managers to extract private benefits (Bennedsen and Zeume 2018; Desai et al. 2007; Desai and Dharmapala 2006; Dutt et al. 2019; Hanlon et al. 2014). In this case, CbCR leads to better informed fiscal authorities and thus better external monitoring. Consequently, voluntary geographic information disclosure becomes less relevant for mitigating information asymmetries between firms and investors.

The introduction of private CbCR—a geographic breakdown of activities and profitability—hence constitutes a major regulatory shock to the information environment of multinational corporations reducing the information asymmetry between international firms and fiscal authorities. Whether and how the public disclosure of geographic information changes following CbCR is eventually an empirical question. Considering the competing predictions from the previous arguments, we do not make a directional prediction, but state the hypothesis in null form:

H1 Firms will not change their (voluntary) public disclosure of geographic information following the implementation of CbCR.

3 Empirical Approach and Methodology

3.1 Empirical Strategy

3.1.1 DiD Approach

As a baseline identification approach, we use the introduction of CbCR as an exogenous policy shock to companies' information environment affecting their voluntary disclosure decisions. Therefore, our identification strategy is based on a DiD approach estimated via the ordinary least squares (OLS) method. This allows us to

⁶ Moreover, firms may have used the degrees of freedom in voluntary geographic reporting to pick a specific geographic segmentation suited to signal low levels of tax avoidance. However, CbCR leads to fiscal authorities being informed at the granular country level. This eliminates the opportunity to portray a specific geographic picture of the firm to fiscal authorities via voluntary reporting. Hence, mandatory private CbCR decreases a specific incentive for voluntary geographic reporting.

isolate the effect of the policy (Angrist and Pischke 2014). CbCR is implemented via staggered introduction at a country level, and only firms above a certain revenue threshold are subject to the confidential reporting requirement (Joshi 2020). Thus, we can compare firms subject to CbCR's disclosure requirements before and after the implementation of CbCR with firms below the revenue threshold. Equation 1 depicts the baseline DiD analysis of our research question:

$$y_{i,t} = \beta_0 + \beta_1 Treat_i * Post_t + \sum_j^J \gamma_j X_{j,i,t} + \sum_i^I \theta_i Firm_i + \sum_t^T \lambda_t Year_t + \mu_{i,t}$$
(1)

where $y_{i,t}$ is a measure indicating geographic disclosure for a given firm *i* and year *t*. We explain our dependent variables in Sect. 3.2 and Table 1. The variables *Treat_i* and *Post_t* capture the effect of being treated, i.e. being subject to CbCR. Treat_i is a dummy variable equal to 1 for firms whose turnover is above the CbCR threshold in the periods preceding CbCR implementation, and equal to 0 otherwise. Likewise, Post_t is equal to 1 if the firm is located in a country which implemented CbCR in year *t*. We also include two-way fixed effects *Firm_i* and *Year_t* that capture unobserved constant factors at the firm and year level. Standard errors $\mu_{i,t}$ are clustered at the firm level.⁷

We follow prior literature and include several variables control variables to control for factors associated with the choice to disclose. These are denoted by $X_{j,i,t}$ and explained in Table 1. We include a proxy for firm size (*firm size_{i,t}*) calculated as the log of total assets. Moreover, we control for profitability (*return on assets_{i,t}* and *return on sales_{i,t}*), debt capacity (*leverage_{i,t}*), and intangible intensity (*intangibles_{i,t}*).

In addition, we include a proxy that measures the international exposure of firms (*foreign subsidiaries*_{*i*,*i*}). The variable is equal to the logarithmic count of all majority-owned foreign subsidiaries of a firm in a given year. Importantly, *foreign subsidiaries*_{*i*,*i*} allows us to control for organizational changes in firm structure that might affect geographic disclosure decision. The last control variable, *share of tax–haven subsidiaries*_{*i*,*i*}, measures the share of subsidiaries that are located in tax haven jurisdictions to control for tax aggressiveness of the firms.⁸ Together, both variables allow us to respond to evidence on private CbCR reporting that examines the organizational structure of large multinational corporations. Specifically, De Simone and Olbert (2022) find that firms affected by CbCR reduce ownership in tax haven subsidiaries. By including both the number of foreign subsidiaries and the share of tax haven subsidiaries in our regression, we hence account for these real responses to CbCR.

3.1.2 RDD Approach

Because CbCR constitutes a policy intervention that conditions its applicability based on a size threshold, relying on DiD only to identify the causal impact of

⁷ As we combine fixed effects with clustered standard errors, we drop singleton observations because these could otherwise lead to overstated significance (Correia 2015).

⁸ We follow the tax haven definition applied by Law and Mills (2022).

Variable	Description	Data Source
Insensitive geo- graphic information	Maximum count of reported segments for the financial items revenues and assets	Geographic Segment Data are obtained from Bloomberg
Sensitive geo- graphic information	Maximum count of reported segments for the financial items gross-profits, EBITDA and operating income	Geographic Segment Data are obtained from Bloomberg
Qualitative geo- graphic information	Share of sentences containing geographic information in the annual report, i.e. sentences with at least one ref- erence to a foreign country. The variable is computed as follows: <i>Number of sentences with country reference/</i> <i>Number of sentences in annual report</i>	Annual Reports are obtained from "Filings Expert" and EDGAR
Firm size	Variable capturing the size of the firm computed as the natural logarithm of total assets	Total assets are obtained from Orbis
Return on assets	Variable measuring profitability computed as follows: Earnings before taxes/total assets	Earnings before taxes and total assets are obtained from Orbis
Return on sales	Variable measuring profitability computed as follows: Earnings before taxes/turnover	Earnings before taxes and turnover are obtained from Orbis
Leverage	Variable measuring level of debt financing computed as follows: Total liabilities/Total assets	Total liabilities and total assets are obtained from Orbis
Intangibles	Variable measuring level of intangible assets computed as follows: Intangibles/Total assets	Intangibles and total assets are obtained from Orbis
Foreign sub- sidiaries	Variable capturing the total number of majority-owned foreign subsidiaries	Ownership information is obtained from Orbis
Share of tax-haven subsidiaries	Variable measuring the share of majority-owned subsidiaries located in tax haven jurisdictions relative to all foreign subsidiaries	Ownership information is obtained from Orbis
Turnover	Variable capturing total turnover in million euros	Turnover information is ob- tained from Orbis
Number of employ- ees	Variable capturing total number of employees	Number of employees is ob- tained from Orbis

 Table 1 Variable Description

Table 1 (Continued)		
Variable	Description	Data Source
Firm age	Variable measuring firm age in years since year of incorporation	Information on year of incorpo- ration is obtained from Orbis
Book ETR	Variable measuring the effective book tax rate computed as: Tax expense/Pre-tax earnings	Tax expense and pre-tax earn- ings are obtained from Orbis
Fog-Index	Variable capturing the complexity based on the Fog-Index, which measures the readability of a text. A high Fog-Index implies a high complexity level and thereby a high level of difficulty in readability. The measure is frequently used in the accounting and finance literature (Bilicka et al. 2022; Li 2010)	Annual Reports are obtained from "Filings Expert" and EDGAR
Negativity score Positivity score Uncertainty score	Variables capturing word sentiment in textual analysis of annual reports, based on a word list approach (Loughran and McDonald 2011)	Annual Reports are obtained from "Filings Expert" and EDGAR
Report length	Variable capturing the length of the annual report computed as the natural log of the number of sentences	Annual Reports are obtained from "Filings Expert" and EDGAR
Tax enforcement	Variable measuring tax enforcement per country as the number of tax administration staff relative to 10,000 habitants	Data on tax administration obtained from OECD Tax Administration 2019
Notes: this table lists a	ill variables used for analyses in this paper, including a description of their components, calculation and the respective	ve data sources

CbCR on geographic disclosure choices is susceptible for the omission of sizerelated unobservable factors that influence disclosure behavior. Henceforth and following prior work on CbCR, we complement our existing empirical strategy by implementing a RDD that allows us to identify the local effect of CbCR (Chi et al. 2023; De Simone and Olbert 2022). To this end, we first restrict the sample to a smaller range above and below the country-specific turnover threshold relevant for CbCR (see Table 2 for details). We then choose turnover bandwidths of \notin 150 Mio. and \notin 300 Mio. around the CbCR threshold. We subsequently estimate the following linear specification:

 $y_{i,t} =$ $\beta_0 + \beta_1 Above_CbCR_Threshold_{i,t} + \beta_2 Diff_CbCR_Threshold_{i,t}$ (2) + $\beta_3 Above_CbCR_Threshold_{i,t} X Diff_CbCR_Threshold_{i,t} + \mu_{i,t}$

Above_CbCR_Threshold_{i.t} if is а binary variable equal to 1 $Diff_CbCR_Threshold_{i,t}$, i.e. the difference of a firm i's turnover in year t to the CbCR threshold, is positive, and equal to zero otherwise. Our coefficient of interest is β_1 , which measures the discontinuity in outcome variable $y_{i,t}$ at the CbCR threshold. Again, we cluster standard errors $\mu_{i,t}$ at the firm level. In our primary approach, we estimate the above regression for observations after CbCR implementation. As a test whether a supposed effect on disclosure has existed prior to CbCR, we also run the above regression for the pre-CbCR period. If CbCR is the cause of negative changes to disclosure behavior at the threshold, we expect the coefficient β_1 to decrease when comparing the results for the post-CbCR period with the pre-CbCR period. Moreover, prior CbCR research acknowledges the possibility of potential revenue manipulation around the thresholds (De Simone and Olbert 2022). Firms might also have expectations about how their future treatment status changes and adjust their disclosure behavior accordingly. We thus also estimate our specification of RDD by excluding observations with turnover levels inside a bin of € 10 Mio. around the CbCR threshold (Dowd 2021).

3.2 Measures of Geographic Disclosure

To examine our research question, we use two different types of measures for geographic disclosure: first, we use quantitative segment disclosure data from Bloomberg. We collect the geographic segment information for the following variables: revenues, gross profits, EBITDA, operating income and assets. We then classify these quantitatively disclosed data into two categories. We denote the first category as *insensitive geographic information* and measure it as the maximum of reported geographic segments for the variables revenues and assets. We qualify the information contained in both variables as insensitive as they pertain to information that (a) does not reveal regional firm profitability (which could be interesting to both fiscal authorities and competitors) and (b) is already subject to minimum mandatory reporting requirements according to IFRS 8. In contrast, the remaining variables all relate to earnings information contained in the P&L statements of firms, albeit not necessarily disclosed at a geographic level in the absence of such reporting

Country	Threshold (EUR Mio.)	Implementation Year	Unique firms	Firm-year observations	Tax staff per 100,000 Pop
Australia	633	2016	155	1190	8
Austria	750	2016	13	105	10
Belgium	750	2016	24	177	18
Bermuda	720	2016	56	435	_
Brazil	525	2016	27	163	1
Canada	750	2016	12	50	12
Cayman Islands	720	2016	148	849	-
China	705	2016	92	475	5
Denmark	751	2016	28	223	15
Finland	750	2016	39	275	9
France	750	2016	65	475	15
Germany	750	2016	107	810	13
Greece	750	2016	16	124	11
Hong Kong	735	2018	40	295	4
India	683	2016	337	1040	_
Ireland	750	2016	18	102	13
Italy	750	2016	24	169	6
Japan	767	2016	643	3254	_
Luxembourg	750	2016	10	51	20
Malaysia	630	2017	96	561	4
Mexico	529	2016	18	106	3
Netherlands	750	2016	37	246	19
New Zealand	750	2016	16	115	10
Norway	677	2016	37	253	12
Poland	750	2016	33	153	15
Russia	676	2017	10	56	10
Saudi Arabia	723	2018	25	89	1
Singapore	707	2017	97	515	3
South Africa	641	2016	65	318	2
South Korea	771	2016	50	168	4
Spain	750	2016	38	258	5
Sweden	683	2016	115	731	10
Switzerland	779	2018	75	524	1
Taiwan	758	2017	218	652	4
Turkey	750	2019	16	72	5
United King- dom	750	2016	196	878	10
United States of America	720	2016	1257	9991	2
Overall obser- vations	25,950				

 Table 2
 CbCR Implementation and Country Characteristics

Notes: this table provides institutional characteristics of the countries present in our firm sample. Threshold refers to the country-specific CbCR threshold, converted to EUR in the year of implementation. The variable tax staff is obtained from the OECD, see Table 1 for further information requirements in the IFRS guidelines. We hence denote the second category *sensitive geographic information* and measure it as the maximum number of reported geographic segments for gross profits, EBITDA and operating income. It is hence not only a measure of disclosure that potentially conveys sensitive proprietary and tax-related information, but also an approximation of the degree to which firms voluntarily disclose beyond what is mandatorily required by accounting regulation.⁹

Second, in addition to our two measures based on quantitative information disclosed in firms' geographic segment reporting, we apply textual analysis methods to capture the qualitative discussion of foreign operations in annual reports. Most firms explain their activities and the corresponding risk exposure in the management discussion and analysis or risk disclosure sections of their reports. This information provides additional context to the accrual-based accounting figures and often includes forward-looking information. Since non-US reports are not standardized, it is hard to identify common sections across reports or years. This is one reason why previous studies in accounting and finance literature have mainly analyzed standardized Form 10-K documents (Lang and Stice-Lawrence 2015). To measure voluntary geographic disclosure in the narrative sections, we apply the bag-of-words approach (Li 2010; Loughran and McDonald 2011). This conservative approach measures the level of discussion of topics related to information that would also be reported in CbCR.

In contrast to more sophisticated methods, keyword search allows targeting single sentences with explicit reference to selected words or phrases. Despite its simplicity, the method is very powerful, easily replicable, and frequently used in the literature (Bilicka et al. 2022; Ehinger et al. 2024; Loughran and McDonald 2016). As described in Sect. 2.2, the introduction of the confidential CbCR might have affected firms' cost-benefit considerations with respect to the optimal level of geographic disclosure. We apply the keyword search using a word list containing country names and their variations¹⁰ to identify sentences with country-specific information. Subsequently, we count all sentences in the document which mention at least one foreign country. References to the firm's country of incorporation are, therefore, excluded. The number of relevant country sentences is then scaled by the total number of sentences (*qualitative geographic information*). This allows us to assess changes in the relative importance of foreign activities and might be more informative than simply counting the occurrence of country references.¹¹

3.3 Sample Selection

In order to analyze whether firms change their disclosure of geographic information following CbCR introduction, we use BvD's Orbis database to identify worldwide,

⁹ An alternative measure of disclosure with similar properties may be the tax reconciliation statement, although measuring the intensity of information would require a different approach.

¹⁰ Besides the official country names, we also include the respective adjectives, i.e., "British" or "French", and their inflections on the list.

¹¹ In regressions with qualitative geographic information as a dependent variable, we further include the *fog-index*, report *length* and additional sentiment scores as control variables.

ultimate parent entities (UPE) of listed firms with turnover exceeding \in 50 Mio. at least once during the period of 2010–2020 (see Table 3). We require all firms to have sufficient financial data available in Orbis to estimate our baseline models.¹² From this initial sample, we drop observations without turnover data, which are needed to determine the treatment status of the firm. Next, we exclude firms operating in the banking and extractive industry as these firms may be subject to a public CbCR regime in the EU (Joshi et al. 2020; Johannesen and Larsen 2016). Moreover, we lose 5339 observations which have no international security identifier (ISIN), leaving us with 13,992 unique firms.

We obtain our geographic segment data from the Bloomberg database. Bloomberg extracts these data from publicly available company documents (e.g., annual reports, sustainability reports, investor presentations etc.) of publicly listed firms worldwide. The database hence contains both voluntary and mandatory disclosure items. We disregard highly aggregated information at the supra-national level and consider only items reported at a country level to ensure comparability across observations.

To construct our qualitative measure of geographic disclosure from annual reports, we use Perfect Information's "Filings Expert" database. The database contains over 15 million corporate documents for roughly 50,000 globally listed public companies. We convert the annual reports from PDF into machine-readable format and parse the text into sentences to construct our variable of interest (see Appendix for more details). For US companies, we download the Form 10-Ks by accessing the EDGAR database and use these reports to determine the level of geographic disclosure. After merging the data from Bloomberg and from the annual reports by Perfect Information to our main sample, we are left with 31,459 firm-year observations from 5339 unique firms.

Given that CbCR only affects firms that operate internationally, we continue by dropping domestic firms as well as holding companies. Domestic firms are neither affected by CbCR nor relevant in their geographic disclosure.¹³ We exclude holding companies because we cannot safely attribute a CbCR specific for one country in these cases.¹⁴ For the remaining sample, we follow the cleaning procedure by Lang and Stice-Lawrence (2015), who also used a large sample of annual reports of international firms for their analysis.¹⁵ We also restrict the sample to countries with no less than ten unique firms, reducing our sample again by 252 observations. Together, these requirements reduce our final sample size to 25,950 firm-year observations by 4253 unique firms from 37 countries.

¹² For the US and Canada, financial data are drawn from Compustat North America, which has a broader coverage of financial information for listed firms from these two jurisdictions.

¹³ We define firms as domestic when they have no foreign subsidiaries and no reported foreign segments.

¹⁴ We define firms as holding companies when their country of domicile does not coincide with the country of listing, as measured through differing country attributions between our three databases ORBIS, Bloomberg and Perfect information. In our sample, these firms are mainly of Chinese origin and listed in common tax haven countries like the Bermudas or Cayman Islands for easier access to capital markets (Coppola et al. 2021).

¹⁵ In particular, we exclude annual reports with a Fog-Index below 12 and above 30. We also exclude documents with less than 50 sentences or less than 100 words as the average annual report is substantially longer and drop remaining duplicates.

Sample Selection Process	Observations	Unique Firms
Publicly Listed Ultimate Parent Entities from Orbis for 2010–2020	140,893	17,567
Missing Turnover Data	-1542	-
Exclude Banking and Extractive Industry	-18,181	-
Missing ISIN	-3938	_
= Sample Prepared for Analysis with Disclosure Data	117,232	13,992
Not Matched to Bloomberg Segment Data	-29,432	_
No Annual Report from Perfect Information/Form 10-K from EDGAR	-56,341	-
= Observations with Segment & Textual Data	31,459	5339
Exclude Domestic and Holding Firms	-4408	_
Cleaning Steps Applied by Lang and Stice-Lawrence (2015)	-849	_
Exclude countries with less than 10 unique firms	-252	_
= Final Sample	25,950	4253

Table 3 Sample Selection

Notes: this table provides the selection process for deriving at our final sample. The first four rows present the steps for selecting our initial sample based on various selection criteria from ORBIS. Rows (6) and (7) depict the process of selecting further based on availability of both quantitative and qualitative information in Bloomberg and Perfect Information/Edgar. The requirement for firms to be covered by Bloomberg and Perfect Information results in some underrepresentation of Chinese, South-Korean and Taiwanese firms. This may reflect that these countries have a substantial number of small, publicly listed firms without an international investor base. The remaining steps in rows (9)–(11) relate to cleaning the sample to ensure data validity and suitable observations for further analysis. We define companies as domestic if they have no foreign subsidiaries. We exclude domestic firms because they are not affected by CbCR and not relevant in their geographic disclosure. Holding companies are identified via name-matching. We exclude those holding companies whose country of residence and country of domicile do not coincide according to our data sources. Otherwise, we would not be able to assign a country-specific treatment by CbCR. This affects mainly Chinese companies that are established simultaneously in e.g. Hong Kong, Bermudas or the Cayman Islands. See Sect. 3.3 for further detail

3.4 Descriptive Statistics

Table 2 depicts the geographic composition of our sample firms, the applicable revenue threshold, and the implementation year in the respective country. The vast majority of countries started to apply the CbCR requirement for the fiscal year 2016. The latest implementation in our sample occurred in 2019 for Turkey. The applicable size thresholds vary mainly due to exchange rate fluctuations but are mostly comparable across countries. Some notable exemptions can be observed, for instance, for Mexico and Nigeria. Concerning the geographic distribution of our observations, two aspects are noteworthy. First, the country with the highest number of observations is the US, followed by Japan and Australia. In general, Perfect Information also covers firms in developing and emerging economies, providing an interesting setting for our analysis. This distinguishes our sample from other studies in the context of CbCR, which often focus on European firms (De Simone and Olbert 2022; Joshi 2020). Second, we still observe a reasonable number of reports for Western Economies. The differences in observations between same-sized economies as France and Germany might be driven by our requirement that the reports must be available in English.

	Control threshol	group: cor d	ns. revenues	S<	Treated threshol	group: cor d	ns. revenues	>
	Before	CbCR	After C	bCR	Before	CbCR	After C	oCR
Variable	Mean	Obs	Mean	Obs	Mean	Obs	Mean	Obs
Geo. Seg. count of EBITDA	1.32	662	1.46	496	2.34	493	2.9	347
Geo. Seg. count of Gross Profits	1.25	560	1.22	755	1.58	663	1.53	677
Geog. Seg. count of Operating In- come	1.70	1576	1.57	1833	2.22	2540	2.11	2210
Sensitive geo- graphic informa- tion	0.57	5391	0.56	5915	0.81	7708	0.76	6936
Geo. Seg. count of Revenues	3.13	5314	3.04	5847	3.76	7641	3.77	6898
Geo. Seg. count of Assets	1.94	2311	1.81	2425	2.33	3074	2.15	2516
Insensitive geo- graphic informa- tion	3.14	5391	3.05	5915	3.75	7708	3.78	6936
Share of Coun- try Sentences in Annual Reports	3.66	5391	3.34	5915	4.23	7708	3.63	6936

 Table 4
 Descriptive Statistics by Treatment Status

Notes: this table presents summary statistics for our main outcome variables of interest and its individual components at the firm-year observation level. All variables are defined in Table 1. If a firm does not disclose any sensitive geographic segment information (rows (1)–(3)), the measure for sensitive geographic information for that firm is equal to zero. This explains that the average value of the composite measure is lower than its individual components. The same holds true for insensitive geographic segment disclosure, albeit here the disclosure of its constituents (disclosed revenues and assets) is higher. Average values and observations are split up according to whether observations belong to the treated or control group before or after treatment. The analysis proceeds at the unique firm-year level

Table 4 reports descriptive statistics for our disclosure variables of interest. We report these separately for firms below the country-specific threshold (control group) and firms above the threshold (treatment group), both before and after the introduction of CbCR. First, note that firms in the treated group form the majority of firms within the overall sample. Sensitive and insensitive geographic segments are disclosed at a higher rate for the treated group than for control firms, both before and after the introduction of CbCR. Similarly, textual geographic segment information is also disclosed more often by treated firms than by control firms throughout the observed period. Both observations relate to larger firms, which we account for in our following regression setting through control variables. Fig. 1 depicts the development of absolute levels of disclosure relative to the introduction of CbCR. One can see directly that while sensitive and insensitive disclosure of quantitative geographic information is relatively stable across time, qualitative disclosure of country information decreases for both the treated and the control group of firms.

Fig. 1 Disclosure Levels Before and After Introduction of CbCR. Notes: this figure provides the development of the mean levels for the three outcomes variables of interest over time. The first two subfigures provide average values for quantitative disclosure of insensitive and sensitive geographic information, measured in segment counts. The third subfigure shows the share of country sentences in annual reports. Values are conditional on whether firms belong to the treatment group (blue) or control group (red). The horizontal axis provides the years relative to CbCR implementation, with a relative year equal to zero denoting the onset of CbCR



Table 5 reports descriptive statistics for firms separately by treatment group and control group. By nature, treated firms have substantially higher consolidated revenues than the control firms. The same holds true for the number of employees and foreign subsidiary count as well as the volume of total assets. Similarly, firms in the treated group are more leveraged, reflecting differences in access to capital markets or risk profiles. Still, the variation especially within the group of larger firms is substantial, as exemplified by the differences between median and mean values. Moving from differences in absolute values (which result from our classification in treatment and control group based on a size criterion) to relative differences, one can observe that firms are also similar along several dimensions: they are similarly profitable (measured by return on assets), they have a similar share of intangible assets and they both have average effective book tax rates closely below thirty percent. A noteworthy difference concerns the share of subsidiaries in tax havens, which is

The same sublisson a sum	Below CbC	CR Threshold (cc	introl)		Above Cb(CR Threshold (tre	cated)	
Variables	p25	p50	p75	Mean	p25	p50	p75	Mean
Insensitive geographic information	1	3	5	3.41	2	3	5	3.91
Sensitive geographic information	0	0	1	0.64	0	0	1	0.84
Qualitative geographic information	7	3	5	4.03	7	3	9	4.20
Firm age	15	27	50	38	19	35	76	51
Number of employees	642	1306	2598	2376	5129	11,613	27,415	30,787
Leverage	0.30	0.43	0.56	0.44	0.45	0.58	0.69	0.57
Intangibles	0.01	0.07	0.28	0.16	0.03	0.14	0.33	0.20
Return on assets	0.04	0.07	0.12	0.09	0.04	0.07	0.11	0.08
Firm size (EUR Mio.)	180	354	681	678	1669	3726	10,546	12,539
Turnover (EUR Mio.)	167	304	498	361	1508	3044	7879	9238
Book ETR	0.19	0.26	0.33	0.28	0.21	0.28	0.34	0.29
Foreign subsidiaries	4	12	25	21	16	58	162	181
Share of tax-haven subsidiaries	0.00	0.08	0.24	0.17	0.02	0.07	0.15	0.12
Number of firm-year observations	11,360				14,644			
Notes: this table provides summary statt to the right) or not (columns (1)–(4) to the average value of the variable. Detai Variable shares (i.e. leverage, intangible	istics of outcome of the left). P25/F iled variable des es, return on ass	and control varia 50/P75 denote t cription is provie ets, book ETR ar	ables, split up int he respective 25, ded in Table 1. F nd share of tax-h	o two categories: , 50 or 75%-perc irrm size in this t aven subsidiaries	whether a firm is centile in column able is measured) are provided as	located above the s (1)–(3) and (5) in EUR Mio. wi decimal numbers	CbCR threshold -(7). Columns (4 thout taking the 1	(columns (5)–(8)) and (8) provide latural logarithm.

higher for firms in the control group. This surprises insofar as firms in the treated group have a substantially higher foreign presence measured by the number of foreign subsidiaries. A possible explanation could be that the existence of tax planning motivations requires a minimal setup of firms in tax havens, which becomes more obvious in relative terms for firms that do not have a substantial overall level of foreign activity.

4 Results

4.1 DiD Results

We provide the results of our baseline DiD regression for our three dependent variables of interest in Table 6. These results capture the average effect of the private CbCR on public disclosure decisions. We first consider our baseline regression results in columns (1), (3) and (5) without control variables. The coefficient on the interaction term of *Treat_i* and *Post_t* is negative across all three specifications, and statistically significant for sensitive and qualitative geographic disclosure. Private CbCR leads to less disclosure of sensitive geographic information by 0.075 segment counts. Disclosure of qualitative geographic information decreases by 0.339 percentage points. While the magnitude of both effects seems somewhat small, one should keep in mind that the average treated firm only reports 0.84 geographic segments with sensitive information, implying a decrease of about 8.9%. Likewise, the share of country sentences in annual reports is at about 4.2 percentage points on average, yielding a similar relative decrease of about 8.1%. Unlike the other two outcome variables, the disclosure of insensitive geographic information does not seem to be affected by CbCR. Our regression results are robust to the country-wise exclusion of firms from the sample, implying that country-specific phenomena do not drive our results.¹⁶

Our findings are also robust to the inclusion of control variables in columns (2), (4) and (6), even though not all firms are retained in the sample because of missing values in control variables. While sensitive geographic disclosure decreases more strongly when controlling for relevant variables, the decrease in qualitative geographic information is slightly less pronounced. Concerning the relevance of the control variables, we observe that firm size and a large count of foreign subsidiaries positively affect the disclosure of both insensitive and qualitative geographic information. Interestingly, both factors seem to play no role for sensitive information disclosure. Instead, firms with a larger share of intangible assets are disclosing substantially less sensitive information at a geographic level, amounting to 0.032

¹⁶ We also vary the dependent variable for qualitative geographic disclosure to include not only individual countries, but to condition on the country being mentioned in the same sentence as the word "tax". We do not find any significant disclosure response in this case. We attribute this to the respective average outcome value being very low (0.132 percentage points) in comparison to the initial outcome variable that includes any sentence with a country mention (3.75 percentage points). There is thus less downward response possible for a variable that conditions on both countries and taxes being mentioned in the same sentence

Table 6 Effect of CbC	R on Disclosure Behavior					
	(1)	(2)	(3)	(4)	(5)	(9)
Variables	Insensitive geographic	c information	Sensitive geographic i	information	Qualitative geographic i	nformation
Post X Treat	-0.0567	-0.080	-0.0664***	-0.075***	-0.349***	-0.339***
	(-1.114)	(-1.210)	(-2.756)	(-2.794)	(-5.680)	(-4.717)
Firm size	I	0.347^{***}	I	0.003	I	0.395^{***}
	I	(3.555)	I	(0.060)	I	(5.078)
Share of intangible	I	-0.165	I	-0.322^{**}	I	0.176
assets	I	(-0.553)	I	(-2.322)	I	(0.531)
Return on assets	I	0.243	I	0.210	I	-0.426
	I	(0.454)	I	(0.859)	I	(-0.655)
Return on sales	I	-0.333	I	-0.125	I	0.941^{*}
	I	(-0.758)	I	(-1.091)	I	(1.941)
Leverage	I	-0.098	I	0.010	I	0.840^{***}
	I	(-0.429)	I	(0.108)	I	(3.674)
Foreign subsidiary	I	0.089^{***}	I	0.001	I	0.082^{**}
count (logarithm)	I	(3.393)	I	(0.057)	I	(2.197)
Share of tax-haven	I	0.219	I	0.030	I	-0.191
subsidiaries	I	(1.613)	I	(0.598)	I	(-1.108)
Book ETR	I	I	I	I	I	-0.073
	I	I	Ι	I	I	(-0.675)
Fog-Index	I	I	I	I	1	-0.264***
	I	I	I	Ι	I	(-5.542)

					į	
	(1)	(2)	(3)	(4)	(2)	(9)
Variables	Insensitive geographic	information	Sensitive geographic in	formation	Qualitative geographic in	formation
Sentence count	1	I	1	1	1	-0.539***
(logarithm)	I	I	I	1	I	(-3.814)
Negativity score	I	I	I	I	I	0.004
	I	I	I	1	I	(0.753)
Positivity score	I	I	I	I	I	0.061^{***}
	I	I	I	1	I	(5.650)
Uncertainty Score	I	1	I	I	I	-0.108^{***}
	I	I	I	I	I	(-5.940)
Constant	3.468***	-1.529	0.680^{***}	0.722	3.821***	6.599***
	(232.1)	(-1.141)	(90.42)	(1.128)	(166.3)	(4.078)
Observations	25,643	19,214	25,643	19,214	25,643	18,148
Adj. R-squared	0.868	0.869	0.850	0.858	0.802	0.798
Fixed Effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm
Controls	No	Yes	No	Yes	No	Yes
Notes: this table present Table 1 and Sect. 3.1.1 included. Columns (2), (slightly varies to accoun	is the results of estimatin All columns include fixed 4) and (6) include control t for the different nature	g Eq. 1 using Ordinary Le effects at the firm-year lev I variables. The observation of qualitative geographic c	ast Squares for our over el. The row named 'Cont 1 number between colum lisclosure. All columns i	all firm sample describ rols' specifies whether the ns (2) and (4) and colum nclude standard errors c	ed on Table 2 and 3. We the control variables mention (6) differs because the substanteed at the firm-level.	lefine all variables in ned in Sect. 3.1.1 are et of control variables Values in parentheses

represent robust t-statistics ***, **, and * denote significance at the one-, five-, and ten-percent level for two-sided tests of significance

Table 6 (Continued)

segment counts less per 10 percentage point increase in the intangible share. This finding is consistent with considerations of proprietary costs playing a role in the decision to voluntarily disclose sensitive financial information at a detailed geographic level.

An essential identifying assumption for DiD designs is that affected firms and control firms would have developed similarly with respect to their disclosure decisions absent the policy reform (Angrist and Pischke 2014). This condition is usually considered to hold if both groups follow a parallel trend before the treatment. We investigate the dynamic effect and verify the plausibility of parallel trends using an event study specification for our three outcome variables (Schmidheiny and Siegloch 2023; Fuest et al. 2018). To this end, we replace the term $Treat_i * Post_t$ from Eq. 1 with a sequence of binary treatment variables denoted by $\sum_{k=-5}^{k=3} \beta_k D_{k,t}$ that indicate k periods prior and posterior to the introduction of CbCR. We use the identical structure of fixed effects and the same clustering procedure of standard errors as in Eq. 1 without control variables. In Fig. 2, we plot the resulting regression coefficients for five years prior to and three years after the treatment. The effect is estimated relative to the control group and normalized to the year prior to the implementation of CbCR. We observe no significant pre-trends for sensitive and qualitative geographic information. Disclosure of insensitive geographic information shows a slight pre-trend, hence the respective results should be interpreted more cautiously. The dynamic patterns also reveal that while the disclosure of qualitative geographic information decreased directly after the introduction of CbCR, firms were not immediately adjusting their public disclosure of sensitive geographic information. Instead, firms seem to have changed their disclosure behavior of sensitive geographic information only after learning about potential responses by fiscal authorities.

Overall, our findings support the notion that the implementation of mandatory private disclosure rules induced negative public disclosure responses. So far, empirical assessments of disclosure theory have reinforced the belief in a complementary relationship between private and public disclosure (Bozanic et al. 2017). On the contrary, our results reveal the opposite pattern: firms' public disclosure of geographic information decreases when private CbCR is introduced. This implies that both types of disclosure can also be substitutes. This effect can be explained by the arguments brought forward in Sect. 2.2.

First, the fear of firms to possibly include numbers in their public reporting that are difficult to square with financial figures privately reported to fiscal authorities might make them more hesitant to voluntarily disclose further geographic information to the public. This fear of contradiction could arise due to varying accounting standards between reports filed for accounting and tax purposes. Moreover, the aggregation of financial figures across different geographic regions can lead to inconsistencies, particularly for sensitive, profit-related items. On the contrary, insensitive information disclosure, which does not react to CbCR implementation, pertains to information that is not of primary relevance to fiscal authorities, as revenues and assets are not as directly linked to the tax burden. Also, unlike voluntary disclosure of sensitive information, it is bounded from below by IFRS regulation. Second, firms reduce their voluntary reporting of geographic information to lower the risk that someone

Fig. 2 Event Study for Assessing Pre-trends in Outcome Variables. Notes: this figure provides the coefficients obtained from estimating event study regressions for the three outcomes variables of interest (see Sect. 4.1 for further detail). Point estimates (red) denote the coefficient estimates for treatment in the periods before and after the actual treatment by CbCR. Blue whiskers indicate the respective 95% confidence intervals. All coefficients are estimated relative to the normalization period -1. Coefficient estimates in periods -5 and +3 (green) are binned off to the left and to the right of the sample. This implies that coefficients for periods -5 and +3 control for any longterm prior or posterior effects. Standard errors underlying the confidence intervals are robust to heteroscedasticity and clustered at the firm level



raises suspicion about discrepancies between the firm's public geographic disclosure and the deemed actual behavior of the firm. This risk is more costly after CbCR, because the public may exert pressure on fiscal authorities to use its access to full CbCR information and investigate further.

We further assess potential channels that might be driving our main results. We consider two aspects that could influence the degree to which firms affected by CbCR adjust their disclosure choices: the role of tax enforcement and the degree of intra-firm complexity as measured by its international presence (via subsidiaries). Throughout this section, we assess the heterogeneity of our main results by modi-fying our baseline DiD approach as depicted in Eq. 1 as follows: we replace our set of DiD coefficients ($\beta_1 Treat_i * Post_t$) with the term ($\beta_1 Treat_i * Post_t$)x Z_i , where Z_i denotes a binary variable that changes for each of the three subgroups of interest and is constant at the firm level. Effectively, we hence estimate a difference-in-dif-

ference-in-differences. This way, we can measure differential responses of firms to CbCR without changes in observation numbers due to sample splits.

Table 7 provides the estimated disclosure effect of CbCR for firms located in countries with high levels of tax enforcement. The variable Z_i in this case is equal to 1 when the number of tax staff relative to a population of 10,000 inhabitants per country, as provided by the OECD, is above the cross-country median. Our coefficient of interest now is the triple interaction *Post*_i *x Treat*_i *x High Tax Enforcement*_i. We observe that after controlling for the disclosure environment, the decrease in disclosure of sensitive geographic information is driven by firms who can reasonably expect their local fiscal authorities to be more able to process the additional financial information provided voluntarily by firms. The same pattern holds true for the disclosure of qualitative geographic information, both with and without the inclusion of control variables. This finding is also in line with evidence in the literature that fiscal authorities indeed access published financial information by companies (Bozanic et al. 2017).

Table 8 reports the regression results for our second aspect of heterogeneity, organizational complexity, which we proxy through high numbers of foreign subsidiaries. The variable Z_i is now equal to 1 if the number of foreign subsidiaries is above the median of all firms in the sample and equal to 0 otherwise. We posit that the more country subsidiary information a company needs to consolidate in its annual report, the higher the risk of potential mismatches with bilateral private reporting to fiscal authorities. Hence, we expect the effect on disclosure to be more negative the higher the foreign subsidiary presence. Interestingly, our results provide evidence that such a link only plays a role in qualitative disclosure of geographic information.

Further heterogeneity analyses reveal that the results for geographic disclosure responses to CbCR are robust when considering individual countries and regions.¹⁷ One exception to this finding stands out: the decrease in qualitative geographic reporting due to CbCR is subdued, albeit still significant, for US firms. We attribute this to the average qualitative geographic disclosure of US firms (2.52% share of country sentences) already being substantially lower than the sample average (3.75% share of country sentence), which limits the leeway to exhibit a negative response.

4.2 RDD Results

We subsequently proceed to the estimation results under the RDD approach to verify whether our initial results using DiD are also robust when specifying the identification of a local treatment effect. We depict the results in the form of both tables and figures. Table 9 and Fig. 3 contain the baseline specification outlined in Eq. 2, with the first table row providing our coefficient of interest. Columns (1), (3) and (5) include firm-years within a turnover bandwidth of \notin 150 Mio. For countries with

¹⁷ Results for country and region heterogeneity are not tabulated, but available from the authors upon request. For instance, results do not differ for the three outcome variables when considering a differential response for member countries of the European Union. For France, we find a stronger reduction in the disclosure of sensitive and qualitative geographic information, consistent with having an effective tax enforcement authority. The decrease in qualitative geographic disclosure is also more pronounced for Japanese, Russian and South Korean firms.

	(1)	(2)	(3)	(4)	(5)	(9)
Variables	Insensitive geographic	: information	Sensitive geographic in	Iformation	Qualitative geographic i	nformation
Post X Treat	-0.121*	-0.150*	-0.035	-0.020	-0.195^{***}	-0.187**
	(-1.958)	(-1.699)	(-1.196)	(-0.625)	(-3.048)	(-2.422)
Post X High Tax	-0.120	-0.094	0.044	0.076	-0.125	-0.074
enforcement	(-1.194)	(-0.706)	(0.880)	(1.353)	(-1.277)	(-0.649)
Post X Treat X High	0.049	0.013	-0.097	-0.150*	-0.462***	-0.395^{**}
Tax Enforcement	(0.317)	(0.071)	(-1.321)	(-1.884)	(-2.944)	(-2.295)
Constant	3.535***	-2.655*	0.679^{***}	1.051	3.392***	6.796***
	(188.977)	(-1.663)	(71.039)	(1.337)	(139.406)	(3.634)
Observations	20,209	14,823	20,209	14,823	20,209	13,887
Adj. R-squared	0.865	0.863	0.839	0.847	0.810	0.810
Fixed Effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm
Controls	No	Yes	No	Yes	No	Yes
Notes: this table prese enforcement. We defin	e all variables in Table 1 a	ing Eq. 1 using Ordinary L ind Sect. 3.1.1. All columns	cast Squares for a subse include fixed effects at th	t of firms that is located ie firm-year level. The ro	l in countries with an abo w named 'Controls' specif	ve-median level of tax ies whether the control
variables mentioned in	n Sect. 3.1.1 are included	. Columns (2), (4) and (6)	include control variables	. The observation numb	er between columns (2) a	nd (4) and column (6)
UILLETS UCCAUSE UIE SET	t of comun variations and	nuly varies to account rot u	ne unrerent mature of yu	aet estinsorisem sangulta	c lable u). All column j	licidue statinatu errors

Table 7Effect of High Tax Enforcement on Disclosure response to CbCR

clustered at the firm-level. Values in parentheses represent robust t-statistics ****, ***, and * denote significance at the one-, five-, and ten-percent level for two-sided tests of significance

Table 8 Effect of Foreign Subsidiary 1	Presence on Disclosur	e Response to CbCR				
	(1)	(2)	(3)	(4)	(5)	(9)
Variables	Insensitive geogr	aphic information	Sensitive geograp	ohic information	Qualitative geogr	aphic information
Post X Treat	-0.079	-0.080	-0.038*	-0.058**	0.005	0.099
	(-1.381)	(-1.008)	(-1.667)	(-2.159)	(0.070)	(1.063)
Post X High Number of foreign	-0.000	0.023	0.002	0.041	-0.292**	-0.054
subsidiaries	(-0.001)	(0.190)	(0.042)	(0.816)	(-2.477)	(-0.400)
Post X Treat X High N. of for. Subs	0.027	-0.014	-0.036	-0.048	-0.319^{**}	-0.561^{***}
	(0.223)	(-0.098)	(-0.653)	(-0.807)	(-2.203)	(-3.393)
Constant	3.482***	-1.534	0.680^{***}	0.721	3.872***	6.842^{***}
	(239.045)	(-1.144)	(89.353)	(1.129)	(166.553)	(4.250)
Observations	25,114	19,214	25,114	19,214	25,114	18,148
Adj. R-squared	0.869	0.869	0.849	0.858	0.800	0.799
Fixed Effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm
Controls	No	Yes	No	Yes	No	Yes
Notes: this table presents results of est We define all variables in Table 1 and mentioned in Sect. 3.1.1 are included. C the set of control variables slightly vari- level. Values in parentheses represent re	imating Eq. 1 using (Sect. 3.1.1. All column Columns (2), (4) and (0 es to account for the d obust t-statistics	Didinary Least Square: ns include fixed effects 3) include control varia ifferent nature of quant	s for a subset of firms a at the firm-year leve bles. The observation itative disclosures (se	that has a count of fo I. The row named 'Con number between colum a Table 6). All columns	teign subsidiaries abo trols' specifies wheth ns (2) and (4) and colt include standard error	ve the sample median. r the control variables mm (6) differs because s clustered at the firm-
***, **, and * denote significance at the	e one-, five-, and ten-f	percent level Ior two-si	ded tests of significan	Se		

Schmalenbach Journal of Business Research (2024) 76:533-571

a CbCR threshold of \notin 750 Mio., this implies a bandwidth of \notin 675–825 Mio., and for the remaining columns (2), (4) and (6) with a turnover bandwidth of \notin 300 Mio., it implies a wider bandwidth of \notin 600–900 Mio.

Despite the low number of observations compared to our DiD analysis, we find similar effects of CbCR on geographic disclosure. While insensitive disclosure does not (significantly) change in any direction after CbCR introduction, disclosure of sensitive geographic information decreases stronger (quantitatively) than in our baseline DiD specification on Table 6, columns (3) and (4). Qualitative geographic information, however, only decreases for the larger bandwidth. Due to the reasons outlined in Sect. 3.2, we repeat the RDD with the exclusion of a small, symmetric bin of € 10 Mio. directly located around the CbCR threshold. The results are depicted in Table 10 and Fig. 4. The coefficients are now closer to our initial DiD estimates, as the decrease in sensitive geographic disclosure is less pronounced. Also, the decrease in qualitative geographic information is consistently negative for both bandwidth specifications, and similar in magnitude to the results in Table 6.

The main estimation results of the RDD specification for periods before the introduction of CbCR are provided in Table 11 and Fig. 5. When comparing our RDD estimates before and after the introduction of CbCR, we find a negative change in the discontinuity at the threshold, further strengthening the robustness of our results. This holds also true for the RDD analysis when comparing the results without observations inside the bin of \notin 10 Mio. after the introduction of CbCR (Table 10) with the results in the pre-CbCR period, as shown in Table 12 and Fig. 6.

5 Conclusion

This study exploits the introduction of CbCR as an exogenous shock to the disclosure environment for geographic reporting of affected firms to examine the effect of private (mandatory) disclosure requirements on (voluntary) public disclosure choices. In our analysis, we find that firms affected by CbCR significantly decreased their public disclosure of sensitive and qualitative geographic information. In contrast, the provision of insensitive geographic information does not seem to be affected, which could be due to the already extensive reporting requirements under IFRS. We further document that the decrease in public disclosure of geographic information following the introduction of CbCR is particularly pronounced for more internationally exposed firms and those located in countries with higher levels of tax enforcement. Our results thus imply that mandatory private disclosure and voluntary public disclosure are not necessarily complements for the firm, but can also be substitutes, at least in the context of geographic information disclosure.

Our empirical setting provides two major advantages. First, the reports required by CbCR are not (yet) published. Therefore, we can link any corporate disclosure responses directly to expected changes in the interaction with fiscal authorities. Second, the content of the reports is standardized such that all firms subject to the transparency regulation must report the same information, making the reform comparable across countries.

	(1)	(2)	(3)	(4)	(5)	(9)
Variables	Insensitive geog	raphic information	Sensitive geogra	phic information	Qualitative geog	graphic information
Above CbCR Threshold	0.299	0.112	-0.250*	-0.211*	0.278	-0.290
	(0.737)	(0.403)	(-1.754)	(-1.710)	(0.492)	(-0.772)
Difference to CbCR	-0.007	0.001	-0.001	-0.001	-0.004	0.003
Threshold	(-1.079)	(0.341)	(-0.528)	(-0.782)	(-0.542)	(1.131)
Above CbCR Threshold X	0.010	-0.001	0.008*	0.004*	-0.005	-0.004
Difference to CbCR Thresh- old	(1.096)	(-0.175)	(1.932)	(1.963)	(-0.456)	(-0.850)
Constant	2.845***	3.128 * * *	0.534^{***}	0.589***	3.431***	3.703 * * *
	(10.508)	(14.736)	(4.733)	(6.221)	(9.243)	(13.398)
Observations	579	1200	579	1200	579	1200
Bandwidth (in EUR Mio.)	150	300	150	300	150	300

***, **, and * denote significance at the one-, five-, and ten-percent level for two-sided tests of significance robust t-statistics



Fig. 3 RDD Results. Notes: this figure visualizes the results of the regression discontinuity design for the three geographic disclosure outcomes depicted in Table 9. It includes firm-year observations in the period after the introduction of CbCR within a bandwidth of € 150 Mio. (left panel) and € 300 Mio. (right panel) around the CbCR threshold. In each subfigure, the horizontal axis provides the distance to the CbCR threshold. The colored dots represent binned average values of the respective geographic disclosure below (blue) and above (red) the CbCR threshold. The effect of CbCR on geographic disclosure can be visually identified as the local difference in the linear trend above (orange line) and below (green line) the CbCR threshold (vertical red dashed line)

We also acknowledge the existence of several caveats to our analysis. Foremost, a simultaneous shock to actual geographic operations due to geopolitical tensions, such as for instance a trade war, might affect (larger) firms in our treatment group differently than (smaller) firms in our control group. This could be due a higher exposure of larger firms to international markets. In consequence, these firms might reduce their actual geographic activities stronger than smaller firms, implying a decrease in disclosed geographic segments that is not due to discretionary disclosure choices. However, in such a case both sensitive and insensitive segment disclosure should decrease, which does not correspond to the results of our analysis.

The sample in our study is further limited to publicly listed firms due to data availability and comparability of the information environment. However, sufficiently large non-listed firms are also subject to CbCR. This raises the question for future research if their reaction is similar to listed firms' behavior. Their reaction might differ from the results found for our sample in two aspects: first, non-listed firms have less dispersed ownership, and hence face less public information demand from investors. Relatedly, non-listed firms lack a uniform minimum public reporting standard of geographic segment information. Taken together, these firms likely start

Table 10 RDD Results Withc	out Observations Clos	e to the Threshold				
	(1)	(2)	(3)	(4)	(5)	(9)
Variables	Insensitive geogra	aphic information	Sensitive geogr	aphic information	Qualitative geog	raphic information
Above CbCR Threshold	0.354	0.124	-0.190	-0.174	-0.578	-0.746^{**}
	(0.707)	(0.409)	(-1.065)	(-1.275)	(-1.052)	(-2.162)
Difference to CbCR	-0.006	0.001	-0.003	-0.001	0.001	0.005
Threshold	(-0.915)	(0.485)	(-0.951)	(-0.983)	(0.094)	(1.553)
Above CbCR Threshold X	0.008	-0.001	0.009 **	0.004*	0.001	-0.002
Difference to CbCR Thresh- old	(0.796)	(-0.349)	(2.058)	(1.900)	(0.114)	(-0.520)
Constant	2.854***	3.162^{***}	0.466^{***}	0.564***	3.693***	3.849 * * *
	(9.212)	(14.505)	(3.761)	(5.615)	(8.522)	(13.048)
Observations	541	1,162	541	1,162	541	1,162
Bandwidth (in EUR Mio.)	150	300	150	300	150	300
Notes: this table presents resu. CbCR threshold after the intro- that identify the treatment effer threshold in columns (1), (3) a around the CbCR threshold wit robust t-statistics *** ** and * denote sionifican	Its of estimating Eq. duction of CbCR. We at of CbCR. Changes and (5) . A larger band hin a \pounds 10 Mio. bin, i coe at the one- five-	2 using Ordinary Least e define all variables in to geographic informati lwidth of \mathfrak{E} 300 Mio. is .e. $\mathfrak{E5}$ Mio. below and i and ten-nercent level for	Squares for a subset of Table 1 and Sect. 3.1.2 on disclosure are estim used for columns (2), (above the threshold. Str above the threshold. Str	of firm-years with turnor 2. Row (1) depicts our co ated for firms inside a sy 4) and (6). In addition, indard errors are clustere infrance	ver values within a na oefficients of interest, i ymmetric \in 150 Mio. b we exclude turnover ol ed at the firm level. Val	row bandwidth around the e. the local discontinuities andwidth around the CbCR servations located directly les in parentheses represent
			D			

Schmalenbach Journal of Business Research (2024) 76:533-571



Fig. 4 RDD Results Without Observations Close to the Threshold. Notes: this figure visualizes the results of the regression discontinuity design for the three geographic reporting outcomes depicted in Table 10. It includes firm-year observations in the period after the introduction of CbCR within a bandwidth of €150 Mio. (left panel) and €300 Mio. (right panel) around the CbCR threshold. In each subfigure, the horizontal axis provides the distance to the CbCR threshold. The colored dots represent binned values of the respective geographic disclosure below (blue) and above (red) the CbCR threshold. Firms with turnover within a bin of €10 Mio. around the CbCR threshold are excluded. The effect of CbCR on geographic reporting can be visually identified as the local difference in the linear trend above (orange line) and below (green line) the CbCR threshold (vertical red dashed line)

from a lower level of geographic disclosure than their listed counterparts. Hence the improvement in the information environment due to the introduction of CbCR could dominate the fear of contradiction between private and public reporting. This might entail a muted negative or even positive public disclosure response. Second, majority owners of these firms may have strong preferences that their firm adheres to a specific policy of transparency. This could widen the dispersion of disclosure responses.

A last caveat relates to our choice of public disclosure of geographic information as a possible outcome affected by CbCR. Our results suggest that public disclosure of sensitive and qualitative geographic information faces substantial proprietary costs related to providing valuable information to competitors and/or bearing the consequences of public scrutiny. However, the public disclosure response could change when considering other disclosure dimensions with lower proprietary costs, such as the disclosure of effective tax rate forecasts. This would also reconcile our findings with converse results from other studies.¹⁸

¹⁸ Consider for instance Chi et al. (2023).

Table 11 RDD Results Before	e the Introduction of	CbCR				
	(1)	(2)	(3)	(4)	(5)	(9)
Variables	Insensitive geogr	aphic information	Sensitive geogra	aphic information	Qualitative geog	graphic information
Above CbCR Threshold	0.341	0.395	-0.077	-0.017	0.436	0.354
	(0.690)	(1.196)	(-0.417)	(-0.130)	(0.835)	(0.971)
Difference to CbCR	-0.000	-0.002	0.002	-0.000	-0.015*	-0.004
Threshold	(-0.074)	(-1.016)	(0.712)	(-0.056)	(-1.837)	(-1.452)
Above CbCR Threshold X	-0.002	0.002	-0.001	0.000	0.016	0.002
Difference to CbCR Thresh- old	(-0.174)	(0.533)	(-0.364)	(0.262)	(1.502)	(0.486)
Constant	3.200^{***}	3.145^{***}	0.700^{***}	0.660^{***}	3.138 * * *	3.407***
	(6.668)	(13.008)	(4.565)	(5.848)	(10.069)	(14.240)
Observations	577	1179	577	1179	577	1179
Bandwidth (in EUR Mio.)	150	300	150	300	150	300
Notes: this table presents resul CbCR threshold prior to the int that identify the treatment effec CbCR threshold in columns (1)	Its of estimating Eq. roduction of CbCR. ¹ et of CbCR. Local ch), (3) and (5). A large	2 using Ordinary Least We define all variables in anges to geographic inft ar bandwidth of \in 300M	Squares for a subset of Table 1 and Sect. 3.1. or Table 1 and Sect. 3.1. Dramation disclosure are fio. is used for column	of firm-years with turno 2.2. Row (1) depicts our e e estimated for firms ins s (2), (4) and (6). Stand	ver values within a na coefficients of interest, ide a symmetric $\in 150$ ard errors are clustered	rrow bandwidth around the i.e. the local discontinuities Mio. bandwidth around the at the firm level. Values in

***, **, and * denote significance at the one-, five-, and ten-percent level for two-sided tests of significance parentheses represent robust t-statistics



Fig. 5 RDD Results Before the Introduction of CbCR. Notes: this figure visualizes the results of the regression discontinuity design for the three geographic disclosure outcomes depicted in Table 11. It includes firm-year observations in the period after the introduction of CbCR within a bandwidth of € 150 Mio. (left panel) and € 300 Mio. (right panel) around the CbCR threshold. In each subfigure, the horizontal axis provides the distance to the CbCR threshold. The colored dots represent binned values of the respective geographic disclosure below (blue) and above (red) the CbCR threshold. The effect of CbCR on geographic disclosure can be visually identified as the local difference in the linear trend above (orange line) and below (green line) the CbCR threshold (vertical red dashed line)

For large firms active in the European Union, public CbCR will become mandatory for financial years starting after 21 June 2024. Given the implicitly documented importance of proprietary costs for the firms' disclosure choices in our setting, policy makers should watch carefully whether there are any signs that firms subject to the new regulation are put at a disadvantage relative to competitors not subject to the regulation. If that is the case, a revised regulation should include targeted carve-out rules, which apply for sub-items that are published with a sufficient delay. After such a period, the relevant information may not be valuable to competitors anymore and would become public. A generous form of such a carve-out rule is part of the current European directive on public CbCR, which provides a period of up to five years during which disclosure of commercially sensitive information may be deferred.¹⁹ Another more restrictive alternative would be a fee schedule according to which firms pay increasing contributions for longer delays in item publication. In such a scenario, firms for which proprietary costs play a significant role would pay

¹⁹ This deferral is conditional on the information not pertaining to tax haven operations (Directive 2021/2101/EU).

Table 12 RDD Results Before	e the Introduction of	CbCR Without Observa	tions Close to the Thre	shold		
	(1)	(2)	(3)	(4)	(5)	(9)
Variables	Insensitive geogr	aphic information	Sensitive geogr	aphic information	Qualitative geo	graphic information
Above CbCR Threshold	0.235	0.361	-0.045	0.008	0.852	0.540
	(0.399)	(1.034)	(-0.218)	(0.059)	(1.371)	(1.384)
Difference to CbCR	0.003	-0.002	0.002	-0.000	-0.014	-0.004
Threshold	(0.379)	(-0.656)	(0.666)	(-0.126)	(-1.613)	(-1.224)
Above CbCR Threshold X	-0.007	0.001	-0.002	0.000	0.008	-0.001
Difference to CbCR Thresh- old	(-0.552)	(0.250)	(-0.469)	(0.203)	(0.634)	(-0.132)
Constant	3.378***	3.214***	0.695***	0.652^{***}	3.145^{***}	3.453***
	(7.910)	(11.743)	(4.594)	(5.873)	(8.642)	(13.354)
Observations	534	1136	534	1136	534	1136
Bandwidth (in EUR Mio.)	150	300	150	300	150	300
Notes: this table presents resul CbCR threshold prior to the int that identify the treatment effec threshold in columns (1), (3) an around the CbCR threshold with robust r-staristics	ts of estimating Eq. roduction of CbCR. et of CbCR. Changes and (5). A larger banc hin a € 10 Mio. bin,	2 using Ordinary Least We define all variables i to geographic informati lwidth of \mathfrak{E} 300 Mio. is i.e. $\mathfrak{E}5$ Mio. below and a	Squares for a subset in Table 1 and Sect. 3.1 on disclosure are estimused for columns (2), above the threshold. St	of firm-years with turno .2. Row (1) depicts our c lated for firms inside a s; (4) and (6). In addition, andard errors are cluster	ver values within a na coefficients of interest, ymmetric € 150 Mio. I we exclude turnover of we at the firm level. Va	arrow bandwidth around the i.e. the local discontinuities bandwidth around the CbCR observations located directly lues in parentheses represent
*** ** and * denote significan	ice at the one- five-	and ten-nercent level for	r two-sided tests of sig	nificance		

Schmalenbach Journal of Business Research (2024) 76:533-571

567



Fig. 6 RDD Results Before the Introduction of CbCR Without Observations Close to the Threshold. Notes: this figure visualizes the results of the regression discontinuity design for the three geographic disclosure outcomes depicted in Table 12. It includes firm-year observations in the period after the introduction of CbCR within a bandwidth of €150Mio. (left panel) and €300Mio. (right panel) around the CbCR threshold. In each subfigure, the horizontal axis provides the distance to the CbCR threshold. The colored dots represent binned values of the respective geographic disclosure below (blue) and above (red) the CbCR threshold. Firms with turnover within a bin of €10 Mio. around the CbCR threshold are excluded. The effect of CbCR on geographic disclosure can be visually identified as the local difference in the linear trend above (orange line) and below (green line) the CbCR threshold (vertical red dashed line)

a fee to compensate for opaqueness. An unintended consequence of such a policy design could be, however, that affected firms move their corporate headquarters to locations with suitable carve-out rules or a more lenient regulation enforcement. Such reactions of multinational corporations with relevant proprietary costs could be akin to those documented in the literature on corporate tax avoidance, particularly in the context of corporate inversions (Desai and Hines 2002; Voget 2011).

6 Appendix

6.1 Download of Annual Reports from Filings Expert

We begin by identifying documents classified as English language annual reports by the data provider for all countries (except for the US)²⁰, which leaves us with roughly 300,000 documents and 46,000 unique firms. Since the companies do not

²⁰ In the US, the Form 10-K are highly standardized. Therefore, reports are frequently used in the accounting literature (Li 2010; Loughran and McDonald 2011). However, we also want to focus on less regulated,

have a common identifier (i.e., ISIN, etc.), we create a list of all companies for which we observe annual reports. In the next step, we match that list based on firm name and country of incorporation with the firms from BvD's Orbis database, which provides us with firm financials and information about the structure of the corporate group including subsidiaries. For the matched firms, we retrieve the annual reports automatically to construct our sample of text corpora. The file format for the documents is standard PDF which must be converted to machine-readable text format. Before the text files can be used for textual analysis, extraneous attributes as well as other artifacts (i.e., graphs and tables, etc.), must be excluded because they are difficult to analyze and likely to add noise to the analysis (Loughran and McDonald 2016). Subsequently, the remaining text elements are parsed into sentences. Manual inspection reveals that some documents classified as annual reports are fourthquarter interim reports or annual results containing only basic financial statement information. We thus require each document to mention the bigram "annual report" on the first two pages to ensure that the remaining documents are indeed annual reports with a rich set of narrative disclosures. We verified for a representative subset of firms that the resulting documents coincide with the relevant annual reports published on their website. Hence, whenever a firm provides an integrated report with additional information on their website, the complete document is used in our data.

Acknowledgements We are grateful to the guest editor, Thorsten Sellhorn, and two anonymous referees for very valuable comments and suggestions. We thank Jeff Hoopes, seminar participants at the University of Mannheim and participants at the TRR 266 Annual Conference 2019, the DIBT Workshop on Mandatory Disclosure Rules 2021 at the WU University of Vienna and the Joint Workshop on Business Taxation 2020 at the University of Brescia for helpful feedback and suggestions on earlier versions of this paper. We thank Moritz Pilarski for outstanding research assistance.

Funding We gratefully acknowledge funding from the Leibniz Science Campus MannheimTaxation, from the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation)—Project-ID 403041268—TRR 266, and from the Graduate School of Economic and Social Sciences of the University of Mannheim.

Conflict of interest R. Müller, J. Voget and J. Zental declare that they have no competing interests.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4. 0/.

References

Akamah, H., O.-K. Hope, and W.B. Thomas. 2018. Tax havens and disclosure aggregation. Journal of International Business Studies 49(1):49–69.

glossy annual reports published by non-US firms. Moreover, the database only has a limited coverage of Form 10-Ks. Therefore, we download these reports directly from EDGAR.

- Angrist, J., and J.-S. Pischke. 2014. Mastering 'metrics: the path from cause to effect. Princeton University Press. https://EconPapers.repec.org/RePEc:pup:pbooks:10363.
- Bennedsen, M., and S. Zeume. 2018. Corporate tax havens and transparency. *Review of Financial Studies* 31(4):1221–1264.
- Bilicka, K.A., E. Casi, C. Seregni, and B. Stage. 2022. Tax strategy disclosure: a greenwashing mandate. ZEW discussion paper no. 21–047. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3871654.
- Bischof, J., and H. Daske. 2013. Mandatory disclosure, voluntary disclosure, and stock market liquidity: evidence from the EU bank stress tests. *Journal of Accounting Research* 51(5):997–1029. https://doi. org/10.1111/1475-679X.12029.
- Bozanic, Z., J.L. Hoopes, J.R. Thornock, and B.M. Williams. 2017. IRS attention. Journal of Accounting Research 55(1):79–114. https://doi.org/10.1111/1475-679X.12154.
- Brown, J., B.N. Jorgensen, and P.F. Pope. 2019. The interplay between mandatory country-by-country reporting, geographic segment reporting, and tax havens: Evidence from the European Union. *Journal* of Accounting and Public Policy 38(2):106–129. https://doi.org/10.1016/j.jaccpubpol.2019.02.001.
- Chi, S., J. Huang, J. Jiang, and A. Persson. 2023. When mandatory private disclosure meets voluntary public disclosure: the effect of private country-by-country reporting on management effective tax rate forecasts (SSRN working papers). https://doi.org/10.2139/Ssrn.3694598.
- Clausing, K.A. 2016. The effect of profit shifting on the corporate tax base in the United States and beyond. *National Tax Journal* 69(4):905–934. https://doi.org/10.17310/ntj.2016.4.09.
- Coppola, A., M. Maggiori, B. Neiman, and J. Schreger. 2021. Redrawing the map of global capital flows: the role of cross-border financing and tax havens. *The Quarterly Journal of Economics* 136(3):1499–1556. https://doi.org/10.1093/qje/qjab014.
- Correia, S. 2015. Singletons, cluster-robust standard errors and fixed effects: a bad mix. Duke University working paper.
- 2021. Council Directive (EU) 2021/2101 of the European Parliament and of the Council of 24 November 2021 amending directive 2013/34/EU as regards disclosure of income tax information by certain undertakings and branches (text with EEA relevance). http://data.europa.eu/eli/dir/2021/2101/oj/eng. CONSIL, EP, 429 OJ L.
- De Simone, L., and M. Olbert. 2022. Real effects of private country-by-country disclosure. *The Accounting Review* 97(6):201–232. https://doi.org/10.2308/TAR-2020-0714.
- Deng, Z., F.B. Gaertner, D.P. Lynch, and L.B. Steele. 2021. Proprietary costs and the reporting of segmentlevel tax expense. *Journal of the American Taxation Association* 43(1):1–26. https://doi.org/10.2308/ JATA-19-002.
- Desai, M.A., and D. Dharmapala. 2006. Corporate tax avoidance and high-powered incentives. Journal of Financial Economics 79(1):145–179.
- Desai, M.A., A. Dyck, and L. Zingales. 2007. Theft and taxes. Journal of Financial Economics 84(3):591–623.
- Desai, M.A., and James R. Hines. 2002. Expectations and expatriations: tracing the causes and consequences of corporate inversions. *National Tax Journal* 55(3):409–440. https://doi.org/10.17310/ntj. 2002.3.03.
- Dowd, C. 2021. Donuts and Distant LATEs: derivative bounds for RD extrapolation. SSRN working paper. https://doi.org/10.2139/ssrn.3641913.
- Dutt, V.K., C.A. Ludwig, K. Nicolay, H. Vay, and J. Voget. 2019. Increasing tax transparency: Investor reactions to the country-by-country reporting requirement for EU financial institutions. *International Tax and Public Finance* 26(6):1259–1290. https://doi.org/10.1007/s10797-019-09575-4.
- Dyreng, S.D., J.L. Hoopes, P. Langetieg, and J.H. Wilde. 2020. Strategic subsidiary disclosure. Journal of Accounting Research 58(3):643–692. https://doi.org/10.1111/1475-679X.12308.
- Dyreng, S.D., and E.L. Maydew. 2018. Virtual issue on tax research. Journal of Accounting Research 56(2):311–311. https://doi.org/10.1111/1475-679X.12213.
- Ehinger, A.C., J.A. Lee, B. Stomberg, and E. Towery. 2024. IRS enforcement and voluntary tax disclosure. Journal of the American Taxation Association https://doi.org/10.2308/JATA-2022-009.
- Einhorn, E. 2005. The nature of the interaction between mandatory and voluntary disclosures. Journal of Accounting Research 43(4):593–621. https://doi.org/10.1111/j.1475-679X.2005.00183.x.
- Fuest, C., A. Peichl, and S. Siegloch. 2018. Do higher corporate taxes reduce wages? Micro evidence from Germany. American Economic Review 108(2):393–418. https://doi.org/10.1257/aer.20130570.
- Hanlon, M., and S. Heitzman. 2010. A review of tax research. Journal of Accounting and Economics 50(2–3):127–178.
- Hanlon, M., J. Hoopes, and N. Shroff. 2014. The effect of tax authority monitoring and enforcement on financial reporting quality. *The Journal of the American Taxation Association* 36(2):137–170.

- Healy, P.M., and K.G. Palepu. 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics* 31(1):405–440. https://doi.org/10.1016/S0165-4101(01)00018-0.
- Hope, O.-K., M.S. Ma, and W.B. Thomas. 2013. Tax avoidance and geographic earnings disclosure. *Journal of Accounting and Economics* 56(2):170–189.
- Johannesen, N., and D.T. Larsen. 2016. The power of financial transparency: An event study of countryby-country reporting standards. *Economics Letters* 145(C):120–122.
- Joshi, P. 2020. Does private country-by-country reporting deter tax avoidance and income shifting? Evidence from BEPS action item 13. *Journal of Accounting Research* 58(2):333–381. https://doi.org/10. 1111/1475-679X.12304.
- Joshi, P., E. Outslay, and A. Persson. 2020. Does public country-by-country reporting deter tax avoidance and income shifting? Evidence from the European banking industry. *Contemporary Accounting Research* 37(4):2357–2397. https://doi.org/10.1111/1911-3846.12601.
- Kays, A. 2022. Voluntary disclosure responses to mandated disclosure: evidence from Australian corporate tax transparency. *The Accounting Review* 97(4):317–344. https://doi.org/10.2308/TAR-2018-0262.
- Lang, M., and L. Stice-Lawrence. 2015. Textual analysis and international financial reporting: Large sample evidence. *Journal of Accounting and Economics* 60(2):110–135.
- Law, K.K.F., and L.F. Mills. 2022. Taxes and haven activities: evidence from linguistic cues. *The Account-ing Review* 97(5):349–375. https://doi.org/10.2308/TAR-2020-0163.
- Leung, E., and A. Verriest. 2019. Does location matter for disclosure? Evidence from geographic segments. Journal of Business Finance & Accounting 46(5):541–568.
- Lewis, C., and S. Young. 2019. Fad or future? Automated analysis of financial text and its implications for corporate reporting. Accounting and Business Research 49(5):587–615. https://doi.org/10.1080/ 00014788.2019.1611730.
- Li, F. 2010. The information content of forward-looking statements in corporate filings—A naive Bayesian machine learning approach. *Journal of Accounting Research* 48(5):1049–1102.
- Loughran, T., and B. McDonald. 2011. When is a liability not a liability? Textual analysis, dictionaries, and 10-Ks. Journal of Finance 66(1):35–65.
- Loughran, T., and B. McDonald. 2016. Textual analysis in accounting and finance: a survey. Journal of Accounting Research 54(4):1187–1230. https://doi.org/10.1111/1475-679x.12123.
- Müller, R., C. Spengel, and H. Vay. 2020. On the determinants and effects of corporate tax transparency: review of an emerging literature (ZEW Centre for European Economic Research discussion paper no. 20-063, november 2020). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3736747.
- Müller, R., C. Spengel, and S. Weck. 2024. How do investors value the publication of tax information? Evidence from the European public country-by-country reporting. *Contemporary Accounting Research*, 41(3):1893–1924. https://doi.org/10.1111/1911-3846.12965
- OECD. 2015. Transfer pricing documentation and country-by-country reporting, action 13-2015 final report. https://doi.org/10.1787/9789264241480-en.
- Samuels, D. 2021. Government procurement and changes in firm transparency. *The Accounting Review* 96(1):401–430. https://doi.org/10.2308/tar-2018-0343.
- Schmidheiny, K., and S. Siegloch. 2023. On event studies and distributed-lags in two-way fixed effects models: Identification, equivalence, and generalization. *Journal of Applied Econometrics*, 38(5):695–713. https://doi.org/10.1002/jae.2971
- Shroff, N. 2017. Corporate investment and changes in GAAP. *Review of Accounting Studies* 22(1):1–63. https://doi.org/10.1007/s11142-016-9375-x.
- Spengel, C. 2018. Country-by-country reporting and the international allocation of taxing rights: comments to Michelle Hanlon. *Bulletin for International Taxation* 72(4/5):218–219.
- Tørsløv, T., and L. Wier. 2023. The missing profits of nations. *The Review of Economic Studies* 90(3):1499–1534. https://doi.org/10.1093/restud/rdac049.
- Towery, E.M. 2017. Unintended consequences of linking tax return disclosures to financial reporting for income taxes: evidence from schedule UTP. *The Accounting Review* 92(5):201–226. https://doi.org/ 10.2308/accr-51660.
- Verrecchia, R.E. 1990. Information quality and discretionary disclosure. Journal of Accounting and Economics 12(4):365–380. https://doi.org/10.1016/0165-4101.
- Voget, J. 2011. Relocation of headquarters and international taxation. *Journal of Public Economics* 95(9):1067–1081. https://doi.org/10.1016/j.jpubeco.2010.11.019.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.