Financial Transparency to the Rescue:
Effects of Country-by-Country Reporting in the
EU Banking Sector on Tax Avoidance

Michael Overesch*
University of Cologne

Hubertus Wolff**
University of Cologne

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Abstract:

We analyze the effect of enforced financial transparency on corporate tax avoidance. Since 2014 an EU directive obliged multinational banks to publish key financial and tax data in the form of Country-by-Country Reporting. We use this as an exogenous shock to disclosure duties and analyze the development of tax expenses of European multinational banks around the reform. We find that European multinational banks increased their tax expenses relative to unaffected other banks after Country-by-Country Reporting became mandatory. Moreover, we find a pronounced response of those banks that were particularly exposed to the new transparency due to significant activities in tax havens. Additional comparisons using several control groups from the financial sector and other industries confirm our main finding. Our results suggest that Country-by-Country-Reporting can be an additional instrument for policy makers to curb corporate tax avoidance.

JEL Classification: F23, G18, G21, H26

Keywords: Tax Transparency, Country-by-Country-Reporting, Banks, Tax Avoidance, Profit-Shifting

*   Albertus-Magnus-Platz, 50923 Cologne, Germany, overesch@wiso.uni-koeln.de, +49 (0)221 470-4451.

**   Albertus-Magnus-Platz, 50923 Cologne, Germany, wolff@wiso.uni-koeln.de, +49 (0)221 470-3201

1.   Introduction

Over the past decades policy makers have been trying to curb tax avoidance of multinational enterprises (MNEs). Recently, the OECD base erosion and profit shifting (BEPS) project has presented additional proposals for novel anti-tax avoidance regulation (OECD, 2015a). Traditional anti-avoidance rules have in common that certain transactions or structures are subject to additional taxes or fines. Direct monetary consequences should prevent firms from using certain tax avoidance structures. However, the success of regulations like controlled foreign company rules, thin-capitalization rules or detailed transfer pricing duties is at least contestable because firms can response by using alternative tax planning structures that are not subject to the specific legislation. Therefore, tax transparency is discussed as an alternative policy instrument. Corporate tax transparency rules require the disclosure of key financial data and factual tax expenses and are intended to indirectly curb tax aggressiveness by exerting pressure on CEOs and CFOs of MNEs.

So far, most tax transparency initiatives are only proposals and have not yet been enacted. Consequently, the effectiveness of tax transparency instruments is largely unexplored. However, from the reporting period of 2014 onwards a European directive obliged financial institutions headquartered in the European Economic Area (EEA)[1] to publicly disclose key financial and tax information on a country-by-country level. This mandatory introduction of a Country-by-Country Reporting (CbCR) for European banks represents a so far rare opportunity to evaluate transparency as an anti-tax avoidance instrument. We use the implementation of CbCR as an exogenous shock to disclosure requirements and investigate a potential effect on worldwide tax expenses of MNEs.[2] We compare tax expenses of European multinational banks with tax expenses of other banks and comparable firms that were unaffected by the new CbCR-legislation. Our results suggest a

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[1] The EEA comprises all 28 member states of the European Union (EU) and Norway, Liechtenstein and Iceland.
[2] Art. 89 of CRD IV, which contains CbCR, was a last-minute amendment to the directive and thus is unlikely to have been anticipated by the affected companies (E&Y, 2014).

significant influence of CbCR on the worldwide tax expenses, and thus on corporate tax avoidance behavior.

The new European CbCR regulation is part of the EU Capital Requirement Directive IV (CRD IV) and was one of the first international policy actions involving a CbCR for MNEs at that time.[3] The implementation of CbCR for multinational banks in Europe stimulated the ongoing debate about tax avoidance tremendously as key figures such as effective tax payments per country had been under the guise of fiscal secrecy thus far. This newly available information currently garnered focus in the media. Headlines of large European newspapers have addressed these issues, for example, "*French banks rely heavily on tax havens*"[4] or "*Barclays in Luxembourg: £593m profits, £4m tax, report reveals*"[5]. Hence, the introduction of CbCR induced a new era in terms of financial transparency to the affected banking institutions (Oxfam France, 2014; Tax Justice Network, 2014).

The European Commission argues that enhanced transparency is essential in order to regain the trust of citizens into the financial sector after the financial crisis (European Commission, 2013a). However, one crucial question on the reasoning behind CbCR is whether it is solely intended to satisfy the curiosity of citizens or additionally has a real impact on future activities of the affected firms through surging pressure from the newly given insights. In fact, the disclosure of sensible information via CRD IV is expected to impact banks' tax avoidance if banks anticipate public scrutiny. First, reputational damages may occur if customers believe that a bank does not pay its fair share of taxes in important markets or is engaged in significant activities in tax havens.

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[3] The European Commission imposed new disclosure rules for extractive industries in a separate EU directive in 2013. To our knowledge, this has been the only other supranational legislation at the time, which obliges firms to fulfill CbCR duties.

[4] CNBC (16/05/2016), available at http://www.cnbc.com/2016/03/16/report-french-banks-rely-heavily-on-tax-havens.html.

[5] The Guardian (30/03/2015), available at https://www.theguardian.com/business/2015/mar/03/barclays-luxembourg-profits-tax-report.

A survey among tax executives of U.S. firms suggests that managers are concerned with the reputational effects associated with corporate tax planning (Graham, Hanlon, Shevlin and Shroff, 2014). Hoopes, Robinson and Slemrod (2018) support this view as they detect reactions in tax payments, consumer sentiment and stock prices after information from company income tax returns was made publicly accessible in Australia. Second, the revealing of sensible information as generated profits and paid taxes per jurisdiction may provide tax auditors with additional information for a more effective prosecution of international profit shifting. Several studies show that banks engage in international profit shifting and other strategies with the purpose of saving taxes (Huizinga, Voget and Wagner, 2012; Merz and Overesch, 2016; Bouvatier, Capelle-Blancard and Delatte, 2017). Third, banks might fear future regulatory actions from governments as a response to the depicted extent of disproportionate profit allocation between high and low tax jurisdictions. Given all this, the expectation of public scrutiny should incentivize bank managers to re-allocate profits to the presumable high-tax countries of origin after CbCR became mandatory. The ten largest banks (Globally Systematically Important Institutions, G-SIBs)[6] with headquarters in the EEA provide first indications for our theory when observed at the three-year-window around the reform: Annual total tax payments of those banks, expressed as percentage of annual profits, increased on average from 28.3 to 31.2 percent over the implementation of CRD IV. The expectation of such a behavioral response of managers goes in line with related work on CbCR of European resource-extracting companies. Rauter (2017) documents real effects on various government payments of European resource extracting firms to hosting governments after CbCR became mandatory.[7]

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[6]G-SIBs are large and strongly systematic interconnected financial institutions whose distress or failure would cause significant disruption to the global financial system. In total, there are twelve EU banks among the 30 G-SIBs in 2017 (Financial Stability Board, 2017), out of which ten are available in our sample.
[7] CbCR in extractive industries was among others motivated by the opaqueness of negotiated contracts between corporations and local governments. However, CbCR in the banking sector exclusively serves tax transparency.

Nevertheless, the benefit of additional information to assess international tax avoidance is arguable. In particular, MNEs are already obliged to disclose information about their tax position in their financial accounts. CbCR provides only new information about the geographical distribution of activities and tax payments but does not disclose detailed information about tax planning techniques. Therefore, conclusions on certain types of tax planning or even aggressive tax avoidance might be difficult. In certain cases, the CbCR could simply confirm that a bank does pay significant taxes in each country. Moreover, the previous literature finds only ambiguous evidence for the magnitude of reputational costs if firms were involved in tax shelters as a particular aggressive form of tax avoidance (Hanlon and Slemrod, 2009; Gallemore, Maydew and Thornock, 2014). Regarding the introduction of mandatory CbCR, findings for the effect on firm values are also mixed. While Johannesen and Larsen (2016) find decreases in firm values after the announcement of European CbCR obligations for extractive industries, an event-study by Dutt, Ludwig, Nikolay, Vay and Voget (2018) for the announcement of CRD IV detects no substantial capital market reaction.

Our focus is on the behavioral response of managers to increasing financial transparency associated with CbCR-obligations. In particular, we evaluate the effect of one of the pioneering CbCR-legislations on corporate tax avoidance of MNEs. We exploit financial data from the consolidated accounts of European headquartered banking groups (and other control groups) through the *Compustat Global* database. Moreover, we retrieve information on international activity of our banks from the *Bankscope* subsidiary database. As dependent variable we deploy effective tax rates (ETRs) as a measure of worldwide tax expenses divided by worldwide pre-tax income of a MNE. ETRs are a well-established measure of worldwide tax payments of a firm. A lower ETR indicates reduced corporate tax payments. Thus, we expect higher ETRs of European

banks, which are obliged to disclose a CbCR compared to non-affected banks or firms. We thereby provide an estimate of the surge in overall tax expenses of an MNE due to CbCR.

We start by comparing the ETRs of international European banks and European domestic banks to determine the impact of CbCR-obligations, which were exclusively established for multinational banks from the 2014 reporting period onwards. Subsequently we differentiate between banks by activity in European tax havens. This way we measure the impact of CbCR on presumably more exposed banks (to the new regulation) in comparison to their multinational peers without reprehensible activities in tax havens.

Our results suggest that European-headquartered multinational banks increased their effective tax levels significantly relative to their domestic peers after CbCR entered into force. We find that banks with activities in tax havens are driving this effect due to their particular exposure to financial transparency. The ETR of those exposed banks increases by 3.7 percentage points relative to other banks without presence in European tax havens. Moreover, comparisons with other control groups are undertaken in order to eliminate trends in tax avoidance either in the financial sector or commonly for multinational enterprises. Additional analyses reveal that neither U.S. multinational banks nor financial sector firms nor manufacturing firms – all unaffected by the CbCR regulations - did exhibit a likewise effect. Our findings support the view that enforced transparency via CbCR curbed tax avoidance of European multinational banks.

We contribute to prior literature, which suggests that disclosure of additional information about the international firm structure influences the scope of international tax avoidance. Hope, Ma and Thomas (2013) find significantly lower ETRs for firms that abstain from the disclosure of geographic earnings in their financial reports after the adoption of the Statement of Financial Accounting Standards No. 131 in 1998. Dyreng, Hoopes and Wilde (2016) analyzed public pressure on MNEs in the United Kingdom (UK) to carefully report a complete list of all foreign

subsidiaries. The study reveals increasing ETRs for UK firms after they were required to reveal additional information. We add to this literature by analyzing the impact of the first comprehensive, supranational tax transparency initiative on tax avoidance behavior of MNEs. In particular, we investigate whether the exposed content of the newly demanded CbCR is powerful enough to reduce incentives for aggressive tax planning.

Our results have clear policy implications. So far, most MNEs are not obliged to disclose a CbCR. The OECD decided only to enhance tax transparency towards the tax authorities instead of the general public (OECD, 2015b). However, supporters clamor for a publicly disclosed CbCR in Europe and the U.S. (Tax Justice Network, 2014; U.S. Congress Members, 2017) or for public disclosure of tax returns (Lenter, Shackelford and Slemrod, 2003; Hoops, Robinson and Slemrod, 2018). Currently, European international banks are among the few firms that have to provide tax information through public CbCR. Our results suggest that publicly available CbCR is associated with less tax avoidance in the European financial sector. Accordingly, our results confirm a relationship between public available information on international firm structures and the scope of international tax avoidance. Consequently, our results support the view that tax transparency can be an effective instrument to limit tax avoidance of MNEs.

The remainder of this paper is structured as follows: Section 2 provides institutional details on CbCR requirements and develops hypotheses. Section 3 describes the data and the applied research design. Section 4 contains the results of our analysis. We show the robustness of our results and rule out other regulatory influences in Section 5. We conclude in section 6.

2. Institutional Background and Hypotheses Development

2.1. Country-by-Country-Reporting Duties within CRD IV

The Basel III regulatory framework imposes guidance on capital adequacy, market liquidity risk and stress testing of worldwide banks. Furthermore, this framework has been devoted to address the deficiencies in financial regulations that were revealed during the financial crisis of 2007/ 08 by fortifying the capital requirements of banks (Basel Committee for Banking Supervision, 2010; Cohen and Statigna, 2015). The European Commission nevertheless expanded the scope of the Basel III agreement on prudential requirements for credit institutions and investment firms with its capital requirements regulation.[8] The legislative package compromises Directive 2013/36/EU (CRD IV) and Regulation (EU) No. 575/2013. In CRD IV, the European Commission included specific rules for corporate governance and remuneration policy linked to risk management and, most important to our purpose, an enhanced transparency initiative regarding the international activities of banks and investment funds via mandatory CbCR. Financial institutions are now required to publish key financial and tax information about the geographical distribution of their business activities and tax payments.

All EEA countries were required to transpose CbCR into domestic law, and most member states effectively implemented the directive in the first half of 2014 at the latest (PWC, 2014). National laws then required financial institutions to publish profits and effective tax payments per tax jurisdiction for the 2014 financial year (European Commission, 2013a; HM Treasury, 2013; E&Y, 2014)[9]. This implies that the public is able to perform meaningful cross-country comparisons of key performance indicators using annual reports referring to the period of 2014. Consequently,

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[8] The Capital Requirements Regulation (CRR) accompanies CRD IV (European Commission, 2013b).
[9] CRD IV introduced a tentative version of CbCR excluding profit and tax figures, which was supposed to pave the way for the upcoming complete transparency initiative in 2014. Those reports referred to the elapsed 2013 fiscal year and did not include information regarding profit and tax payments.

bank managers have to consider the additional transparency of CbCR for their tax planning since 2014. However, banks certainly were urged to adjust their tax structures quickly due to the short time frame between the publication of CRD IV legislation and its transposition into national law.

According to Art. 89 of CRD IV, multinational European banks must publish the following information, per country:

a) The name, activities and geographical location of any subsidiary and branch

b) Turnover

c) Average number of employees

d) Profit or loss before tax

e) Corporate taxes paid

f) Public subsidies received

Institutions of scope are defined as entities authorized to act as a credit institution or an investment firm. Specifically, European headquartered groups with at least one foreign subsidiary must disclose CbCR-Information on the highest group level. We will refer to all these institutions as multinational banks. Banks without foreign subsidiaries, which we refer to as domestic banks, are not required to publish CbCR. European headquartered financial service providers without credit lending activities, as e.g. insurances, do not have to fulfill any CbCR duties. International banks that are headquartered outside Europe must disclose it solely for their subsidiaries located within Europe. This means, that U.S. multinational banks must only provide a very fragmentary CbCR that covers solely their subsidiaries in the EEA.

European G-SIBs, the largest and hence most relevant banks, have already been required to submit profit and tax figures confidentially to the European Commission for the 2013 fiscal years as a special feature of Art. 89 CRD IV. The special status of G-SIBs is discussed in depth in empirical specifications of the robustness section.

In particular, the information on profitability in combination with measures of the scope of real economic activities (turnover and number of employees) allows one to compute financial indicators by country such as operating profit margin ($\frac{d}{b}$) or profit per employee ($\frac{d}{c}$). Accordingly, this information can be used for simple cross country comparisons. Significant deviations from the mean might be perceived as an indication for profit shifting i.e., where profits might be artificially inflated and hence shifted from other locations. Moreover, intelligence regarding surprisingly low tax payments on a per-country basis can help to identify tax avoidance in certain host countries. This information does not only facilitate the work of tax auditors, it makes disproportionate tax patterns easy to grasp and to pass on by the media, as Oxfam France (2014) did in its special report on French banks: *"Abroad French banks make one third of their profits in tax havens while they only represent on fourth of their activity, one fifth of their tax and one sixth of their employees"*.

2.2.   Development of Hypotheses

The implementation of CbCR increases transparency regarding the geographical distribution of activities and tax payments. So far MNEs have been required to disclose information about their tax position in their financial accounts. This information already can be used to compute measures of effective tax expenses. However, the detailed information about the distribution of economic activities, profits and tax payments provided by a CbCR allows for the first time an assessment of intra-group profit shifting activities with the goal of saving taxes.

In fact, the additional information can be used to identify anomalies in profit margins as well as tax payments across host countries of an MNE. Moreover, international tax avoidance is associated with cross-border firm structures (Lewellen and Robinson, 2013). Therefore,

information about subsidiary information and particularly about activities in tax havens is often perceived as evidence for an aggressive tax avoidance strategy.

The disclosure of detailed information via CbCR might impact banks' tax avoidance behavior if managers and investors anticipate public scrutiny. Additional costs cause the link between rising fiscal transparency and tax avoidance: An engagement in tax avoidance strategies is not only associated with paying less taxes but also with costs and risks. Engagement in tax avoiding strategies or tax shelter schemes results in the risk of being detected or suffering a negative reputation for the firm and its top management. Accordingly, tax transparency may increase reputational costs, litigation costs and regulatory costs associated with tax avoidance.

First, reputational damages may occur if customers believe that a bank does not pay its fair share of taxes in all of its locations of presence and/ or is engaged in significant activities in tax havens. Reputational costs crucially depend on the information available for the assessment of a firm's tax strategy by shareholders, customers or the general public. If a firm uses aggressive tax avoidance strategies and fears reputational effects, the firm should benefit from less transparency due to the decreasing risk of being detected or suffering a negative reputation. Consequently, rising fiscal transparency due to a new CbCR should increase reputational costs (Hombach and Sellhorn, 2018). A survey among tax executives of U.S. firms confirms that manager are concerned about reputational costs associated with corporate tax avoidance (Graham et al., 2014). Managers should be less tax aggressive, if they perceive significant reputational costs associated with public disclosure regulations.

Second, the revealing of sensible information as generated profits and paid taxes per jurisdiction may increase litigation costs. Fiscal authorities have access to additional information on the worldwide distribution of profits and might intensify their investigations leading to additional tax litigations. Tax audits are often characterized by discussions about interpretation of

laws and administrative instructions between the taxpayer and tax-auditors. Transfer pricing disputes serve as important examples. Therefore, the bargaining position of a taxpayer in confrontations with tax authorities is likely to be deteriorated by the new CbCR.

Third, additional disclosure might be associated with future regulatory cost: The salience of disproportional profit and tax patterns of certain banks between high and low tax jurisdictions could trigger new laws and regulations by governments or standard setting institutions.

Due to its large geographical scope of application over all 31 member states of the EEA, the new CbCR regulation for European Banks is expected to be very powerful in exerting pressure trough the creation of financial transparency beyond borders. Consequently, firms might engage less in tax avoidance due to the public pressure they anticipate from information published by CbCR. Therefore, we will test the following hypotheses:

H1: Banks that have been affected by the implementation of CbCR-duties in 2014 should experience increasing effective tax levels relative to unaffected banks or firms.

From a conceptual perspective the intensity of the transparency shock introduced via CbCR depends on the intelligence, which a financial institution is forced to reveal. Tax savings from international tax planning crucially depend from tax rate differentials between host countries. Therefore, the existence of significant activities in tax-haven countries that impose only low or even zero taxes are associated with low ETRs (Dyreng and Lindsey 2009; Lisowsky, 2010; Markle and Shackelford, 2012a, 2012b). Therefore, information on subsidiary location, particularly on subsidiaries in tax haven countries, is often perceived as evidence for an aggressive form of tax avoidance strategy. Thus, it is reasonable to argue that enforced transparency has a particular impact if a bank is more exposed to reputational damage or litigation effects due to its revealed activities in tax havens. We test this supposition in the second hypothesis:

H2: Banks with activities in tax havens should be more exposed to financial transparency and consequently experience a stronger surge in effective tax levels after CbCR introduction.

3.   Data and Research Design

3.1.   Data and Sampling

To analyze the impact of CbCR-duties on corporate taxation we exploit consolidated financial information on banking groups from the *Compustat Global* database. In a first step we collect financial data on all available banks headquartered in EEA countries from the year 2010 to 2016. We identify 375 such banks within the *Compustat Global* database.

Table 1: Sample Selection

Description	Observations	
	European Banks	Firm-Years
Available in Database	375	1,952
Highest Consolidated Group Level	336	1,748
Non-Missing Control Variables	207	1,202

Second, we restrict our sample to banks that represent the highest hierarchy level within their group structure. Lastly, we remove all observations with missing financial control variables. We pursued a consistent elimination of outlier and non-plausible values at this stage of the sample selection. [10] We deleted all firm year observations with negative profits and erased the top and bottom one percentile of ETR values in the sample. Finally, there are 207 banks in our sample, providing in total 1,202 bank-year observations.

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[10] Italian-headquartered banks were removed from the sample due to apparently conceptual measurement errors in the Compustat Database. Despite a statutory tax rate of 27.5%, the average ETR of an Italian bank ranges above 50%. The implausibly high Italian ETRs in the Compustat database have been previously lamented by other scholars. See e.g. Kohlhase and Pierk (2016).

The third step of our data sampling is a match with information on the regional activities of banking groups. We gain this information from the *Bankscope* subsidiary database, which is intended to enlist all globally held stakes by banks in other companies, including their subsidiaries. Thus, we create a profile regarding international activity for each bank, which provides exact information on the locations of its subsidiaries. Given the fragmentariness of the *Bankscope* database, we augment the data by manual research on the corporate structures of the banks. This additional information was taken, if available, from annual reports or other official documents disclosed on the official webpages or from trustworthy internet sources on company structures.

We denote a European bank as a multinational (*MULTI* = 1) if it has at least one subsidiary in another country than the bank headquarter is located in. The distinction between multinational banks and domestic banks (*MULTI* = 0) matters as only multinational banks are subject to CbCR obligation according to CRD IV.[11] Of the 207 firms, 83 are categorized as multinational banks and 124 banks count as domestic.[12] A bank is classified as domestic if either all of its subsidiaries are located within the same country as the banks headquarter or if the bank does not own subsidiaries at all.

Furthermore, we distinguish multinational banking groups according to their activities in tax havens. We designate banks in our sample accordingly with the dummy variable *EXPOSED*, which equals 1 for all banking groups that have at the minimum one subsidiary in at least one of the following five European tax havens: Cyprus, Ireland, Liechtenstein, Luxembourg and Malta. All five countries can be found in the established tax haven list by Dyreng and Lindsey (2009) and are moreover listed as tax havens by the IMF (Reuters, 2008). We focused on countries with small

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[11] The most minimalistic case of CbCR extends to two countries, as it exemplarily can be observed for the UK headquartered Arbuthnot Banking Group, which is active in the UK and Dubai.

[12] The Bank for International Settlements (BIS) regularly publishes monitoring results of the implemented standards for worldwide banks and refers to an amount of 101 large international and 129 "other" banks within its confidential data analysis (Bank for International Settlements, 2016). The number of 83 international banks in our EU sample is smaller, but appears fairly justified in terms of selection as we only refer to European banks.

population numbers and relatively low GDP figures because activities in small countries are more likely to be perceived as purely tax motivated.[13]

We exclusively consider European tax havens because of poor data quality in the Bankscope database: The listing of worldwide subsidiaries in *Bankscope* is fragmentary, which required us to perform manual research on the subsidiary locations of all banking groups in our sample. However, there exists recent evidence by Bouvatier et al. (2017) for European banks to have strong preferences for tax havens within geographical Europe, which suggests that we pick up a substantial share of banks' overall tax haven activity in the selected five countries. Moreover, it is unlikely that European banks have subsidiary in overseas tax havens like the Bahamas if they are not already engaged in a European one.

As dependent variable, we consider a firm's effective tax rate (ETR). We define the ETR as tax expenses divided by pretax income and adjust the latter for extraordinary items. In accordance with the accounting literature, we use ETR as an ex post measure of tax avoidance (e.g. Hanlon and Slemrod, 2009; Dyreng, Hanlon and Maydew, 2010; Markle and Shackelford, 2012a/2012b). Information to compute the ETR is taken from the consolidated financial statements of MNEs. Consequently, the ETR considers the overall effects of tax avoidance structures of the MNE and does not refer to a single subsidiary. The ETR evaluates retrospectively the worldwide tax expenses of a firm and thus, indicates the level of employed tax avoidance. A lower ETR implies higher tax avoidance. A multinational bank with a low ETR appears to exercise tax planning activities more effectively compared to its peers with higher ETRs (Hanlon and Heitzman, 2010).[14]

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[13] Whereas a country such as the Netherlands is well-known for its IP box regime, a bank's decision to open a subsidiary on the spot is likely to be motivated by other factors than tax-related reasons such as the market potential, which countries with larger population and GDP numbers typically entail.

[14] The ETR used in this study is not to be confused with the effective tax rate as described in King and Fullerton (1984) and Devereux and Griffith (1998) who define it differently as a forward-looking measure.

3.2. Descriptive Statistics

Our base sample of European banks covers a wide array of member states of the EEA and hence delivers an extensive picture over the European banking sector. The largest financial centers as London and Frankfurt host the most banking headquarters, which puts the UK and Germany to the top of our sample in terms of observations. Data availability of banking data in *Compustat Global* limits the representativeness of countries to some extent, but further stratification would be difficult to justify given the already small sample size. Therefore, to address imbalances among the regional compositions of our subsamples, we introduce country specific trends over time in our robustness section. Table A2 in the Appendix provides a country snapshot of the headquarters of all multinational banking groups in the sample.

In accordance with the previous literature in tax accounting we define the ETR as tax expenses divided by pretax income that is corrected for extraordinary items. As one control variable, we deploy the size of a bank (*SIZE*) measured by the log of its total assets because banks that differ in size are likely to differ in their possibilities to pursue tax planning (Omer, Molloy and Ziebart, 1993). Second, we include bank profitability, represented by the return on equity figure (*ROE*), as more profitable institutions theoretically might encounter lower pressure to engage in aggressive tax planning strategies.[15] Lastly, we control for the equity ratio of a bank (*EQUITY*) which describes the ratio of a bank's equity to total assets. The capital structure of a bank matters for tax planning as it indirectly proxies financial leverage, which is well known for functioning as a tax shield through the deductibility of interest payments (Graham, 2000; Andries, Gallemore and Jacob, 2017). Table 2 contains summary statistics on all of our variables of interests for multinational and domestic banks.

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[15] Similarly, one could argue alternatively that profitable banks could engage more easily into tax planning due to greater financial resources. For a more detailed analysis of this connection see Thomas and Zhang (2014).

Table 2: Descriptive Statistics

Variable	Multinational Banks					Domestic Banks				
	N	Mean	Std. Dev.	Min	Max	N	Mean	Std. Dev.	Min	Max
ETR	467	0.232	0.109	0.003	0.703	737	0.249	0.099	0	0.805
SIZE	467	17.280	2.904	4.888	21.52	737	14.76	2.169	6.164	19.77
ROE	467	0.151	0.208	0.008	2.652	737	0.132	0.12	0.001	1.192
EQUITY	467	0.112	0.135	0.011	0.996	737	0.128	0.111	0.010	0.991
MULTI	467	1	0	1	1	737	0	0	0	0
EXPOSED	467	0.486	0.500	0	1	737	0	0	0	0
EMPLOYEES	396	30,287	53,532	4	295,061	414	3,037	4,636	8	21,121

Notes: Summary statistics for both banking groups are based on the pooled firm-year observations from 2010 to 2016.

Certain structural attributes of multinational and domestic banks are apparent in the sample: First, internationally active banks are expectedly larger than their domestic peers. This finding is captured by differences in scaled total assets but becomes particularly clear when comparing the number of full-time employees which on average ranks ten times higher for multinationals. The multinational banks in our sample show a ETR of approximately 23.2 percent whereas domestic firms report on average an ETR that is 1.7 percentage points higher. This finding is in accordance with the expectation that more international firms have enhanced tax planning opportunities.

Multinational banks show a slightly higher profitability than for domestic banks. This pattern is familiar in financial services industries within OECD countries, where substantial profits arise from cross border activities (Shehzad, De Haan and Scholtens, 2013). We observe an equity ratio of approximately around 12 percent for both groups, which accompanies the mandatory Basel III capital adequacy ratio of 8 percent. [16] Among the multinational banks, the *EXPOSED* dummy indicates that every second multinational bank in our sample has to reveal tax-haven activities in its CbCR.

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[16] Basel III sets a fixed threshold for the capital adequacy ratio. This ratio differs from the equity ratio as it involves risk weighted total assets. The set minimum capital adequacy ratio (Tier 1) that banks must maintain is 8% (Basel Committee for Banking Supervision, 2010).

3.3.   Methodology

Our empirical analysis of tax avoidance in the banking sector consists of several independent Difference in Differences (DiD) setups with altering control groups in order to test hypothesis 1. We begin with the comparison of European multinational and domestic banks. We measure the relative change in the ETR between the two groups over time to identify the effect of mandatory CbCR. Therefore, we deploy the dummy variable *MULTI* as a quasi-treatment in our DiD regression approach:

$$ETR_{it} = \beta_0 + \beta_1\, MULTI_i + \beta_2\, MULTI_i \; x \; POST_{it} + Year_t + \beta_j X_{it} + u_{it} \qquad (1)$$

The dependent variable is the ETR of bank *i* in year *t*. The variable *POST* is a time dummy, which equals 1 from the year in which the full CbCR-regulations have been in place. This is the case for the financial years from 2014 to 2016.

We include year fixed effects in order to correct for annual trends in ETRs. Following the initial application of DiD regression analysis by Ashenfelter and Card (1985), the main coefficient of interest is β_2 as it measures the relative change of multinational bank-ETRs over the CRD IV implementation to the change of domestic banks over the same period. The vector X_{it} denotes additional covariates, which are introduced into the regression framework to account for other variables associated with effective tax payments of banking institutions. Finally, we perform additional regression specifications including bank-fixed effects to eliminate omitted variable bias through time-invariant factors.

We test hypothesis 2 and analyze the heterogeneity in treatment intensity across European multinational banks by extending equation (1) with an additional interaction term:

$$ETR_{it} = \beta_0 + \cdots + \beta_2\, MULTI_i x \; EXPOSED_i + \beta_2\, MULTI_i \; x \; POST_{it} \; x \; EXPOSED_i + \cdots + u_{it} \qquad (2)$$

This way we differentiate the treatment effect between multinational banks, which have at least one subsidiary in one of the designated tax havens (Cyprus, Ireland, Liechtenstein, Luxembourg and Malta) and other multinational banks, which do not. We expect a positive effect, i.e. presumably more exposed international banks should react stronger to the transparency shock induced by CbCR.

Alternative Control Groups

Domestic and international banks generally offer similar services, face the same financial market environment and underlie the same regulatory regime, namely, the Basel Committee. However, the business models of domestic banks potentially differ from the concept of their multinational peers. For example, domestic banks may be more focused on retail lending and/or less involved in risky investments.[17] Therefore, in additional analyses, we consider three additional control groups, which were not subject to CbCR during the observed time-period.

First, we deploy matched large multinational U.S. banking corporations as alternative control group. Large U.S. multinational banks are likely to rely on similar business models as European ones and possess equally international firm structures. We retrieved information on the multinational activity of U.S. banks from the Federal Reserve System's list of large commercial banks (Federal Reserve System, 2017). Second, we consider matched European financial service providers outside banking as control firms to check for general trends in the financial industry with regard to tax-expenditures. Non-banking financial firms as e.g. insurances have been subject to regulatory change by a reform named Solvency II, but not yet with regard to tax transparency (European Commission, 2014). Third, we consider a control group of matched European

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[17] Theoretically, international banks penetrate foreign markets and crowd domestic players out of their routine business or alternatively can focus on niche services in the foreign market. Buch and Golder (2001) conclude that co-existence between domestic and international banks in most service lines is the case and hence business concepts are comparable.

corporations from various industries, particularly manufacturing industries. This comparison is intended to test whether higher tax payments by banks after CRD IV could have also been explained by an upwards trend in the ETR across all industries in Europe, that is possibly driven by the BEPS process.

For each comparison a Propensity Score Matching (PSM) approach is applied. We identify matching partners for our international banks with regard to key financial characteristics, such that we receive other firms similar to our multinational banks in terms of size and/ or profitability. The underlying idea of applying PSM here is to account for confounding factors that partly explain structural differences between the European banking industry and the control groups.

4.   Empirical Results

4.1.   ETR Development in the European Banking Sector

We begin our investigation by using domestic European banks as control group. Table 3 contains the corresponding outcome. We always use the ETR as the dependent variable. Specifications (1) reports the most concise DiD estimation which solely includes the indicator variable *MULTI* and year fixed effects as control variables. Specifications (2) introduces additional control variables to the regression and specification (3) adds firm-fixed-effects. The overall DiD-coefficient of interest is the interaction term *MULTI x POST*. The coefficient is positive and statistically significant in specifications (1) – (3). Considering specification (2), the point estimate suggests that banks affected by the CbCR-regulation experienced an average increase in effective tax levels of 2.5 percentage points relative to banks, which remained unaffected by the reform, ceteris paribus. The effect size ranges at 2.3 percentage points and is significant when firm fixed effects are introduced in column (3). This finding implies, that multinational banks paid

substantially more taxes than their domestic peers after the reform. Taking an average ETR of 23 percent, the magnitude of the coefficient suggests that the overall tax expenditure of an affected banking group increased by approximately one tenth in total through CbCR. In particular, the introduction of firm fixed effects bolsters our interpretation of the CbCR-reform as the driving force because this model eliminates potential bias through time-invariant unobserved factors; this way any constant level differences between EU countries regarding taxes are controlled for.

Table 3: ETR Comparisons in the European Banking Sector

VARIABLES	Testing H1			Testing H2		Placebo Test (H2)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MUTLI	-0.0230*	-0.0133		-0.0117		-0.0070	
	(0.0122)	(0.0117)		(0.0134)		(0.0123)	
MULTI x POST	0.0203**	0.0254**	0.0231**	0.0089	0.0044	0.0145	0.0120
	(0.0101)	(0.0101)	(0.0101)	(0.0136)	(0.0139)	(0.0125)	(0.0129)
MULTI x EXPOSED				0.00002			
				(0.0191)			
MULTI x EXPOSED x POST				0.0336**	0.0368**		
				(0.0168)	(0.0167)		
MULTI x LARGE						-0.0164	
						(0.0184)	
MULTI x LARGE x POST						0.0220	0.0216
						(0.0171)	(0.0173)
SIZE		-0.0023	-0.0119*	-0.00287	-0.00986	-0.0017	-0.0097
		(0.0028)	(0.0067)	(0.0029)	(0.0061)	(0.0028)	(0.0065)
ROE		-0.0491*	-0.0835**	-0.0494*	-0.0818**	-0.0508*	-0.0854**
		(0.0260)	(0.0401)	(0.0255)	(0.0394)	(0.0259)	(0.0399)
EQUITY		-0.0728*	-0.0233	-0.0746*	-0.0221	-0.0711*	-0.0221
		(0.0416)	(0.0589)	(0.0416)	(0.0578)	(0.0417)	(0.0584)
CITR		0.0074***	0.0052***	0.0073***	0.0048***	0.0073***	0.0050***
		(0.0007)	(0.0016)	(0.0007)	(0.0016)	(0.0007)	(0.0016)
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Firm Fixed Effects			✓		✓		✓
N	1,204	1,202	1,202	1,202	1,202	1,202	1,202
Pseudo R2	0.016	0.222	0.510	0.226	0.513	0.223	0.510

Notes: The dependent variable is ETR. OLS Regressions are based on a sample of multinational and domestic European banks from 2010 to 2016. In total 83 multinational and 124 domestic banks are in the sample. Specifications (1-3) serve the testing of H1 and compare the ETRs of both banking groups over the introduction of CbCR. Specifications (4-6) serve the testing of H2, the analysis of particular exposed banks, by introducing an additional interaction term to the regressions. Analogous to (4-6) an alternative placebo interaction term is introduced in specification (6-7) to show the distinct effect of exposure to transparency. The constant is not reported. Robust standard errors clustered by firms are shown in parentheses. *, **, and *** show significance at the level of 10 percent, 5 percent, and 1 percent, respectively.

The covariates in our model affect banks' tax payments in an anticipated manner: A one percentage point increase in the corporate income tax rate (*CITR*) of a bank's home country is associated with an average increase of roughly 0.5 percentage points in the ETR of the bank. Larger and more profitable banks tend to pay slightly less taxes (conditional on cross-border activity) than their smaller and less profitable peers. We do not find an association between equity ratio and tax payments in our sample. The *MULTI*-indicator in specification (1) reveals a significant negative ETR level difference of 2.3 percentage points for international banks. This mirrors the fact, that international banks enjoy additional possibilities to reduce their taxes.

In columns (4) – (5) of Table 3 we test our hypothesis H2. We expect that multinational banks with activities in tax havens are particularly exposed to a shock in transparency and consequently may show a stronger reaction in their adaption of tax payments. Therefore, we insert an additional interaction term *MULTI x POST x EXPOSED*. The coefficient is positive and significant in both specifications. In column (5) we detect an effect of 3.7 percentage points. Hence firms with activities in tax havens increased their ETR by 3.7 percentage points relative to all other multinational banks over the period. This finding implies twofold: First, firms that declare activities in the named tax havens react in a more pronounced manner to CbCR-duties than other multinationals, which confirms H2. Second, the magnitude of the interaction term and the corresponding insignificant coefficient of the *MULTI x POST* variable suggest, that the exposed banks are driving the detected overall effect of column (3). The remaining multinational banks do not provide a substantial reaction in tax payments – relative to domestic banks. This is in line with the presented concept of surging pressure through reputational cost and litigation risk: Banks that are not forced to lay bare any dubious activity, are not urged to adjust their tax planning in the presence of enhanced transparency.

For presumable reasons, the indicator *EXPOSED* is positively correlated with the size of a bank, as larger banking groups per se possess more subsidiaries and hence are more likely to be present in one of the designated countries. To not misinterpret the *EXPOSED* indicator as a disguised size proxy, we run a placebo test in specifications (6) - (7) of Table 3: The dummy *LARGE* equals 1 for the largest 38 multinational banks measured in total assets in the sample[18]. The coefficient of interest *MULTI x POST x LARGE* is positive but not significant and supports our interpretation that truly the fact whether a bank has been subject to critical exposure of dubious tax planning in fiscal havens by CbCR, evocated the more pronounced reaction in tax levels.

Our results support H2: Banks with activities in tax havens experienced stronger transparency pressure through CbCR, which is expressed in higher effective tax levels post 2014.

4.2. Additional Control Groups

To strengthen our findings, we present additional comparisons with alternative control groups. We assign each European multinational bank to a certain number of alike firms from the respective control group in order to compare the development of exposed banks' tax levels to other trends across industries.[19] Given the available pool of matchable firms, the PSM criteria were selected in such way, that comparability according to the attributes is guaranteed and the number of successfully matched multinational banks is maximized.[20]

The subsequent matched sample analysis follows the specification from equation (1) while different control groups are introduced in separate samples, illustrated by the panels A, B and C. Table 4 contains the corresponding outcome

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[18] The threshold of 38 is to design a proportionally alike sample split to the exposed/non-exposed differentiation among the multinational banks. Taking the median in size as threshold neither entails significant interaction terms.
[19] Only exposed multinational European banks with activities in tax havens are used for the PSM.
[20] Information on the undertaken PSM and for all control groups are shown in Table A3 in the Appendix.

Table 4: ETR Comparisons beyond the European Banking Sector

Variables	Panel A Control Group: U.S. Multinational Banks			Panel B Control Group: EU Financial Services			Panel C Control Group: EU Manufacturing Firms		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EU-Multi-Bank	-0.0626***	0.0051		-0.0139	-0.0285		-0.0284	-0.0835***	
	(0.0173)	(0.0226)		(0.0209)	(0.0185)		(0.0179)	(0.0260)	
EU-Multi-Bank x POST	0.0323*	0.0494*	0.0398*	0.0391**	0.0397**	0.0382**	0.0300*	0.0310*	0.0317**
	(0.0174)	(0.0259)	(0.0207)	(0.0170)	(0.0177)	(0.0176)	(0.0155)	(0.0159)	(0.0157)
SIZE		-0.0009	-0.0078		0.0029	-0.0126		0.0034	-0.0076
		(0.0031)	(0.0092)		(0.0044)	(0.0091)		(0.0054)	(0.0108)
ROE		0.0818	-0.182		-0.0472**	-0.0552**		-0.0251	-0.0261
		(0.103)	(0.165)		(0.0235)	(0.0214)		(0.0184)	(0.0273)
EQUITY		0.0267***	0.0129*		-0.0585	-0.0920		-0.146***	-0.192*
		(0.0065)	(0.0075)		(0.0564)	(0.0885)		(0.0505)	(0.100)
STAT. TAX RATE		0.505***	0.0324		0.0041***	0.0039		0.0032***	0.0007
		(0.166)	(0.389)		(0.0015)	(0.0038)		(0.0012)	(0.0027)
Matched Control Group	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year-Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firm Fixed Effects			✓			✓			✓
Number of EU Banks	15	15	15	35	35	35	34	34	34
Number of Control Firms	15	15	15	41	41	41	82	82	82
N	199	184	184	442	439	439	715	713	713
Adj. R²	0.111	0.230	0.3069	0.035	0.160	0.538	0.004	0.085	0.4417

Notes: The dependent variable is ETR. OLS Regressions are based on three separate sample-panels (A, B and C) with observations ranging from 2010 to 2016. In each panel a specific number of EU banks is matched to a number of respective control firms over a specific set of control variables. Panel A comprises 1:1 matched (total assets in € and return on equity) U.S. Banks and EU Banks. Panel B comprises 1:2 matched (absolute profits in €, total equity in €, number of employees) EU banks an EU non-banking financial services providers. Panel C contains 1:3 matched (absolute profits in €, number of employees) EU banks and EU manufacturing enterprises. Information on the quality of the undertaking PSM are to be found in Table A3. The constant is not reported. Robust standard errors clustered on the firm level and are shown in parentheses. *, **, and *** show significance at the level of 10 percent, 5 percent, and 1 percent, respectively.

Panel A contains a small-scaled matched sample of equally large and profitable U.S. and European multinational banks.[21] Large U.S. multinational banks appear suitable as they undergo similar regulatory actions as their European peers and are likely to be affected by likewise business cycles. Specifications (1) - (3) show the corresponding results and deliver a similar interpretation to our main analysis: The coefficient of interest is *EU Multi Bank x POST*. The effect is positive which suggests that the observed rise in the ETR after the implementation of CbCR for European banks was not experienced in a similar manner by U.S. multinational banks. The significance of the coefficient of interest holds when including further controls and firm-fixed effects. However overall statistical significance does not exceed the 10 percent level, which partly is owed to the small number of observations. Furthermore, it is shown that European banks, on average, pay less taxes than their U.S. peers. This difference may originate from lower statutory tax rates in Europe and corresponds to findings in previous studies (PWC, 2011; Overesch, Schenkelberg and Wamser, 2017). The sample size restrains the extensive validity of the findings; however together with the first comparison, it supports our interpretation that not explicit business cycle conditions for multinational banking groups explain the relative surge in ETRs of European multinational banks.

Columns (4) – (6) refer to a matched sample of European multinational banks and other European financial service providers. We consider the alternative control group in order to test whether the particular development of the ETR in the banking sector was due to the implementation of CbCR and did not result from a general trend in the financial services industry. The control group includes mostly insurance and non-banking investment companies. Insurances appear among others suitable for our purpose because they have undergone Solvency II – an insurance regulatory

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[21] In the case of U.S. control group , the very limited number of multinational U.S. banks origins from the list of large commercial banks from the FED (Federal Reserve System, 2017), which lists 23 U.S. headquartered banks to have subsidiaries abroad and data availability issues from the Compustat Banks Database. A 1:1 nearest neighbor PSM approach has been applied over the amount of total assets in € and the return on equity ratio. In total, we compare 15 European multinational banks with 15 U.S. multinational banks in Panel A.

regime, passed by the European Commission in June 2014 – which imposed somewhat similar capital requirements to the BASEL III, but without the obligation of CbCR.[22]

The results shown in columns (4) – (6) of Table 4 supports the established results. The main coefficient of interest, *EU Multi Bank x POST*, turns out to be positive and significant at the 5 percent level and is robust to the introduction of firm fixed effects. This finding suggests that other financial service providers, which have not been subject to CbCR-duties, did not experience a comparable rise in effective tax levels post 2014. Moreover, no systematic difference in ETR between banks and insurances has been detected by the indicator variable *EU Multi Bank*.

Panel C contains European multinational banks and matched firms from various manufacturing industries, whereby all firms are headquartered in the EU.[23]

Results of the matched sample analysis are shown in columns (7) - (9). The results support the preceding findings. The coefficient of interest *EU Multi Bank x POST* is positive and significant at the 5 percent level. The magnitude of the coefficients resembles the magnitude of the previous results and is robust to the introduction of firm fixed effects. Particularly the specification (9) suggests that constant heterogeneity neither between industries, nor between individual firms, causes the surge of banks' ETRs relative to the ones of industrial firms.

Independent comparisons across industries may suffer from structural differences among the groups. To curb such criticism here, we deployed sector-related industries (financial services) and to certain extent, statistically comparable firms (matched firms) as counterfactuals for multinational banks from Europe. We do not observe any likewise increase in effective tax levels for non-banking institutions post CRD IV. The concurrence of our comparisons within and beyond

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[22] We apply 1:2 nearest neighbor matching and consider absolute profit in €, number of employees and the total amount of equity in € when computing the propensity score. The matched sample contains 35 European multinational banks and 41 other European financial firms.

[23] A 1:3 nearest neighbor matching was applied over the number of employees and absolute profit in € made in order to construct a group of firms that is similar to banks in terms of size and absolute profitability before the implementation of CbCR. The matching procedure leads to 34 multinational banks and 82 industry firms in Panel C.

the European banking sector suggests that the increase in the effective tax levels of multinational banks since 2014 is associated with the implementation of the CbCR obligation.

5. Robustness Checks

5.1 Variations in Sample Design

In additional analysis standard placebo and other robustness checks of the applied statistics are conducted. For each model specification we present only the coefficient of interest *MULTI x POST*. Table 5 contains the corresponding outcomes.

We implement altering timings of the treatment before and after the actual implementation of the regulation in 2014 in order to examine the exact timing of the observed effect (specifications (A1) - (A3) of Table 5). We find no significant coefficient for a placebo-early treatment in 2013 (specifications (A2)) but if we take out the actual treatment year (specification (A1)) or start belated treatment in 2015 (specifications (A3)). This implies threefold: First, the disclosure duty of CbCR for annual reports of 2014 affected the effective tax levels of consolidated banking groups positively, which could not be observed in a likewise manner before the reform. Second, the fact that the exemption of the treatment year 2014 does not alter our findings, suggests that banks did not only adapt their tax payments in the short run, but experienced longer lasting pressure through CbCR. Last, belated treatment from the year 2015 onwards yields a significant treatment effect. One possible reasoning behind this could be that – analogous to the second point - the banks' response to the transparency shock required some time. The observed adaptation in tax planning seems to be a gradual process over the post-CRD IV years.

Table 5: Alternative Sample Designs

Sample: EU Multinational and EU Domestic Banks	
Description of Robustness Specification	MULTI x POST
(A1) Elimination of Treatment Year (2014)	0.0306*** (0.0116)
(A2) Early Treatment in 2013	0.0157 (0.0110)
(A3) Late Treatment in 2015	0.0241** (0.0108)
(A4) Large Sample including Financial Crisis (2007 - 2015)	0.0216** (0.00994)
(A5) Without Outliers (top & bottom 5% in ETR)	0.0210** (0.00946)
(A6) Reduced - perfectly balanced - Subsample	0.0307*** (0.0101)
(A7) Negative Profit Observations remain in the sample	0.0240* (0.0124)
(A8) G-SIBS Special Treatment in 2013	0.0207** (0.00982)
(A9) Including Country-Year Fixed Effects	0.0258* (0.0139)
Year Fixed Effects	✓
Controls	✓
Firm Fixed Effects	✓

Notes: The dependent variable is ETR. OLS Regressions are based on the sample of EU multinational and EU domestic banks from 2010 to 2016, as used in table 3. Exceptionally the specification A4 extends the sample to the time-period from 2007 to 2016. The regression model resembles specification (3) of Table 3, including control variables and firm-fixed effects. The interaction terms refer to the DiD coefficient of interest in the respective regression captured by the interaction term of treatment and post-treatment period. The coefficients of other control variables and the constant are not reported. Robust standard errors clustered on the firm level and are shown in parentheses. *, **, and *** show significance at the level of 10 percent, 5 percent, and 1 percent, respectively.

Moreover, we run several robustness tests on different samples altering in size (specifications (A4) - (A7)). First, we include the years 2007 – 2009 and thus ingest the financial crisis time-period. Second, we run our initial setup on the sample excluding outlier banks with

regard to ETR values.[24] Third, we use a reduced, fully balanced panel sample for the original estimation.[25] Fourth, we repeat the analysis on the baseline sample including negative profit observations (specification (A7)), which have been eliminated in the original sample selection process. The tests on modified sample sizes indicate that the detected results are robust to changes in the sample composition and the estimation strategy. Including the years of the financial crisis in the sample does not affect the estimates in a notable manner. The same is true for the application of smaller subsamples: Neither using a perfectly balanced sample nor the exclusion of outliers in the ETR triggers changes in the coefficient of interest.

Subsequently we examine the role of G-SIBs that have been obliged to report their tax data confidentially to the European Commission one year before CbCR became mandatory. We respect their early CbCR duty in 2013 and dignify their respective treatment from this year on in specification (A8). The early treatment of G-SIBs in 2013 does not turn out to be a major driving force, either.

Lastly, we introduce country-year fixed effects into our original regressions in order to account for potential national trends and/ or legislative changes and/or imbalances in country coverage in our sample (Specification (A9). Introducing country-specific-trends over time even increases the magnitude of the DiD-coefficient.

Given all the above, the detected surge in effective tax levels of multinational banks over their domestic peers in the European banking industry appears robust to several variations in our research design.

5.2 Disentangling the effect of CbCR from CRD IV

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[24] Outlier banks are defined as the bottom and top fifth percentile in ETR values. Hence in total 10% of banks in the sample are – additionally to the original elimination of outliers- truncated for this specification.
[25] The reduced fully balanced sample contains 692 observations over the 2010 to 2016 period.

In additional analysis, we address concerns regarding the influences of other specific guidelines that were implemented within CRD IV besides CbCR (Art. 89): The new standard minimum capital adequacy rate (Art. 129), new liquidity requirements (Art. 105) and revised corporate governance rules (Art. 90 – 96) for banking groups represent the most pertinent ones. In order to avoid a misinterpretation of our identified effect, we analyze whether ETRs of discernibly different banks with regard to size, profitability and equity equipment developed differently over the implementation of CRD IV.

For this purpose, we again install placebo-treatments: we categorize banks as placebo-treated according to their above/below-median attribute in the respective characteristic in the year before the reform. In specification (B1) of Table 6, we compare the change in effective tax payments of large relative to small European banks over the enactment of CRD IV. Likewise, we compare more profitable to less profitable ones in specification (B2) and stronger financially leveraged to less leveraged banks in specification (B3). Despite certain correlation among the applied criteria, the presented setups provide widely diverging treatment group constellations of banks, containing both multinational and domestic ones. If our interpretation holds, we should not observe an effect from the placebo treatments on the ETR. Table 6 contains the coefficients of interest to the designated placebo-identification strategies, analogous to the empirical models from our main analysis:

Table 6: CRD IV Placebo Treatment Groups

	Sample: EU Multinational and EU Domestic Banks		
	Description of Robustness Specification	Coefficient of Interest	DiD Interaction Term
(B1)	Placebo: Critical Size as Treatment Classification	0.0132 (0.0100)	LARGE x POST
(B2)	Placebo: Critical Profitability as Treatment Classification	0.0136 (0.00957)	PROFITABLE x POST
(B3)	Placebo: Critical Equity Share as Treatment Classification	-0.0111 (0.00928)	STRONG EQUITY x POST
	Year Fixed Effects	✓	
	Controls	✓	
	Firm Fixed Effects	✓	

Notes: The dependent variable is ETR. OLS Regressions are based on the sample of EU multinational and EU domestic banks from 2010 to 2016. The regression model resembles specification (3) of Table 3, including control variables and firm-fixed effects. The interaction terms refer to the DiD coefficient of interest in the respective regression captured by the interaction term of treatment and post-treatment period. The coefficients of other control variables and the constant are not reported. Robust standard errors clustered on the firm level and are shown in parentheses. *, **, and *** show significance at the level of 10 percent, 5 percent, and 1 percent, respectively.

No placebo-treatment delivers a statistically significant coefficient of interest. This means, that we only observe – in relative terms - higher post-reform effective tax payments for international banks, but not for larger, more profitable or less leveraged ones. Given this, we are confident that exclusively CbCR-duty explains this surge in tax payments, whereas other regulatory implementations over the course of Basel III did not.

6. Conclusion

The European Commission implemented within CRD IV one of the first CbCR regulations in order to fight financial opacity in the European banking sector. However, the question remains whether the newly created tax transparency solely satisfies the curiosity of citizens or has a limiting effect on tax avoidance. We have therefore analyzed the impact of the tax transparency shock on banks' tax avoidance behavior by evaluating their effective tax rates before and after the mandatory disclosure of CbCR.

Our results suggest that European multinational banks experienced a significant increase in their effective tax levels after the regulation, relative to unaffected banks. In particular, we find that multinational banks, which are most exposed to the new transparency through the revelation of their activities in tax havens, particularly respond to the mandatory disclosure of CbCR. Our results suggest that those banks with activities in tax havens increased their ETR by 3.7 percentage points relative to other banks. In additional comparisons, we have checked our results against trends in corporate tax avoidance, both in the financial sector and across other industries. This further analysis reveals only a response in the European banking sector. We also rule out other regulatory influences embedded in the Basel III framework as alternative explanations. Therefore, our results suggest that European multinational banks responded to the new transparency and did not simply follow a general trend in the financial sector or in international tax avoidance.

Our study contributes to the recent debate about tax transparency as a potential mean to limit tax avoidance of MNEs. From our analysis, we conclude tax avoidance behavior of managers and the scope of public disclosure are related. Our findings suggest that CbCR can be an additional effective instrument for policy makers to curb global corporate tax planning.

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APPENDIX

Table A1: Variable Definitions

EMPLOYEES	Number of a firm's full-time employees
EQUITY	Ratio of a firm's equity over total assets
ETR	GAAP Effective Tax Rate of a firm, i.e. income taxes divided by pretax income, which was corrected for extraordinary items
EXPOSED	Indicator variable, which equals one for all exposed banks that possess subsidiaries in at least one of the following five EEA Tax Havens: Cyprus, Ireland, Liechtenstein, Luxembourg, Malta
LARGE	Indicator variable, which equals one for firms that rank above the median value of Size in the respective sample
MULTI/ EU MULTI BANK	Indicator variable, which equals one for EEA-headquartered banks that possess at least one subsidiary in another country
POST	Indicator variable, which equals one for the year of treatment and following years
PROFIT	A firms annual profit in millions of €
PROFITABLE	Indicator variable, which equals one for firms that rank above the median value of ROE in the respective sample
SIZE	Size of a Firm, i.e. logarithm of total assets
STRONG EQUITY	Indicator variable, which equals one for firms that rank above the median value of Equity Ratio in the respective sample
CITR	Corporate Income Tax Rate of a firm's home country
ROE	Return on Equity i.e. pretax income divided by total assets
TOTAL ASSETS	Total Assets of a firm in billions of €
TOTAL EQUITY	A firms equity in billions of €

Table A2: Multinational Bank-Headquarter Locations by Country

	EU Multinational Banks	
	# of Banks	% of Banks
Austria	6	7.2%
Belgium	2	2.4%
Bulgaria	2	2.4%
Croatia	1	1.2%
Cyprus	2	2.4%
Denmark	5	6.0%
Finland	2	2.4%
France	6	7.2%
Germany	13	15.7%
Hungary	1	1.2%
Iceland	1	1.2%
Latvia	1	1.2%
Liechtenstein	2	2.4%
Netherlands	3	3.6%
Norway	2	2.4%
Poland	2	2.4%
Portugal	1	1.2%
Slovenia	1	1.2%
Spain	4	4.8%
Sweden	7	8.4%
United Kingdom	19	22.9%
Total	83	100.0%

The baseline sample contains 83 multinational banks with their headquarters in the EEA. In total, the sample covers 21 of all 31 EEA countries.

Table A3: Propensity Score Matching Quality

Panel A: Matching EU Multinational Banks & US Multinational Banks

Nearest Neighbor 1:1	Mean			Bias	t-test	
	N	EU Multi Banks	US Multi Banks	(in %)	t	p>t
Total Assets (bn. €)	199	289.21	271.36	3.7	0.10	0.92
ROE	199	0.1513	0.1682	-13.5	-0.63	0.53

Panel B: Matching EU Multinational Banks & EU Financial Service Providers

Nearest Neighbor 1:2	Mean			Bias	t-test	
	N	EU Multi Banks	EU Fin. Services	(in %)	t	p>t
Profit (m. €)	442	2,387	2,033	14.5	0.50	0.62
Total Equity (bn. €)	442	21.470	18.321	16.2	0.53	0.60
Employees	402	48,313	33,251	32.9	1.10	0.28

Panel C: Matching EU Multinational Banks & EU Manufacturing Firms

Nearest Neighbor 1:3	Mean			Bias	t-test	
	N	EU Multi Banks	EU Manufacturing	(in %)	t	p>t
Profit (m. €)	715	1.595	2.005	0.3	0.02	0.98
Employees	692	40,732	73,187	-56.8	-1.60	0.11

Notes on the performed PSM-Methodology:
Table A3 shows the matched samples A, B and C, used in Table 4, and their respective attributes after PSM was applied. For each panel we show the number of nearest neighbor matched firms, the variables of interest, the number of observations and most importantly the attribute-means for both groups, which should not be provide a statistically significant difference (t-tests). The bias in mean values is expressed in percentage of the EU multinational banks' mean. In Panel A we apply 1:1 nearest neighbor PSM approach over the amount of total assets in € and the return on equity ratio. In total, Panel A contains 15 European multinational banks with 15 U.S. multinational banks. Observations are from the period 2010-2016. In Panel B we apply a 1:2 nearest neighbor matching over the criteria absolute profit in €, number of employees and the total amount of equity in € in order to compute the propensity score. Panel B contains 35 European multinational banks and 41 other European financial firms. Observations are from the period 2010-2016. In Panel C we apply a 1:3 nearest neighbor matching approach over the number of employees and absolute profit in €. The matching procedure leads to 34 multinational banks and 82 industry firms in Panel C. Observations are from the period 2010-2016. Standard caliper values are set to 0.03 for all matching procedures, which is in accordance with existing literature on the methodology (Austin, 2011; Lunt, 2014; Rosenbaum and Rubin, 1983). Matching procedures in Panel B and C allowed for replacement in the pool of firms. Replacement in Panel A was not feasible due to the low number of available multinational U.S. banks.