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The Impact of Country-by-Country Reporting on Corporate Tax Avoidance

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Abstract

Within the framework of its BEPS initiative, the OECD introduced a requirement for non-public country-by-country reporting (CbCR) applying to multinational companies with revenues above EUR 750m. The reports provide data on the global activities and financial structure of multinationals at a country level to tax authorities. This paper investigates the effectiveness of this measure against corporate tax avoidance using a difference-in-difference approach. The analysis is based on financial data both at the group and the subsidiary level. By testing several hypotheses, this paper provides limited support for the effectiveness of CbCR. While the effective tax rates of multinational groups with a reporting requirement increase by about 0.8 percentage points as compared to companies in the control group, the growth rate of total tax payments is unaffected. This seems to be due to a reduction of the tax base which is also due to a rise in leverage and resulting tax-deductible interest payments. At the same time, shifting of profits out of high tax jurisdictions is reduced by CbCR, but not at the expense of low tax OECD countries. CbCR therefore seems to primarily reduce profits located in tax haven affiliates of multinational groups. Lastly, there is little evidence for a distribution of profits closer aligned with frequently suggested apportionment factors.

JEL Code: H20, H26, F23, K34

Keywords: Corporate tax avoidance, profit shifting, multinational firms, country-by-country reporting

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1. Introduction

The vast sums large corporations shift around the globe to reduce their tax load have long been a topic of public and academic debate. The Luxembourg Leaks of 2014 and the publication of the Paradise Papers in 2016 lead to a further increase in public pressure on policy makers around the world to address the issue.

Recent estimations on the actual volume of profit shifting come from the OECD (2015a), Clausing (2016), and Tørsløv, Wier and Zucman (2018). The OECD (2015a) estimates that revenue losses due to profit shifting amount to between USD 100 to 240 billion per year, representing 4 to 10% of global corporate tax revenue. Clausing (2016) describes a strong increase in the amount of profits shifted to low tax jurisdictions, especially since the early 2000s. For 2012, Clausing estimates revenue losses to the US government of between USD 77 and 111 billion, and worldwide losses of about USD 280 billion. Tørsløv, Wier and Zucman (2018) calculate that in total USD 600 billion, or 40% of all profits of foreign subsidiaries of multinational companies, were shifted to tax havens in 2015.

The OECD's initiative on Base Erosion and Profit Shifting (BEPS) aims to address the issue of corporate tax avoidance and evasion through a number of measures. As of June 2019, about 130 countries have joined this initiative as part of the "Inclusive Framework on BEPS". One key action of the BEPS initiative is the introduction of non-public country-by-country reporting (CbCR) for multinational company groups with revenues above EUR 750 million. The CbCR reports are shared between tax authorities and contain financial information, such as revenues, profits and taxes paid, at the country level. The goal of this reporting requirement is to increase transparency and to allow for a high-level assessment of tax-risks. The requirement was put into practice in many countries starting in 2016.

This paper investigates, whether non-public CbCR as introduced via the OECD BEPS project is an effective tool to reduce corporate tax avoidance.

The work most closely related to this study of non-public CbCR is a conference draft of Joshi (2019). Joshi evaluates the effects of CbCR as introduced by BEPS Action 13, focusing strongly on the impact on the effective tax rate (ETR) of companies. Joshi (2019) focuses exclusively on multinational enterprises (MNEs) from the EU and reports an increase of effective tax rate at the group level of between 2 and 4%.

While the analysis of the ETR also provides the starting point of the analysis in this paper, it considerably extends and complements the work of Joshi (2019) in a number of ways. First, the effects of CbCR on different channels of profit shifting are investigated. Second, the analysis differentiates between country groups that are affected differently by the introduction of CbCR. Third, it is assessed whether CbCR led to a move towards a closer correlation of tax payments with factors commonly suggested in the debate about formula apportionment (see e.g. European Commission, 2007). Last, this paper provides a first attempt to assess the overall effect of non-public CbCR on tax revenues.

The analysis is mainly based on firm-level financial information taken from Bureau van Dijk's Orbis database.² The Orbis data is used to construct two complementary datasets: One dataset contains consolidated financial information of multinational groups; a second dataset holds unconsolidated financial information on subsidiaries of MNEs. A difference-in-difference estimator is used exploiting the CbCR threshold of EUR 750m.

The main findings of this paper provide limited support for the effectiveness of non-public CbCR against profit shifting. Profit shifting out of high tax jurisdictions is reduced by CbCR, but not at the expense of low tax OECD countries. CbCR seems to primarily reduce profits located in tax haven affiliates of company groups. At the group level, ETRs of companies with a reporting requirement increase by about 0.8 percentage point as compared to companies in the control group. On the other hand, the growth rate of total tax payments is unaffected. This seems to be due to a reduction of the tax base driven by higher tax-deductible interest expenses. In addition, companies do not change the allocation of their tax payments to more closely reflect the distribution of frequently suggested apportionment factors.

For certain industries, *public* CbCR has been required before 2016. There exists some empirical literature evaluating its effects on profit shifting. Dyreng, Hoopes and Wilde (2016) describe how public information on subsidiary location in the UK led to increased tax payments of the businesses affected. Overesch and Wolff (2019) and Joshi, Outslay and Persson (2018) both investigate the effect of the EU's Capital Requirement Directive (CRD IV). This directive was put into force in 2014 and requires multinational financial companies in the EU to publicly disclose financial information, including tax payment on a country-level. Joshi, Outslay and Persson (2018) find a decrease in profit shifting by financial affiliates due to CRD IV. At the same time, non-financial affiliates of European banks increase their profit shifting. Overesch and Wolff (2019) describe an increase in ETRs of affected companies by 2.5 percentage points as compared to companies without reporting requirement. In addition, the authors find that companies with subsidiaries in European tax havens experience a stronger increase in ETRs than companies without such subsidiaries. Whether the effect of public CbCR is driven by the additional information available to tax auditors, increased costs of tax planning, or fear of reputational costs due to the public availability of CbC reports is left by the authors as a question for future research.

When evaluating the effects of *non-public* CbCR on profit shifting, the potential channel of increased public scrutiny is switched off. Any effects found in this paper can therefore be attributed to the additional information available to tax authorities.

The remainder of this paper is organized as follows: Section 2 introduces the institutional framework. In Section 3, five testable hypotheses on the effects of CbCR are derived. Section 4 presents the first dataset based on consolidated financial information, the corresponding empirical approach and estimation results. The subsidiary data and regression results are discussed in Section 5. Section 6 summarizes the findings regarding the different hypotheses and offers a short conclusion.

² The data was provided by the ifo Institute's Economics & Business Data Center (EBDC).

2. Institutional Framework

OECD BEPS Project

In 2013, the OECD published a first action plan on its Base Erosion and Profit Shifting project (OECD, 2013). This action plan recognized the increased profit shifting opportunities of MNEs due to globalization and listed 15 Actions to address this issue. In 2015, the final report on BEPS was published, setting out in detail the 15 instruments aimed to reduce opportunities of tax avoidance for MNEs. These measures are supposed to introduce “coherence in domestic rules that affect cross-border activities, reinforcing substance requirements in the existing international standards, and improving transparency as well as certainty” (OECD, 2015b, p. 3). A list of the different BEPS Actions is provided in the Appendix (see Table A1).

To include a wider range of countries, the OECD/G20 Inclusive Framework on Base Erosion and Profit Shifting (Inclusive Framework) was created. All interested countries can join the Inclusive Framework, but have to commit to four BEPS minimum standards. These are four of the 15 BEPS Actions which have to be implemented by all members (see Table A1). The implementation of the minimum standards is monitored and peer-reviewed. As of June 2019, 129 countries have joined the Inclusive Framework, including most of the world’s major offshore financial centers.³

Action 13 – Country-by-Country Reporting

This paper now focuses on one of the four minimum standards, namely Action 13 on Country-by-Country Reporting. This Action not only constitutes a new framework of transfer pricing documentation, but also establishes a far-reaching exchange of information between tax authorities based on CbC reports of multinational groups. The goal of this reporting requirement is to “provide tax administrations with a high level overview of the operations and tax risk profile of the largest multinational enterprise groups” (OECD, 2017, p. 11). The OECD recommends the introduction of a respective requirement for fiscal years starting on or after 1 January 2016. Still, a number of countries made use of the option to introduce the requirement at a later point in time.⁴

While the reports are shared between tax authorities, they are not made publicly available. Before receiving any CbC report, jurisdictions have to ensure the confidentiality and appropriate use of any information received.

Content of CbC reports

The content of the CbC reports is set out in the 2015 Final Report which also contains a model template (OECD, 2015b, p. 29 f.). In general, CbC reports consist of three tables. The first table contains financial information on the global activities of an MNE group. The information on all items is aggregated by tax jurisdiction. The following items are part of this first table:

- Revenues (unrelated party, related party, total)

³ A list of all Inclusive Framework members can be found here: <http://www.oecd.org/tax/beps/inclusive-framework-on-beps-composition.pdf>.

⁴ The implementation status of the different Inclusive Framework members is summarized under <https://www.oecd.org/tax/automatic-exchange/country-specific-information-on-country-by-country-reporting-implementation.htm>.

- Profit (Loss) before Income Tax
- Income Tax Paid (on Cash Basis)
- Income Tax Accrued – Current Year
- Stated Capital
- Accumulated Earnings
- Number of Employees
- Tangible Assets other than Cash and Cash Equivalents

In addition, all subsidiaries of the MNE group have to be listed in a second table with their tax jurisdiction and main activities. A third table allows for additional information and comments.

Filing obligation for CbCR

The obligation to file a CbC report applies to all MNE groups with the exception of groups “with annual consolidated group revenue in the immediately preceding fiscal year of less than EUR 750 million or a near equivalent amount in domestic currency” (OECD, 2015b, p. 21). The objective of this exception is to exclude the majority of companies, but to include the majority of tax revenue.⁵

The model legislation proposed by the OECD describes two main ways in which the obligation to file a CbC report can come about (OECD, 2015b):

- a. Parent entity filing obligation: A MNE is required to file a CbC report by corresponding legislation in the country of residence of its ultimate parent entity (UPE).
- b. Local filing obligation: Countries can require constituent entities that are resident for tax purposes to file a CbC report if there is no such obligation for the UPE in its home country, but the group otherwise meets the conditions for a CbC requirement.⁶

If there are local filing requirements from several jurisdictions, a MNE can pick one of its subsidiaries to act as “Surrogate Parent Entity”. In sum, any MNE with revenues above the CbCR threshold of EUR 750m that is headed in a country with CbCR legislation in place or that has a subsidiary in a country with a local filing requirement has to file a CbC report in a given fiscal year.

Other CbCR frameworks

Apart from the CbCR framework established by the OECD’s BEPS project, there exist a number of other CbCR requirements for certain company groups. As mentioned in the

⁵ The OECD estimates that about 85-90% of MNE groups will be excluded, while 90% of corporate tax revenues are covered (OECD, 2015b). An MNE group is defined as “any Group that (i) includes two or more enterprises the tax residence for which is in different jurisdictions, or includes an enterprise that is resident for tax purposes in one jurisdiction and is subject to tax with respect to the business carried out through a permanent establishment in another jurisdiction, and (ii) is not an Excluded MNE Group” (OECD, 2015, p. 39).

⁶ Alternatively, local filing can apply if “the jurisdiction in which the Ultimate Parent Entity is resident for tax purposes has a current International Agreement to which the given jurisdiction is a party but does not have a Qualifying Competent Authority Agreement in effect to which this jurisdiction is a party by the time for filing the Country-by-Country Report; or there has been a Systemic Failure of the jurisdiction of tax residence of the Ultimate Parent Entity that has been notified to the Constituent Entity by its tax administration” (OECD, 2017, p. 13 f.).

introduction, the EU Capital Requirements Directive (CRD IV, Directive 2013/36/EU) requires banks in the European Union to compile CbC reports containing key financial information, including tax payments. These CbC reports are not only available to tax authorities, but have to be published. A further reporting requirement exists for resource companies in the context of the Extractive Industries Transparency Initiative (EITI).

So while there are other CbCR frameworks in place, all of them are much less comprehensive than BEPS CbCR which is not limited to certain sectors, but covers companies from all industries. For most industries, the requirement of MNEs to provide extensive information on their firm structure and activities by country to tax authorities is unprecedented.

3. Hypotheses Development

Based on the model by Hines and Rice (1994), Huizinga and Laeven (2008) describe a model of corporate tax avoidance. In their model, the amount of profits shifted depends (inter alia) on the costs of profit shifting. The introduction of CbCR may now increase these costs. This makes profit shifting less attractive to companies with a corresponding reporting requirement as compared to firms that do not have to file a CbC report. On the other hand, the CbC reports are not made publicly available, so companies do not have to fear public scrutiny. Many scholars are skeptical about the effectiveness of BEPS CbCR against profit shifting. Tax authorities may already have some information on subsidiaries of MNEs due to legislation on controlled foreign corporations (CFC rules). It is well possible that the introduction of additional reporting requirements only adds a burden on businesses without reducing profit shifting. Accordingly, Durst (2015) warns about exaggerated expectations regarding the BEPS project in general. While he concedes that CbCR may provide some guidance to tax authorities on where to focus their resources and enforcement efforts, Durst argues the underlying problem is the complexity of transfer pricing legislation rather than missing information. Similarly, Evers, Meier and Spengel (2017) question the benefits of CbCR, even if CbC reports provide additional information to tax authorities, because tax planning mostly relies on “the legal exploitation of gaps and loopholes in national and international tax law” (Evers, Meier and Spengel, 2017, p. 11). At the same time, the way CbCR was finally implemented, addresses a number of the concerns raised by Evers, Meier and Spengel. Most importantly, the CbCR template does not rely exclusively on data already available but requires companies to provide some new information following harmonized definitions. Ex-ante, the effect of non-public CbCR on tax avoidance seems unclear. To assess the impact of CbCR on MNE groups as a whole, this paper tests the following hypothesis:

Hypothesis 1: MNE groups with a CbCR requirement have reduced their profit shifting activity compared to companies out of scope.

The main channels companies typically use to shift profits to low tax jurisdictions can be divided into financial (intra-company debt structure) and non-financial channels (strategic transfer pricing and location of intangibles; see e.g. Dharmapala, 2014, or Heckemeyer and Overesch, 2017). CbCR does not focus on a particular channel of profit shifting. The relative

attractiveness of the different shifting channels should not be changed. This leads to the second hypothesis:

Hypothesis 2: The usage of all major channels of profit shifting is reduced by CbCR to a similar degree.

Reduced profit shifting would not only show up in the consolidated financial statement of company groups, but should also affect the financial statements of subsidiaries in different countries. In particular, reduced profit shifting from high to low tax jurisdictions should lead to an increase in profits remaining in the high tax subsidiaries. This leads to a third testable hypothesis:

Hypothesis 3: The profitability of subsidiaries of MNEs with CbCR requirement in high tax jurisdictions increases, while the profitability of low tax subsidiaries declines.

Apart from companies, tax authorities might also change their behavior due to CbCR. By modelling the incentives of tax authorities, Tørsløv, Wier and Zucman (2018) show that the authorities in high-tax jurisdictions rationally focus on relocating profits from other high-tax countries rather than from tax havens. The authors claim that one main driver for this result is that data on subsidiaries of MNEs in high-tax countries is more readily available as compared to data from tax havens. CbCR that includes tax haven affiliates might now change the incentive structure of fiscal authorities. Countries that receive a small share of tax payments from a certain company relative to employment, revenue or other criteria might try to use the information provided by CbC reports to get a larger share of total tax payments. Companies might also anticipate such claims by governments and distribute their tax payments closer to commonly suggested apportionment factors such as number or costs of employees, revenues, and total assets (see e.g. European Commission, 2007). Such an effect could also reduce the tendency of companies to leave a relatively large proportion of profits in their headquarter entity – a phenomenon described by Dischinger, Knoll and Riedel (2014a and 2014b). All these effects are tested based on a fourth hypothesis:

Hypothesis 4: CbCR leads to a distribution of tax payments more closely matches the distribution of basic economic variables such as employment, assets, or revenue.

However, the OECD explicitly states that the CbC reports “should not be used by tax administrations to propose transfer pricing adjustments based on a global formulary apportionment of income” (OECD, 2015b, p. 16).

Lastly, reduced profit shifting should increase the total tax payments of companies with reporting requirement compared to firms with such an obligation, leading to a fifth and last hypothesis:

Hypothesis 5: CbCR leads to an increase in tax payments of companies with reporting requirement compared to companies without reporting obligation.

Firms may, however, reduce their profit shifting, but also lower their total tax base by engaging more in activities that lead to deductions from the tax base.

4. Company groups

4.1 Data & Descriptive Statistics

The first part of the analysis looks at company groups based on consolidated financial information. The firm-level data is taken from Bureau van Dijk's Orbis database.⁷ This data is complemented by information on statutory tax rates taken from KPMG's Corporate Tax Tables and EY's Worldwide Corporate Tax Guides. The dataset covers the pre-treatment years 2009-2014 and the post-treatment years of 2016 and 2017. Years are defined according to the start date of a company's business year. The year 2015 is excluded to account for potential announcement effects, since the exact threshold was published in the OECD's 2015 Final Report (OECD, 2015b).⁸

The sample is divided into a treatment and a control group. The treatment group consists of all companies that had to file a CbC report in 2016 and 2017. The control group includes all firms without such an obligation. Companies are assigned to the treatment group either based on the requirement to file a CbC report in its home country (residence of the UPE) or a local filing requirement of one or more of its subsidiaries. In the first case, a firm is assigned to the treatment group, if

- 1) its home country has CbC legislation in place at the start of the fiscal year of a company,
- 2) consolidated revenues of the company group are above the threshold applicable in its home country, and
- 3) the company has at least one majority owned foreign subsidiary.⁹

In addition, a company can be assigned to the treatment group, if one or more of its subsidiaries are required to file a CbC report (due to local filing). A company is thus also assigned to the treatment group, if

- 1) it has at least one majority owned subsidiary in a country with a local filing requirement in a given year, and
- 2) consolidated revenues of the company group are above the CbCR threshold applicable.

The control group consists of company groups with revenues below the threshold, but a minimum of EUR 100m in revenues. This minimum turnover ensures that the control group

⁷ Tørsløv, Wier and Zucman (2018) show that Orbis is very incomplete when it comes to the coverage of subsidiaries. This lead to problems, if subsidiary information from Orbis is added up. At the same time, the authors concede that the consolidated data is reliable.

⁸ In previous publications, the OECD described the planned introduction of stricter reporting rules for transfer pricing (see OECD, 2013) and CbCR (see OECD, 2014), but made no reference to a threshold.

⁹ Whenever available, the information on subsidiaries is used from the respective year. This covers the vast majority of cases (about 80% in consolidated dataset, and more than 97 % for the subsidiary dataset). However, for some companies only current (2019) information on its subsidiaries is available which was then used instead.

only contains companies of considerable size. Firms with revenues above the threshold that do not have any foreign subsidiary according to Orbis are excluded from the sample.¹⁰

Since CbCR was introduced starting in January 2016, treatment status is defined only for the years 2016 and 2017. To allow for a clean classification into treatment and control group, companies with a change in its CbCR requirement between 2016 and 2017 are excluded. This concerns less than 5% of the sample.

The sample is further restricted to non-financial companies due to two reasons: First, the balance sheet of financial and non-financial companies follow different guidelines. Applying the CbCR threshold to the balance sheet information of a bank may lead to a flawed assignment of such companies to the treatment or control group. Second, financial companies were already subject to stricter transparency rules due to Basel III effective since 2013 and the subsequent introduction of CRD IV by the EU in 2014.

The final sample contains 105,240 observations on 17,425 companies from 118 countries. In 2016, the tax accrued by these companies amounted to EUR 646 billion of tax revenue, which represents 59 percent of all corporate tax revenue collected from OECD countries as reported in the OECD Global Revenue Statistics Database. Of all companies in the sample 11,044 are located in OECD countries. 25.7% of companies or 31.8% of all observations have a CbCR requirement. The number of firms by country in the treatment and control group are summarized in Table A2, the number of observations in treatment and control group by year is shown in Table A3 in the Appendix.

Most variables used are trimmed at the 1% level to account for outliers and mistakes in the data. In addition, ratios are used to normalize variables and make firms of different sizes more comparable. Table A4 provides some details on the main variables used.

4.2 Bunching at the CbCR threshold

Preparing a CbC report can constitute a substantial burden to companies, especially to those with a large number of subsidiaries in many different countries. Some of the data required is not part of regular financial statements, requiring firms to generate new data and put the necessary processes in place. The OECD recognizes potential compliance costs in their Final Report on Action 13 (OECD, 2015b). At the same time, companies may try to circumvent the obligation to file a CbC report simply to avoid the increased transparency.

Both factors create an incentive for firms with revenues close to EUR 750m to stay just below the CbCR threshold. If compliance costs are interpreted as a fixed cost to companies around the threshold, CbCR leads to a notch in profits at the threshold and a potential bunching point (bunching at notches is described by Kleven and Waseem, 2013). However, revenues cannot be controlled perfectly by most companies, reducing the likelihood of very clean bunching behavior.

¹⁰ Orbis does not cover all subsidiaries of MNEs (see Tørsløv, Wier and Zucman, 2018). If there is no information on foreign subsidiaries for a company in Orbis, it can therefore not safely be assumed that this firm is no MNE and has no CbCR requirement.

Figure 1 shows the distribution of company groups in terms of revenue between EUR 500m and EUR 1 bn before and after the introduction of CbCR.¹¹ Compared to the years before CbCR was introduced (left part of Figure 1), there clearly is excess mass to the left and missing mass to the right of the CbCR threshold after 2016 (right part of Figure 1). The share of all firms in the sample that is between EUR 700m and 750m increased by 6% between 2014 and 2016, while the share of firms just above the threshold (between EUR 750m and 800m) fell by almost 8%.

This finding indicates that some firms are indeed trying to avoid the obligation to file a CbC report. Apparently, companies see CbCR as a considerable burden. However, the simple approach taken here does not allow to differentiate whether the effect is driven by the direct cost of compiling the CbC report or due to sensible information the report provides to tax authorities. Since the exact costs of CbCR to companies are likely to differ widely, an estimation of an elasticity is not feasible with the data publicly available.

4.3 Empirical approach

To investigate the effect of CbCR as introduced by BEPS Action 13 on the behavior of multinational companies, a difference-in-difference approach is employed for a number of dependent variables ($DV_{i,t}$). In the most specifications, a regression model of the following form is used:

$$DV_{i,t} = \beta_0 + \beta_1 CbCRreq_i + \beta_1 post2016_{i,t} + \beta_3 CbCRreq_i * post2016_{i,t} + \beta_4 X_{i,t} + \gamma_i + \varepsilon_{i,t},$$

where $CbCRreq_i$ indicates whether a company i is required to file a CbC report in 2016 and 2017. $post2016_{i,t}$ is a dummy variable that takes the value of 1 for all years t since 2016 and 0 for all years before the introduction of CbCR. The coefficient of the interaction term, β_3 is the coefficient of main interest as it describes the change in the dependent variable for treatment group relative to the change in the control group after the implementation of CbCR. $X_{i,t}$ is a set of firm- and country-level characteristics that control for potential confounding variables. Additional year, industry, and home country fixed-effects (γ_i) are included in most specifications. Standard errors are robust and clustered at the company level. In addition, fixed effects panel estimations are used to test the robustness of results.

To investigate the effect of CbCR on tax avoidance of multinationals in general and to test *Hypothesis 1*, effective tax rates (defined as taxation over pre-tax profits) are used as a dependent variable. Only firms with positive profits and tax payments are considered. An increase in the ETR of company groups with a reporting requirement as compared to companies without such an obligation points towards reduced profit shifting due to CbCR. Following the approach of Overesch and Wolff (2019), a set of additional estimations compares the effects of CbCR on the effective tax rate of companies with and without subsidiaries in tax havens.¹² These specifications contain two additional explanatory variables: First, an interaction term

¹¹ The threshold of EUR 750m is used for all companies here, as it applies in the majority of countries and is mentioned explicitly in the OECD model legislation (OECD, 2015b). Companies are therefore likely to be most aware of this EUR threshold.

¹² A list of these countries is provided in Table A5 in the Appendix.

between the dummy variable indicating the requirement to file a CbC report (*CbCRreq*) and a dummy variable *haven* that takes the value of 1, if an company group has at least one subsidiary in a tax haven. Second, this term is interacted with the *post2016* dummy for post-treatment periods. Orbis records subsidiaries in a tax haven for about one third of all companies with a reporting requirement.

A second test of *Hypothesis 1* is whether or not companies with CbCR requirement reduced their activities in tax havens as compared to the control group. To this end, a dummy variable that equals 1 if Orbis lists at least one subsidiary of a company group located in a tax haven serves as dependent variable. Both linear probability models and logit estimations are used.

To give a first indication regarding the channels of profit shifting that are impacted by CbCR, the share of taxes in EBIT is employed as a dependent variable. Since EBIT does not take interest payments into account, any increase in the ratio of tax payments in EBIT due to CbCR must be due to reductions in non-financial profit shifting channels (i.e. strategic transfer pricing or the location of intangibles, s. Heckemeyer and Overesch, 2017). In addition, the effect of CbCR on the profitability and the financing structure of companies is examined.

The effect of CbCR on the share of profits and taxes of the UPE relative to total group profits and taxes is studied to assess changes in the “headquarter bias”. According to Dischinger, Knoll and Riedel (2014a and 2014b), companies tend to keep an overly large proportion of profits at their headquarter entity. A reduction in this bias points may be caused by a stronger orientation of the distribution of profits based on apportionment factors as proposed by *Hypothesis 4*.

Lastly, the overall impact of CbCR on tax revenues is assessed to test *Hypothesis 5*, by using the growth rate of taxes as dependent variable. The growth rate allows a sensible comparison between companies of different sizes.

A number of robustness checks are reported in Section 4.5, including estimations using a control group based on the entropy balancing method as suggested by Hainmueller (2012).

4.4 Results: Effects of CbCR on company groups

This section describes the regression results based on the dataset containing consolidated financial information of company groups.

Effective tax rates

Table 1 summarizes the effects of CbCR on tax payments as a share of pre-tax profits, testing *Hypothesis 1*. Specifications (1) to (3) are OLS estimations based on the full sample. Throughout these specifications, the coefficient of the interaction term is positive and highly significant. The effective tax rates of companies with a CbCR requirement increased as compared to the control group by about 0.8 to 0.9 percentage points according to most specifications. Compared to the effects of public CbCR in the financial sector as described by Overesch and Wolff (2019), the increase in ETRs found here are about half as large. While this may be due to the fact that the reports are not made publicly available, it could also be caused by fundamental differences between the financial and the non-financial sector.

The coefficient of *CbCreq* is negative and highly significant when controlling for the home country and industry of a company group. Before the introduction of CbCR, companies with revenues above the threshold had lower effective tax rates than smaller companies. In addition, the coefficient for *post2016* lies between -2.7 and -2.9 in specifications (1) and (2), indicating lower ETRs in the later years of the sample. However, this effect seems to be mainly driven by tax rate reductions in many countries. The coefficient of *post2016* becomes insignificant when controlling for the statutory tax rate of the company's home country (see Column (3)) of Table 1). These results are robust to the inclusion of additional company-level controls such as total assets, profitability or leverage. Columns (5) and (6) report the results of fixed-effects panel estimation. In these estimations, the coefficient of the interaction term is again positive and statistically significant.

Estimation (4) of Table 1 contains additional variables testing for differences in reactions to CbCR between companies with and without subsidiaries in tax havens. The interaction term between *haven* and *CbCRreq16* yields a highly significant, negative coefficient. Before CbCR, companies in the treatment group with subsidiaries in tax havens had 1.2 percentage points lower ETRs than treated companies without tax haven subsidiaries. This relates to the results of Dyreng and Lindsey (2009) who find that US firms with presence in tax havens have a lower worldwide tax burden of about 1.5 percentage points. At the same time, the effect of CbCR on the ETR of large MNEs seems to be driven by companies with subsidiaries in tax havens. There is no significant change in the ETR of companies with reporting requirement that do not have such subsidiaries. The fixed-effects regression reported in Column (7) of Table 1 gives a similar result. The same holds when controlling for company-level characteristics and the statutory corporate tax rate of the company's home country.

In sum, the results on the effect of CbCR on the ETR of company groups support *Hypothesis 1* of a reduction in the profit shifting activities of companies covered by CbCR. The reduction in profit shifting seems to be driven by companies with subsidiaries in tax havens.

Tax haven subsidiaries

A further indication of profit shifting activities is the presence of a company in a tax haven. Table 2 reports regression results on the probability of a company group to have at least one subsidiary in a tax haven. As Column (1) of Table 2 shows, for about 7% of all companies in the control group Orbis listed a tax haven subsidiary before 2016. This share increased to about 8.3 percent after the introduction of CbCR. For companies with CbCR requirement, the share was much higher before 2016 (22.8%), but also increased by almost 8 percentage points since the introduction of CbCR. This finding is robust to the inclusion of a number of fixed effects (see Column 2) and is also confirmed by panel and logit regressions (see Columns (3) to (5) of Table 2). The result is also robust to controlling for the total number of subsidiaries of a company (unreported). While the results reported above suggest that companies with reporting requirement use tax haven subsidiaries less to shift profits, CbCR did not reduce the probability of MNEs to be active in tax havens in general. However, since data quality on subsidiaries is far from perfect, this results should be treated with caution.

ETR (tax / EBIT)

Effective tax rates defined over pre-tax profits are affected positively by CbCR. When looking

at the share of taxes in EBIT, the picture changes. As shown in Table 3, CbCR has no positive effect on the share of taxes in EBIT. The panel estimations even yield a negative coefficient for the interaction term (see Columns (3) and (4) of Table 3). Results are very similar, when company-level controls are included. The differential results for the share of tax in EBIT and tax in pre-tax profits suggests that companies only reduce their profit shifting via the financial channel, contradicting *Hypothesis 2*.

Profitability and financing structure

The impact of CbCR on the profitability of companies is reported in Column (1) of Table 4.¹³ A CbCR requirement reduces the profitability of firms as signaled by the negative coefficient of the interaction term. This negative effect on profitability, however, seems to be mainly driven by higher interest payments due to increased debt financing. Accordingly, the coefficient of the interaction term becomes insignificant when controlling for leverage (see Column (2) of Table 4). As specifications (3) and (4) show, both leverage and the share of interest payments in EBIT increase in companies that have to file a CbC report after the introduction of CbCR as compared to the control group. When looking at different measures of profitability, such as pre-tax profits in revenues, the negative effect of CbCR on profitability is confirmed. These findings indicate that company groups with reporting requirement seem to reduce their tax base.

Headquarter bias

As shown in Columns (1) and (2) of Table 5, company groups with a CbCR requirement reduce the share of profits booked with their UPE. The same holds for the amount of taxes accrued by the headquarter entity (see Columns (3) and (4) of Table 5). Fixed-effects panel regressions yield similar results. A reduction in the headquarter bias due to CbCR may lead to a distribution of profits that is closer aligned with basic indicators of value creation, providing some indicative support for *Hypothesis 4*.

Taxation

To assess the overall effect of the different reactions of companies to CbCR, the relative changes in the growth rate of taxes is compared between treatment and control group as reported in Table 6. Both the OLS regressions reported in Column (1) and the fixed-effects panel regressions reported in Column (3) yield a negative coefficient that is not statistically significant. Results change very little, when the statutory tax rate of the company's home country is included as control variable (see Columns (2) and (4) of Table 6). The effect of a lower tax base seems to offset the increase in ETRs. This result contradicts *Hypothesis 5* of an increase in tax payments due to CbCR.

Overall, companies above the CbCR threshold seem to react to the reporting requirement by a reduction in their profit shifting activity, a result driven by companies with subsidiaries in tax havens. Profit shifting using the debt-channel is reduced, but there seems to be little effect of CbCR on the non-financial shifting channels. In addition, companies respond in a number of additional dimensions. Multinationals with a reporting requirement increase their leverage,

¹³ While only firms with positive return on assets are used in these estimations, results are similar if firms with negative returns are also included.

leading to lower profitability as compared to companies in the control group. In sum, the growth rate of tax payments is not impacted by CbCR.

4.5 Entropy balancing and further robustness tests

The main results reported above are robust to a number of tests. Table B1 shows the effect of CbCR on the ETR in 2016 and 2017 based on a weighted estimation. Weights are calculated by employing the entropy balancing method as suggested by Hainmueller (2012) and using the Stata packages described by Hainmueller and Xu (2013). This approach reweights the observations in the control group such that the weighted sample exactly matches the treatment group in a number of predefined characteristics. Columns (1) and (2) of Table B1 report results regarding the ETR when the control group is reweighted based on the mean ETR in 2013 and 2014. The estimation compares the ETR in 2016 (Column (1)) and 2017 (Column (2)) between companies with and without CbCR requirement. For Columns (3) and (4) of Table B1, the reweighting is based on ETR, return on assets, and industry. In both cases, the difference in ETR between firms with and without CbCR requirement is statistically significant. Companies with CbCR requirement had higher ETRs in both 2016 and 2017. However, the effect is stronger for 2016 both in terms of statistical significance and size of the coefficient.

In addition, all results reported in Section 4.4 are of similar size when financial firms are included. Estimating the effect of CbCR on the ETR of financial firms only (both worldwide and European) yields insignificant results on the interaction term (see Table B2 in the Appendix). This result is not surprising, considering the reporting requirements already in place for this group of companies.

Results are mostly robust to restricting the sample to companies with revenues between EUR 300m and 1.1bn. Since this reduces the sample size of the treatment group to about a third, significance levels are lower in some estimations.

As shown in Section 4.2, companies close to the threshold may try to avoid the obligation to file a CbC report. Such a selection into treatment may cause an issue with the identification. To take care of this concern, all regression are rerun excluding companies close to the threshold (with revenues between EUR 700m and 800m). This does not substantially change on any of the results.

Lastly, the estimations were conducted for a balanced sample of company groups. In these estimations, results are again similar to those reported in Section 4.4, with somewhat lower significance levels in some cases.

5. Subsidiaries

5.1 Data & Descriptive Statistics

This part of the analysis relies on unconsolidated financial information at the subsidiary level. As Tørsløv, Wier and Zucman (2018) show, many subsidiaries of MNEs are not listed in Orbis. Coverage is particularly bad in jurisdictions without public register. At the same time, a substantial number of subsidiaries, including their unconsolidated financial information, is available from Orbis, especially from a number of European economies.

The dataset used here contains data on subsidiaries from non-financial company groups with total revenues exceeding EUR 100m. All subsidiaries in the sample have revenues of at least EUR 1m. The dataset again covers the time period 2009-2017, while the year 2015 is excluded. Subsidiaries are split into treatment and control groups, based on whether their company group has the obligation to file a CbC report as defined in Section 4.1. Table A6 in the Appendix shows the distribution of observations by year for the treatment and control group. In total, the dataset contains 164,558 observations on 50,396 unique subsidiaries. Of these, 73.1% are part of an MNE group that had to file a CbC report in 2016 and 2017.

Subsidiaries are located in 35 OECD countries. The distribution of subsidiaries across countries for the treatment and control group is summarized in Table A7. While the location of subsidiaries is limited to OECD countries, the corresponding parents come from 72 countries. The largest share of subsidiaries has a US parent (15%), followed by subsidiaries with Japanese, British, French, and German parents (13.1% Japanese, 12.9% British, 12.2% French, 8.0% German). For many of the parent companies, limited financial data is available as well. The key variables used in the analysis are summarized in Table A8 (see Appendix).

5.2 Empirical Approach

As for company groups, the identification of the effects of CbCR on subsidiaries relies on difference-in-difference estimations. Subsidiary-level data allows to investigate the effects of CbCR on a number of dependent variables (*DV*). The estimation model looks similar for most estimations and takes the following form:

$$DV_{i,t} = \beta_0 + \beta_1 CbCRreq_i + \beta_2 post2016_{i,t} + \beta_3 CbCRreq_i * post2016_{i,t} + \beta_4 X_{i,t} + \gamma_{i,t} + \varepsilon_{i,t},$$

where *CbCRreq* is a dummy that is equal to 1 if a subsidiary *i* belongs to a company group that had to file a CbC report in 2016 and 2017. The dummy variable *post2016* equals 1 in all years *t* following the introduction of CbCR in 2016. Again, the coefficient of main interest is β_3 which describes the relative change in the dependent variable between treatment and control group after 2016.

For most of the analysis, the sample is divided into subsidiaries located in high and low tax jurisdictions. The definition is based on the mean statutory corporate tax rate in 2016 and 2017. Countries with mean corporate tax rates above 29% are considered as high tax jurisdictions,

countries with tax rates of or below 20% are considered as low tax jurisdictions.¹⁴ Of all subsidiaries in the sample, 18,864 (accounting for 62,087 observations) are located in high tax countries, 12,992 subsidiaries (41,983 observations) are located in low tax jurisdictions. To illustrate selected results, some of the regressions are also run restricted to subsidiaries in Germany and France, as common examples of high tax countries, and subsidiaries in Ireland, as the typical example of a low tax OECD jurisdiction. When interpreting any of the results based on this sample split, it is important to keep in mind that all low tax jurisdictions in the sample still have statutory corporate tax rates of at least 9%, (many close or equal to 20%). Zero-tax jurisdictions are not part of the sample as subsidiaries in many of these jurisdictions are not covered well in Orbis.

First, the effect of CbCR on effective tax rates is examined. Changes in profit shifting should not change the effective tax rate for a given subsidiary, only the allocation of profits between subsidiaries. The distance to the mean tax rate is used to examine whether there is a tendency to move towards average ETRs due to CbCR.

The subsamples of high and low tax subsidiaries are then used to extensively test *Hypothesis 3* of an opposing effect of CbCR on the profitability of subsidiaries in high and low tax countries. An additional specification includes the statutory corporate tax rate of the subsidiary country and an interaction term between the tax rate and the treatment status. A negative relationship between the corporate tax rate and profitability can be interpreted as a signal for profit shifting. As an alternative dependent variable, the share of subsidiary profits in total group profits is used.

To test *Hypothesis 4*, the share of taxes paid by subsidiaries in total taxes of a company group is regressed on the respective shares of common apportionment factors and their interaction terms with the treatment status of a subsidiary. The potential apportionment factors used are total assets, revenues and either costs or number of employees. The last two are not included in the same specification to avoid issues regarding multicollinearity.

5.3 Regression Analysis of CbCR Effects on Subsidiaries

Effective tax rates

As shown in Section 4.4, the effective tax rate of company groups with reporting requirement increased following the introduction of CbCR. In contrast, there is no positive effect of CbCR on the ETR at the subsidiary level (see Table 7).¹⁵ When accounting for potential changes in statutory tax rates, subsidiaries do not pay higher effective tax rates in a given country. This holds for the full sample (Column (1) of Table 7), as well as for subsidiaries in both high- and low tax countries (Columns (2) and (3)). Table B3 in the Appendix summarizes the corresponding results from fixed-effects panel estimations. These also show no positive effect of CbCR on the ETR at the subsidiary level. This result is still consistent with lower profit

¹⁴ High tax countries following the above definition are Australia, Belgium, Germany, France, Japan and Mexico. Low tax jurisdictions are the Czech Republic, Estonia, Finland, Hungary, Ireland, Iceland, Latvia, Lithuania, Poland, Slovenia, Switzerland, Turkey and the UK.

¹⁵ The ETR is again only calculated for subsidiaries with positive profits and tax payments.

shifting from high to low tax jurisdictions. If a larger share of total company profits is taxed in high tax locations as assumed by *Hypothesis 3* (and tested below), the average ETR of the MNE increases, without changes in the ETR of the subsidiaries.

As shown in Column (4) of Table 7, companies with reporting requirement have a tendency to move the ETRs of their subsidiaries towards the average. The dependent variable is the difference between a company's ETR and the mean ETR in a given year. The convergence is mainly driven by subsidiaries in high tax countries. Extremely low or high effective tax rates of a given subsidiary may be interpreted as a signal of tax planning activities. Since countries may use the information provided by CbC reports for high-level tax risk assessment, companies may try to avoid "extreme" relations of taxes to profits.

Profitability & profit share

To test *Hypothesis 3*, the effect of CbCR on the profitability (return on assets) of subsidiaries in high and low tax jurisdictions is compared. Before CbCR, the mean profitability in high tax subsidiaries was 12.9% in high tax countries and 15.6% in low tax jurisdictions.¹⁶ As the negative coefficients on *post2016* in Columns (1) and (2) of Table 8 show, the profitability of subsidiaries in both high and low tax countries decreased substantially since 2016. In high tax countries, however, this decrease was much smaller for subsidiaries of MNEs with a CbCR obligation than for subsidiaries of the control group. In low tax locations, the difference between treatment and control group is insignificant in the OLS estimation and much less pronounced in a fixed effects panel estimation (see Columns (1) and (2) Table B4 in the Appendix). These results are robust to the inclusion of the profitability (profit and assets) of the parent company.

Columns (1) to (3) Table B5 in the Appendix look at Germany, France and Ireland individually. While CbCR has a positive effect on the profitability of subsidiaries in the high tax countries France and Germany, the effect in the low tax country Ireland is insignificant. Unreported panel estimations yield similar results.

Tax rate differentials combined with the opportunity to shift profits from high to low tax jurisdictions lead to a negative correlation between tax rates and profitability as shown in Column (3) of Table 8. Before CbCR, a one percentage point higher statutory corporate tax rate in the subsidiary jurisdiction was associated with a 0.15 percentage points lower profitability in terms of return on assets. For subsidiaries of companies with a CbC requirement, however, this relationship is weaker since 2016. The effect is reduced by about a quarter. Again, results are similar when a fixed effects estimation is employed (see Column (3) of Table B4) and robust to the inclusion of additional control variables fixing the profitability of the parent company.

The dependent variable in Columns (4) and (5) of Table 8 is the share of subsidiary pre-tax profits in overall group profits. In both high and low tax countries, the share of profits increased since 2016 in companies with a CbCR requirement as compared to the control group, but the coefficient of the interaction term is much larger for high tax countries. Looking at individual

¹⁶ If subsidiaries with negative profits are considered as well, the means before the introduction of CbCR were 12.8% in high tax countries and 15.4% in low tax countries.

high and low tax jurisdictions confirms this result. In Germany and France, CbCR led to an increase in the share of profits reported. In Ireland, there is no significant effect (see Columns (4) to (6) of Table B5 in the Appendix). Unreported fixed-effects panel estimations produce even larger coefficients for Germany and France, while the effect of CbCR on the profit share of Irish subsidiaries remains insignificant.

In sum, the results on profitability and profit shares of subsidiaries give some support to *Hypothesis 3* in terms of increased profitability and profit shares in high tax countries. At the same time, reduced profit shifting away from high tax jurisdictions does not seem to come at the expense of low tax OECD countries. CbCR has no negative effect on the profitability and profit share of subsidiaries in these countries. Since the shares of profits have to sum to 1, profits booked in non OECD countries are likely to decline. Potentially, profit shifting is mainly reduced from high tax countries to offshore financial centers which are not part of the subsidiary sample. This explanation would also be in line with the result reported in Section 4.4 that the increase in ETRs of company groups due to CbCR is mainly driven by companies with tax haven subsidiaries.

Formula apportionment

The regressions reported in Table 9 test *Hypothesis 4* by assessing whether companies covered by CbCR allocate their tax payments more closely according to the distribution of factors that might be used for formula apportionment. The dependent variable is the share of subsidiary profits in total tax payments of a company group. According to OLS and panel estimations, the shares of assets and revenues are both highly correlated with the distribution of tax payments before and after the introduction of CbCR. The effect of costs and number of employees is less robust.

Of the interaction terms, none yield a statistically significant positive coefficient. In some cases, the coefficient is even negative and significant. This holds for OLS and fixed-effects panel regressions. Controlling for the corporate tax rate does not change these results. These results run counter *Hypothesis 4*, which assumed a stronger correlation between the distribution of tax payments and common apportionment factors.

6. Conclusion

Starting in 2016, many countries introduced mandatory CbCR requirements for multinational groups with revenues equal to or exceeding EUR 750m. The CbC reports contain information on MNE activities, including their profits and taxes paid, on a country-level as well as a list of all majority-owned subsidiaries. These reports are made available to all tax authorities of jurisdiction a MNE is present in, but are not published.

This paper investigated whether the introduction of CbCR had any effect on the profit shifting behavior of the companies in scope and a number of related hypotheses. The identification relies on a number of difference-in-difference estimations, based on both consolidated financial information of MNE groups and unconsolidated financial data of their subsidiaries. The main results regarding the five hypotheses tested can be summarized as follows:

This paper finds an increase in the ETR by about 0.8 percentage points of company groups with reporting requirement compared to the control group, providing some support for

Hypothesis 1 of reduced overall profit shifting due to CbCR. The fact that the effect is driven by companies with a presence in tax havens also suggest a reduction in profit shifting. Then again, companies with reporting requirement become more likely to be active in a tax haven in general.

Regarding the different profit shifting channels, the results reported in Section 4.4 suggest that firms mainly reduce profit shifting via financial channels. This contradicts *Hypothesis 2* of a similar reduction in all shifting channels.

As predicted by *Hypothesis 3*, profitability and the share of profits of subsidiaries in high tax countries increase, but not at the cost of low tax OECD subsidiaries. Potentially, the reduction in profit shifting from high tax countries is largely at the expense of offshore tax havens, as also suggested by the fact that the increase in ETRs of company groups due to CbCR is driven by companies with tax haven subsidiaries.

The reduction in the headquarter bias due to CbCR provides some indicative support for *Hypothesis 4* on a move towards formula apportionment in terms of the distribution of tax payments. The more direct test conducted in Section 5.3, however, suggest that CbCR does not lead to a distribution of tax payments closer aligned with the shares of assets, revenues, or costs and number of employees.

The overall effect of CbCR on the growth rate of tax payments of company groups was found to be insignificant, contradicting *Hypothesis 5* of a relative increase in taxes paid by companies in scope of CbCR. Apparently, increase in ETRs of company groups is counterbalanced by a reduction in their tax base.

These findings contribute to the public and academic debate on the effectiveness of the BEPS process in curbing corporate tax avoidance. In comparison to the work of Joshi (2019), the main result of an increase in ETRs due to CbCR is confirmed. However, the more detailed investigation of different adjustments of companies to the new reporting requirement provided here leads to a more clouded picture regarding the effectiveness of non-public CbCR.

One limitation of this study is that it is not able to directly compare the effectiveness of non-public with public CbCR. While a previous study by Overesch and Wolff (2019) on public CbCR in the European financial sector finds effects on the ETR that are about twice as large as the effect reported in our estimations, this might be also be driven by fundamental differences between the financial and non-financial sector. The question on whether the additional benefits of public CbCR outweigh the additional costs therefore remains open for discussion. In addition, the exact effect of CbCR on tax haven subsidiaries remains to be investigate in future research.

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Figures and Tables

Company groups

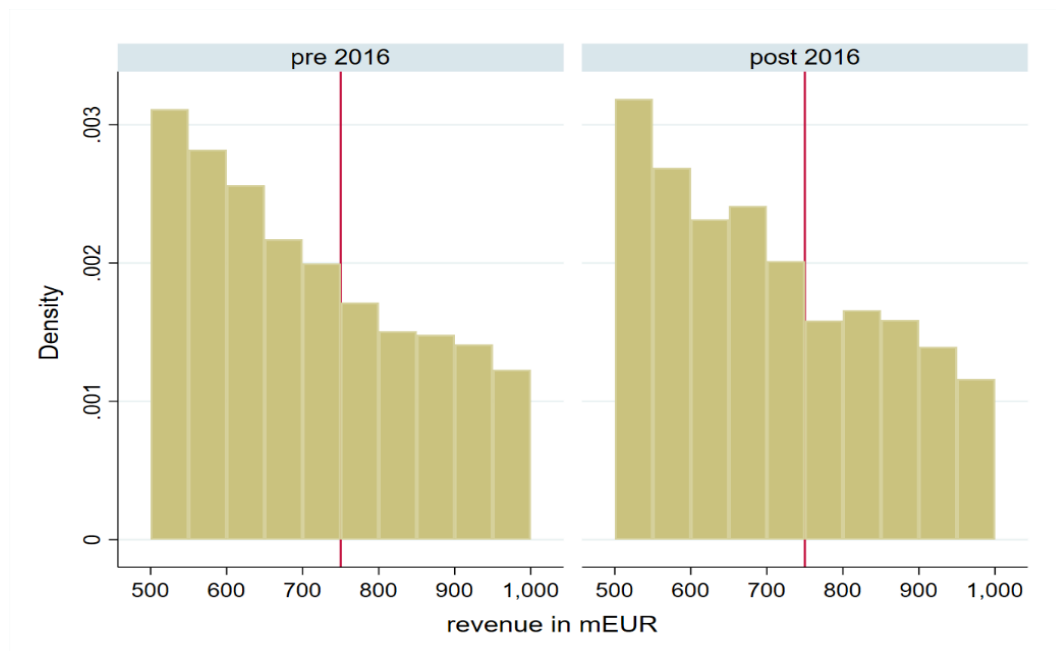


Figure 1: Distribution of company groups around the CbCR threshold

Table 1: Effective tax rates of company groups

	OLS (1) ETR	OLS (2) ETR	OLS (3) ETR	OLS (4) ETR	Panel FE (5) ETR	Panel FE (6) ETR	Panel FE (7) ETR
CbCRreq	-0.223 (0.242)	-0.755*** (0.209)	-0.716*** (0.209)	-0.272 (0.243)			
post2016	-2.763*** (0.171)	-2.913*** (0.265)	-0.353 (0.285)	-2.922*** (0.265)	-1.978*** (0.261)	0.500* (0.274)	-1.983*** (0.261)
CbCRreq * post2016	1.343*** (0.286)	0.889*** (0.280)	0.861*** (0.274)	-0.133 (0.322)	0.726** (0.287)	0.585** (0.281)	-0.402 (0.331)
Stat. CIT rate			0.756*** (0.0350)			0.830*** (0.0359)	
Haven*CbCRreq				-1.203*** (0.313)			
Haven*CbCRreq * post2016				2.576*** (0.473)			2.857*** (0.480)
cons	29.52*** (0.155)	17.44*** (5.844)	-25.61*** (6.230)	17.36*** (5.797)	29.51*** (0.179)	5.085*** (1.066)	29.52*** (0.179)
Year FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	Yes	Yes	Yes	-	-	-
Industry FE	No	Yes	Yes	Yes	-	-	-
N	85233	85063	84954	85063	85233	85124	85233
R ²	0.004	0.157	0.162	0.158			

Standard errors in parentheses. Standard errors are robust and clustered at the company level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: Probability of tax haven presence of company groups

	OLS	OLS	Panel FE	Logit	Logit FE
	(1)	(2)	(3)	(4)	(5)
	Haven	Haven	Haven	Haven	Haven
CbCRreq	0.158*** (0.00636)	0.150*** (0.00590)		1.659*** (0.0606)	
post2016	0.0138*** (0.00197)	0.0420*** (0.00302)	0.0560*** (0.00289)	0.580*** (0.0449)	3.003*** (0.112)
CbCRreq * post2016	0.0629*** (0.00495)	0.0586*** (0.00493)	0.0615*** (0.00484)	0.211*** (0.0450)	0.417*** (0.0985)
cons	0.0696*** (0.00245)	0.318*** (0.0931)	0.0852*** (0.00204)	-1.489*** (0.528)	
Year FE	No	Yes	Yes	Yes	Yes
Country FE	No	Yes	No	Yes	No
Industry FE	No	Yes	No	Yes	No
<i>N</i>	105240	105005	105240	103307	13597
<i>R</i> ²	0.062	0.217			

Standard errors in parentheses. Standard errors are robust and clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Tax in EBIT of company groups

	OLS	OLS	Panel FE	Panel FE
	(1)	(2)	(3)	(4)
	Tax/EBIT	Tax/EBIT	Tax/EBIT	Tax/EBIT
CbCRreq	-1.038*** (0.216)	-1.008*** (0.216)		
post2016	-1.382*** (0.268)	0.593** (0.283)	-0.473* (0.278)	1.675*** (0.291)
CbCRreq * post2016	-0.254 (0.269)	-0.273 (0.265)	-0.687** (0.277)	-0.782*** (0.272)
Stat. CIT rate		0.586*** (0.0350)		0.607*** (0.0360)
cons	10.63*** (3.191)	-22.48*** (3.756)	26.19*** (0.182)	8.317*** (1.060)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	-	-
Industry FE	Yes	Yes	-	-
<i>N</i>	86626	86506	86799	86679
<i>R</i> ²	0.161	0.164		

Standard errors in parentheses Standard errors are robust and clustered at the company level. Columns (1) and (2) report results of pooled OLS regressions, Columns (3) and (4) report results of fixed-effects panel regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: RoA, Leverage, interest payments, and taxation of UPEs

	(1) RoA	(2) RoA	(3) Leverage	(4) Interest/EBIT
CbCRreq	-0.0220 (0.0910)	0.290*** (0.0848)	2.357*** (0.294)	-2.998*** (0.633)
post2016	-0.170** (0.0793)	-0.336*** (0.0756)	-1.634*** (0.194)	-7.936*** (0.706)
CbCRreq * post2016	-0.378*** (0.0844)	-0.123 (0.0807)	2.121*** (0.220)	3.170*** (0.700)
Leverage		-0.112*** (0.00209)		
cons	5.642*** (0.701)	7.568*** (0.712)	19.20*** (3.370)	34.98*** (5.694)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	90150	88314	102117	87968
R ²	0.070	0.173	0.132	0.077

Standard errors in parentheses. Standard errors are robust and clustered at the company level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Headquarter bias in taxation and profits

	(1) Profit share Headquarter	(2) Profit share Headquarter	(3) Tax share Headquarter	(4) Tax share Headquarter
CbCRreq	-7.919*** (0.830)	-7.352*** (0.864)	-11.01*** (0.999)	-9.883*** (1.073)
post2016	-2.682*** (0.829)	-2.687*** (0.831)	-4.994*** (0.956)	-4.966*** (0.958)
CbCRreq * post2016	-2.500*** (0.756)	-2.173*** (0.777)	-3.069*** (0.844)	-2.802*** (0.851)
Pre-tax profits (group)		-0.00261* (0.000134)		
Taxation (group)				-0.00185*** (0.000609)
cons	113.8*** (6.386)	113.9*** (6.387)	109.2*** (8.478)	109.2*** (8.427)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	No
Industry FE	Yes	Yes	Yes	No
N	22103	22014	22330	22213
R ²	0.254	0.255	0.241	0.243

Standard errors in parentheses. Standard errors are robust and clustered at the firm level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Tax growth

	OLS	OLS	Panel FE	Panel FE
	(1)	(2)	(3)	(4)
	Tax growth	Tax growth	Tax growth	Tax growth
CbCRreq	-2.133* (1.257)	-2.121* (1.255)		
post2016	-36.19*** (2.273)	-31.71*** (2.463)	-32.77*** (2.411)	-41.26*** (2.623)
CbCRreq * post2016	-2.048 (2.050)	-2.086 (2.051)	0.723 (2.171)	0.563 (2.172)
Stat. CIT rate		1.396*** (0.267)		1.376*** (0.284)
cons	58.58*** (12.14)	-20.54 (19.47)	69.15*** (1.764)	28.96*** (8.547)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	No	No
Industry FE	Yes	Yes	No	No
<i>N</i>	72537	72431	72665	72559
<i>R</i> ²	0.014	0.015		

Standard errors in parentheses. Standard errors are robust and clustered at the company level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Subsidiaries

Table 7: Effective tax rates of subsidiaries

	(1) ETR All	(2) ETR High Tax	(3) ETR Low Tax	(4) ETR mdist All
CbCRreq	0.653*** (0.149)	-0.775*** (0.297)	0.791*** (0.274)	0.846*** (0.112)
post2016	0.241 (0.198)	2.385*** (0.406)	0.450 (0.405)	0.191 (0.149)
CbCRreq * post2016	0.102 (0.173)	0.0559 (0.349)	-0.455 (0.320)	-0.642*** (0.134)
Stat. CIT rate (Subs.)	0.734*** (0.0101)	1.313*** (0.0357)	0.730*** (0.0268)	
cons	-2.701 (5.649)	-34.73*** (3.075)	12.64*** (4.296)	11.55*** (3.494)
Year FE	Yes	Yes	Yes	Yes
UPE Country FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	134840	51160	31646	134840
R ²	0.184	0.188	0.124	0.051

Standard errors in parentheses. Standard errors are robust and clustered at the subsidiary level.
 $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: RoA and profit shares of subsidiaries

	(1) RoA High Tax	(2) RoA Low Tax	(3) RoA All	(4) Profit share High Tax	(5) Profit share Low Tax
CbCRreq	-2.115*** (0.316)	-2.220*** (0.377)	-1.080*** (0.182)	-19.99*** (0.560)	-14.48*** (0.611)
post2016	-2.769*** (0.357)	-2.105*** (0.426)	-3.206*** (0.209)	-7.496*** (0.690)	-3.775*** (0.650)
CbCRreq * post2016	0.811** (0.323)	-0.394 (0.400)	-1.012*** (0.362)	4.428*** (0.649)	1.706*** (0.593)
Pre-tax profits (group)				-0.898*** (0.0330)	-0.873*** (0.0433)
Stat. CIT rate (Subs.)			-0.155*** (0.0128)		
CITRate * CbCRreq * post2016			0.0408*** (0.0116)		
cons	33.14*** (3.451)	-1.099 (2.321)	9.690** (4.021)	63.22*** (9.793)	20.16** (8.123)
Year FE	Yes	Yes	Yes	Yes	Yes
GUO Country FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
N	59577	39208	156761	44277	32236
R ²	0.080	0.061	0.066	0.301	0.239

Standard errors in parentheses. Standard errors are robust and clustered at the subsidiary level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Formula apportionment - Tax share

	OLS	OLS	Panel FE	Panel FE
	(1)	(2)	(3)	(4)
	Tax share	Tax share	Tax share	Tax share
Share Assets	0.368*** (0.0251)	0.339*** (0.0234)	0.173*** (0.0504)	0.186*** (0.0461)
Share Assets * CbCRreq*post2016	-0.0279 (0.0460)	-0.0819** (0.0354)	0.0894 (0.0545)	0.0223 (0.0415)
Share Revenue	0.384*** (0.0230)	0.384*** (0.0224)	0.523*** (0.0479)	0.492*** (0.0479)
Share Revenue * CbCRreq*post2016	-0.0453 (0.0476)	-0.0482 (0.0390)	-0.166*** (0.0494)	-0.0623* (0.0368)
Share Cost of empl.	0.118*** (0.0174)		-0.0126 (0.0274)	
Share CoE * CbCRreq*post2016	-0.0433** (0.0173)		0.00706 (0.0162)	
Share Employees		0.165*** (0.0210)		0.0252 (0.0366)
Share Employees * CbCRreq*post2016		0.0511 (0.0438)		-0.0134 (0.0474)
Year FE	Yes	Yes	Yes	Yes
GUO Country FE	Yes	Yes	No	No
Industry FE	Yes	Yes	No	No
<i>N</i>	41578	68593	41579	68600
<i>R</i> ²	0.547	0.552		

Standard errors in parentheses. Standard errors are robust and clustered at the firm level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix A: Definitions and summary statistics

Table A1: BEPS Actions

Action 1	Address the Tax Challenges of the Digital Economy
Action 2	Neutralise the Effects of Hybrid Mismatch Arrangements
Action 3	Strengthen CFC Rules
Action 4	Limit Base Erosion via Interest Deductions and Other Financial Payments
Action 5	Counter Harmful Tax Practices More Effectively, Taking into Account Transparency and Substance
Action 6	Prevent Treaty Abuse
Action 7	Prevent the Artificial Avoidance of PE Status
Action 8-10	Assure that Transfer Pricing Outcomes are in Line with Value Creation
Action 11	Measuring and Monitoring BEPS
Action 12	Require Taxpayers to Disclose their Aggressive Tax Planning Arrangements
Action 13	Re-examine Transfer Pricing Documentation
Action 14	Make Dispute Resolution Mechanisms More Effective
Action 15	Develop a Multilateral Instrument

Actions and descriptions as listed in Annex A of the Explanatory Statement of the 2015 Final Reports available at <https://www.oecd.org/ctp/beps-explanatory-statement-2015.pdf>. Actions in bold are the four minimum standards of the Inclusive Framework.

Table A2: Number of company groups by country in treatment and control group

Coun-try	No CbCR	CbCR	Coun-try	No CbCR	CbCR	Coun-try	No CbCR	CbCR	Coun-try	No CbCR	CbCR
AE	20	5	EC	3	2	LA	2		PS	1	
AR	22	4	EE	3	1	LB	2		PT	49	8
AT	96	28	EG	21	3	LI	1		QA	10	1
AU	154	84	ES	302	63	LK	17		RO	8	1
BA	3		FI	123	41	LR		1	RS	5	
BB	2		FJ	1		LT	19		RU	101	22
BD	11		FR	357	118	LU	32	31	SA	51	9
BE	176	35	GB	752	231	LV	11		SD	1	
BG	7		GH	2	1	MA	17		SE	268	65
BH	4	1	GI	1		MC	1		SG	164	31
BM	161	62	GR	43	11	ME	1		SI	6	3
BO	2		GY	1		MH	21	2	SK	16	
BR	147	50	HK	33	31	MK	2		SV	1	
BS	2		HR	26	1	MT	4		SZ	1	
BW	3		HU	10	4	MU	10	1	TH	186	21
CA	142	105	ID	124	17	MW	1		TN	9	
CH	74	57	IE	34	35	MX	29	24	TR	61	11
CI	1	1	IL	86	21	MY	214	29	TT	3	2
CL	45	18	IN	528	103	NA	1		TW	474	118
CM	1		IR	12	4	NG	6		UA	35	1
CN	1,767	563	IS	23	2	NL	336	61	US	794	932
CO	15	6	IT	610	98	NO	167	42	UY	4	
CR		1	JM	4		NZ	62	14	VG	7	3
CW		2	JO	4		OM	14		VN	104	7
CY	13	4	JP	1,219	646	PA	2	2	ZA	44	51
CZ	4	1	KE	2		PE	17	4	ZM	2	
DE	870	149	KR	495	191	PG	2	1	ZW	6	
DK	137	38	KW	28	4	PH	33	11			
DO	1		KY	349	107	PK	29	3			
DZ	1		KZ	8		PL	119	15			

Table A3: Number of observations in treatment and control group by year (company groups)

Year	No CbCR	CbCR
2009	5,648	3,764
2010	6,785	3,896
2011	7,739	4,058
2012	8,348	4,178
2013	9,065	4,275
2014	10,534	4,358
2016	12,668	4,476
2017	10,972	4,476

Table A4: Summary statistics of key variables (company groups)

Variable	Obs.	Mean	Std. Dev.	Min	Max
No CbCR					
ETR (%)	56,889	28.65	18.84	0.75	179.75
RoA (%)	60,656	7.37	5.89	0.16	34.36
Leverage (%)	69,377	22.73	18.14	0	79.26
Interest/EBIT (%)	58,438	30.87	48.77	0.04	462.87
Tax/EBIT (%)	57,880	26.17	18.85	0.54	174.85
Tax Share (HQ)	16,772	55.58	33.85	0.06	100
Profit Share (HQ)	16,344	63.06	29.84	0.73	100
Pre-tax Profits (mEUR)	71,444	20.25	56.98	-340.48	2798
Taxation (mEUR)	71,256	5.18	11.61	-48.58	528.78
Total Assets (mEUR)	70,535	454.96	767.29	38.53	23109
Haven	71,759	0.074	0.26	0	1
CbCR					
ETR (%)	28,344	28.95	16.48	0.75	179.17
RoA (%)	29,686	7.48	5.68	0.02	34.30
Leverage (%)	32,958	25.16	16.83	0	79.31
Interest/EBIT (%)	29,675	28.54	43.55	0.04	462.97
Tax/EBIT (%)	28,919	25.97	16.60	0.54	175
Tax Share HQ (%)	5,610	49.21	30.92	0.06	100
Profit Share HQ (%)	5,817	59.33	27.64	0.72	100
Pre-tax Profits (mEUR)	31,928	300.84	535.64	-341.11	3643
Taxation (mEUR)	31,548	72.55	121.24	-48.85	782.69
Total Assets (mEUR)	33,105	6798	13326	42.39	122532
Haven	33,481	0.25	0.43	0	1

Table A5: List of tax haven countries

Andorra	Gibraltar	Netherlands Antilles
Anguilla	Grenada	Niue
Antigua and Barbuda	Guernsey	Panama
Aruba	Isle of Man	Samoa
The Bahama	Jersey	San Marino
Bahrain	Liberia	Seychelles
Bermuda	Liechtenstein	St. Lucia
Belize	Malta	St. Kitts & Nevis
British Virgin Islands	Marshall Islands	St. Vincent and the Grenadines
Cayman Islands	Mauritius	Turks & Caicos Islands
Cook Islands	Monaco	US Virgin Islands
Cyprus	Montserrat	Vanuatu
Dominica	Nauru	

Source: OECD (2000).

Table A6: Number of observations in treatment and control group by year (subsidiaries)

Year	No CbCR	CbCR
2009	2,708	9,561
2010	3,438	12,970
2011	3,640	13,800
2012	4,036	14,873
2013	4,389	16,401
2014	5,486	17,703
2016	6,292	20,129
2017	6,984	22,148

Table A7: Number of subsidiaries by country in treatment and control group

Coun-try	No CbCR	CbCR	Coun-try	No CbCR	CbCR	Coun-try	No CbCR	CbCR	Coun-try	No CbCR	CbCR
AT	248	859	ES	967	2,420	JP	777	3,983	PL	423	1,128
AU	438	1,229	FI	271	488	KR	509	983	PT	333	595
BE	512	1,473	FR	1,168	5,301	LT	19	62	SE	1,132	1,286
CH	4	11	GB	2,875	6,394	LU	38	209	SI	29	75
CL		4	GR	62	223	LV	26	67	SK	70	277
CZ	204	802	HU	69	404	MX	43	59	TR	69	126
DE	968	2,913	IE	153	664	NL	300	1,041	US	5	1
DK	221	440	IS	38	19	NO	665	935			
EE	33	90	IT	1,013	1,878	NZ	73	202			

Table A8: Summary statistics of key variables (subsidiaries)

Variable	Obs.	Mean	Std. Dev.	Min	Max
No CbCR					
ETR (%)	30,073	24.02	12.69	0.06	96.37
RoA (%)	35,313	15.02	14.44	0.39	97.31
Profit Share (%)	26,392	23.87	24.65	0.02	100
Tax Share (%)	25,916	21.62	24.92	0.002	100
Assets Share (%)	34,777	14.67	18.35	0.01	86.53
CoE Share (%)	19,439	20.58	25.39	0.01	100
Employees Share (%)	19,509	17.05	22.09	0.004	98.81
Revenue Share (%)	34,590	16.87	20.69	0.01	94.15
CbCR					
ETR (%)	104,773	25.90	14.02	0.06	96.96
RoA (%)	121,454	13.74	13.37	0.39	97.41
Profit Share (%)	98,364	4.85	11.20	0.02	100
Tax Share (%)	98,946	3.21	8.71	0.002	100
Assets Share (%)	126,023	2.46	7.00	0.004	86.49
CoE Share (%)	36,054	4.88	12.06	0.01	100
Employees Share (%)	68,451	2.18	6.37	0.004	98.72
Revenue Share (%)	125,605	2.68	6.99	0.01	94.04

Appendix B: Additional result tables

Table B1: Effective tax rates of company groups – Entropy Balancing

	(1)	(2)	(3)	(4)
	ETR 2016	ETR 2017	ETR 2016	ETR 2017
CbCRreq	0.745** (0.326)	0.599* (0.363)	0.771** (0.335)	0.662* (0.365)
cons	27.13*** (0.201)	26.69*** (0.220)	27.12*** (0.214)	26.65*** (0.220)
<i>N</i>	8598	7926	7912	7800

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B2: Effective tax rates of financial companies

	OLS	OLS	Panel FE
	(1)	(2)	(3)
	ETR	ETR	ETR
CbCRreq	-0.0303 (1.757)	1.328 (1.601)	
post2016	-6.469*** (1.922)	-4.189** (1.835)	-1.775 (1.786)
CbCRreq * post2016	1.900 (2.086)	0.685 (1.973)	2.411 (1.978)
cons	32.89*** (1.675)	34.69*** (7.953)	30.95*** (1.333)
Year FE	Yes	Yes	Yes
Country FE	No	Yes	-
Industry FE	No	Yes	-
<i>N</i>	2705	2678	2705

Standard errors in parentheses. Standard errors are robust and clustered at the company level. Columns (1) and (2) report results of pooled OLS regressions, Column (3) reports the results of a fixed-effects panel regression. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B3: Effective tax rates of subsidiaries, Panel FE estimations

	(1) ETR All	(2) ETR High Tax	(3) ETR Low Tax	(4) ETR mdist All
CbCRreq	-0.748 (0.629)	-0.909 (1.139)	-2.524 (1.555)	1.334*** (0.467)
post2016	0.229 (0.228)	1.318*** (0.418)	0.157 (0.492)	0.437*** (0.161)
CbCRreq * post2016	0.245 (0.190)	-0.629* (0.366)	0.250 (0.354)	-1.008*** (0.151)
Stat. CIT rate (Subs.)	0.844*** (0.0216)	0.864*** (0.0365)	0.768*** (0.0438)	
cons	2.819*** (0.802)	0.0468 (1.543)	6.059*** (1.638)	8.707*** (0.370)
Year FE	Yes	Yes	Yes	Yes
N	134846	51165	31647	134846

Standard errors in parentheses. Standard errors are robust and clustered at the firm level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B4: Profitability and profit share of subsidiaries, FE panel estimations

	(1) RoA High Tax	(2) RoA Low Tax	(3) RoA All	(4) Profit share High Tax	(5) Profit share Low Tax
CbCRreq	0.907 (1.137)	2.871** (1.345)	-0.528 (0.614)	-9.971*** (3.172)	-9.773*** (2.207)
post2016	-2.979*** (0.315)	-4.241*** (0.392)	-3.963*** (0.195)	-7.234*** (0.610)	-6.048*** (0.570)
CbCRreq * post2016	1.052*** (0.286)	0.676* (0.363)	-1.047*** (0.316)	5.931*** (0.579)	3.695*** (0.543)
Pre-tax profits (group)				-0.586*** (0.0740)	-0.697*** (0.0741)
Stat. CIT rate (Subs.)			-0.155*** (0.0167)		
CIT*CbCRreq *post2016			0.0602*** (0.00986)		
cons	12.71*** (0.960)	14.62*** (1.024)	20.30*** (0.682)	18.63*** (2.700)	19.06*** (1.710)
Year FE	Yes	Yes	Yes	Yes	Yes
N	59582	39209	156767	44282	32237

Standard errors in parentheses. Standard errors are robust and clustered at the subsidiary level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B5: Profitability of subsidiaries in individual countries

	(1) RoA DE	(2) RoA FR	(3) RoA IE	(4) Profit share DE	(5) Profit share FR	(6) Profit share IE
CbCRreq	-1.430** (0.715)	-1.181** (0.565)	-4.367* (2.228)	-22.79*** (1.040)	-19.03*** (1.036)	-17.32*** (5.085)
post2016	-3.182*** (0.948)	-4.383*** (0.592)	0.775 (2.529)	-5.352*** (1.608)	-8.624*** (1.196)	-2.314 (2.817)
CbCRreq * post2016	1.716** (0.861)	1.114** (0.542)	-2.816 (2.355)	3.221** (1.518)	3.522*** (1.150)	2.438 (2.978)
Pre-tax profits (group)				-0.641*** (0.0700)	-0.500*** (0.0571)	-0.616*** (0.118)
cons	44.99*** (13.07)	8.771*** (2.578)	71.30*** (6.432)	40.46*** (8.503)	26.99* (14.55)	13.28*** (4.797)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
UPE Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	11658	21284	2454	9157	12076	2084
<i>R</i> ²	0.083	0.070	0.181	0.351	0.358	0.277

Standard errors in parentheses. Standard errors are robust and clustered at the subsidiary level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.