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Profit shifting by EU banks: evidence from country-by-country reporting

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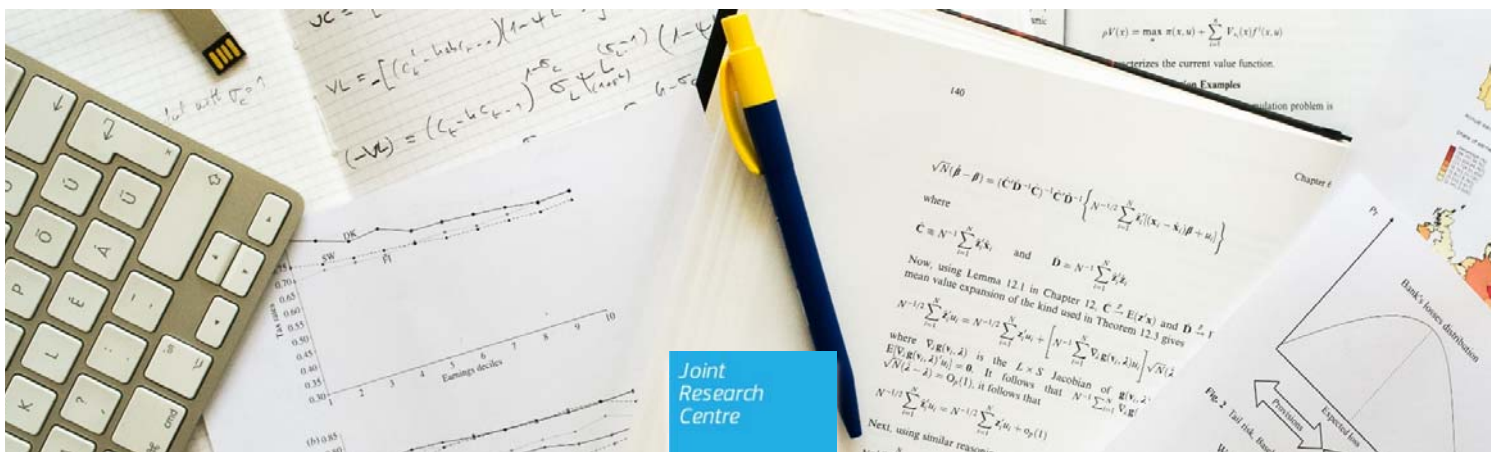
JRC TECHNICAL REPORTS

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Profit shifting by EU banks: evidence from country-by-country reporting

Serena Fatica, Wildmer Daniel Gregori*

Abstract

We investigate profit shifting by the largest and systemically relevant European multinational banks using new data made available through country-by-country reporting for the financial years 2014-2016. We capture tax incentives for income shifting using a multilateral tax differential between the local tax rate and the tax rates in the other countries where the bank has operations. We find that profits - particularly those recorded in tax havens - are negatively affected by corporate taxation. Moreover, the bulk of income shifting seems to take place among subsidiaries, as foreign-to-foreign tax differences matter significantly more than home-to-foreign differentials. Simulation results suggest that the amount of shifted profits in tax havens is about 38% of true profits. The ratio between shifted and true profits drops to about 7% when selected non havens are considered.

Keywords: Banks, Tax havens, Regulation, Tax avoidance, Transparency.

JEL classification: G21, G28, H26, H87.

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1 Introduction

“Base erosion constitutes a serious risk to tax revenues, tax sovereignty and tax fairness for OECD member countries and non-members alike. While there are many ways in which domestic tax bases can be eroded, a significant source of base erosion is profit shifting” (OECD, 2013). In the recent years, a series of scandals (Offshore leaks, Luxleaks, Swissleaks and Panama Papers) have raised attention on the role that financial institutions play in sheltering corporate or private wealth, possibly easing tax avoidance. Like any other multinational companies, financial institutions may take advantage of low tax jurisdictions, such as tax havens, to shift profits in order to reduce their global tax burden.

Multinationals may avoid taxation implementing transfer pricing between entities under common control. For instance, they can strategically locate their intangible assets in a low tax country, so as to minimize taxes on income from royalties (Dischinger and Riedel, 2011). They may also inflate costs in countries that offer tax relief on specific items, such as interest payments, thus ultimately increasing the leverage in high tax countries (Gu et al., 2015). Next to that, banks might also have an incentive to operate in tax and financial havens to take advantage of a less stringent regulatory environment than in advanced economies, including when it comes to rules on transparency and banking secrecy (Balakina et al., 2017).

Against this background, in the aftermath of the global financial crisis the European Union (EU) has promoted a policy agenda aimed to enhance transparency and financial stability. On July 17th, 2013, the EU’s fourth Capital Requirements Directive (CRD IV) entered into force, affirming that “increased transparency regarding the activities of institutions, and in particular regarding profits made, taxes paid and subsidies received, is essential for regaining the trust of citizens of the Union in the financial sector. Mandatory reporting in that area can therefore be seen as an important element of the corporate responsibility of institutions towards stakeholders and society” (Recital 52 to Directive 2013/36/EU). In particular, article 89 requires a new country-by-country public reporting (CBCR) obligation for banks and investment firms, which have to disclose annually the geographical location of their operations, including detailed information on turnover, profit, taxes, government subsidies, and number of employees at the different locales. Thus, the CBCR requirements allow to study comprehensively the activities of EU banks worldwide, including in tax havens. This is a major advance, since commercial firm-level databases (such as Orbis) do not contain exhaustive information on multinational activities in these jurisdictions, as recently highlighted by Tørsløv *et al.* (2018).

Failing to account for operations in tax havens has important implications for the analysis of the international allocation of corporate income. Figure 1 depicts profits per employees (in full-time equivalent units), as reported in the CBCR data, both at the global level, and separately for tax havens and non-havens, respectively. Each employee generates 48,000 euros of profits on average. However, the partial averages range from roughly 40,000 in non-havens to 220,000 euros in tax havens. By the same token, while the overall average profitability (calculated as the ratio of profits over turnover) is around 20%, the value for tax havens is more than double, at 47% ⁽¹⁾. The extent to which such abnormal profitability in low tax jurisdictions is the result of shifting accounting profits rather than of real activity is the object of our econometric analysis.

⁽¹⁾ See section 2 for further details about CBCR data.

Figure 1. Profits per employees (in Euro) and Profitability



Notes: Profit per employees (left axis) is the ratio between Earnings Before Taxation (EBT) and the number of employees in full-time equivalent units. Profitability (right axis) is the ratio between EBT and Turnover. Country-by-country reporting data related to 2014-2016 financial years.

Our paper is related to the literature on profit shifting, initiated by Hines and Rice (1994). Dharmapala (2014) provides a review of the numerous empirical contributions. When data allows, the focus is placed on the role played by tax havens in base erosion and income shifting. For instance, Dowd *et al.* (2017) uncover significant nonlinearities in the extent to which accounting profits of US corporations react to tax rates. The response is particularly strong in low-tax jurisdictions where supposedly the fiscal cost represents the main incentive for multinationals.

While most of the empirical studies in the field focus on non-financial corporations, the literature on profit shifting by financial institutions is still limited. When investigating the effects of international double taxation on interest margins and foreign direct investment in the banking industry, Huizinga *et al.* (2014) find evidence of income shifting in the presence of low tax rates. Using a commercial database with bank-level data, Merz and Overesch (2016) find that the profitability of bank subsidiaries is much more sensitive to tax rates than that of non-financial companies. Their results suggest that it is somewhat easier for financial institutions to book profits internationally for tax reasons than it is for manufacturing companies. Interestingly, however, they do not consider tax havens in their analysis. In general, the evidence on global profit shifting by banks – including in tax havens – is limited by the data issues discussed above.

Our study contributes to the literature on profit shifting by analysing the behaviour of European financial institutions. By exploiting a new dataset based on CBCR data, we can provide a comprehensive assessment of banks' profitability in the global arena, including tax havens. To the best of our knowledge, we are among the first to use this data. Oxfam (2017) uses CBCR data for the 2014 financial year for descriptive analyses similar to the one we show in Figure 1. They take that as *prima facie* evidence of profit shifting to countries with low or zero corporate tax rate. Using data for a larger cross-section of banks from the same year, Bouvatier *et al.* (2017) estimate a gravity model to investigate the determinants of bank international operations. They find that tax havens attract a comparatively higher level of bank activities – proxied with turnover –, all other factors being equal.

Thus, our study is the first attempt to examine comprehensively tax-induced income shifting by the biggest and systemically relevant European multinational financial institutions. To this purpose, we employ CBCR data for the 2014-2016 financial years.

Importantly, the use of a panel allows us to use fixed effects in order to control for unobservables that might affect profitability, so as to minimize the concern for omitted variable bias that plagues cross-sectional studies. Moreover, we employ a multilateral tax differential that appropriately captures tax incentives to income shifting, in the spirit of Huizinga and Laeven (2008). For multinational banks, the decision to book profits in a jurisdiction does not depend on the level of local taxation only. In fact, arbitrage possibilities are available if the level of corporate taxation differs across the jurisdictions where the group has operations. Thus, the parent company will allocate profits internationally in a strategic way, internalizing the overall bankruptcy cost implied by high debt levels.

Our results suggest that bank profits respond to corporate taxes, and particularly so in low-tax countries. Simple simulations based on our econometric exercise indicate that 7% of true profits are subject to profit shifting activities for non-havens countries, while for tax havens this ratio increases to 38%. The remainder of the paper is organised as follows. Section 2 sketches the theoretical framework. Section 3 illustrates our empirical methodology. The data is presented in Section 4. Our main results, as well as robustness checks, are detailed in section 5. Section 6 concludes.

2 Theoretical framework

Our empirical analysis is based on the theoretical model developed by Huizinga and Laeven (2008) who extend to a multilateral context the workhorse model proposed by Hines and Rice (1994). In this setup, reported earnings can be separated into "true" profits generated by economic activity, and a second component stemming from profit shifting. Formally, the profits of a multinational banking group in country c are:

$$B_c + S_c - \psi(S_c)^2/2B_c. \quad (1)$$

In equation (1), B denotes 'true' economic profits and S is the amount of shifted profits. If $S > 0$ ($S < 0$), then profits are shifted in (out of) country c . The last term in equation (1) indicates the positive and convex total cost of profit shifting. The marginal cost of profit shifting is assumed to increase proportionally with the ratio of income shifted to true profits, S_c/B_c . This is because it becomes increasingly costlier to hide profit shifting from the tax authorities the larger the amount of relocated income, ceteris paribus (Haufler and Schjelderup, 2000). By the same token, the shape of the marginal cost reflects the fact that a company's accounts have to be distorted relatively little to accommodate a given level of profit shifting if true profits B_c are relatively large. The factor of proportionality is ψ . The resulting total cost function ($\psi(S_c)^2/2B_c$) attains a minimum at $S_c = 0$, and is symmetric.

The multinational group maximizes after-tax profits given by:

$$\max_{S_c} \sum_c (1 - t_c) (B_c + S_c - \psi(S_c)^2/2B_c)$$

under the constraint that $\sum_c S_c \leq 0$, that is the flows of inward and outward shifted profits cancel out. This is because income shifting activities simply reallocate profits across jurisdictions, but do not create an additional return. In the equation above, t is the tax rate on corporate profits. In the formulation we adopt, thus, profit shifting costs are assumed to be deductible from the tax base. Consistent with Hines and Rice (1994), the first-order conditions with respect to S_c look like:

$$(1 - t_c) \left(1 - \psi \frac{S_c}{B_c}\right) - \lambda = 0, \text{ for all } c = 1, \dots, n, \quad (2)$$

where λ denotes, as usual, the Lagrange multiplier. Solving equation (2) for S_c , we obtain the equilibrium value of profits shifted into country c by the multinational as:

$$S_c = \left(\frac{B_c}{\psi} \right) \frac{1}{(1-t_c)} \frac{\sum_{j \neq c}^n \left(\frac{B_j}{1-t_j} \right) (t_c - t_j)}{\sum_j^n \left(\frac{B_j}{1-t_j} \right)}. \quad (3)$$

$\underbrace{\hspace{10em}}_{\text{multilateral tax difference}} \equiv T_{cj}$

Equation (3) shows that inward profit shifting increase with the amount of true profits (B_c) and decreases with the net-of-tax rate in the host country ($1 - t_c$). This is a direct consequence of assuming that profit shifting expenses are tax deductible in the country where they are incurred. The second term on the right-hand side of equation (3) is a multilateral tax differential, which captures the fiscal incentives to record profits in country c vis-à-vis all the other locales where the multinational operates. The bilateral tax differences are aggregate into a weighted average, where the weights are given by the scale of bank operations, and the net-of-tax rates in the corresponding countries. Therefore, the composite tax difference conflates all information about incentives and potential for profit shifting in a multilateral setting.

True and shifted profits add up to reported profits, gross of shifting costs. Thus, overall reported profits, denoted by π_c , can be expressed as:

$$\pi_c = \left[B_c - \frac{B_c}{\psi} T_{cj} \right] = B_c \left[1 - \frac{1}{\psi} T_{cj} \right] \quad (4)$$

Huizinga and Laeven (2008) use equation (4) to derive an empirical model that can be taken to the data. Additional assumptions are needed, however, on the way true profits, which are unobserved, are generated. This is usually done using a production function approach, whereby true income is proxied with observable inputs in the production process. As is apparent from equation (4), the parameter ψ plays a crucial role also in the empirical model, because its inverse captures exactly the responsiveness of reported profits to the multilateral tax differential. The next section discusses the empirical approach and its implementation more in detail.

3 Empirical methodology

To investigate profit shifting of international financial institutions we follow the standard identification strategy that links variations in tax rates to reported income in multinational subsidiaries, conditioning on other determinants of profits. Specifically, for the latter, we implement a production function approach that gives the "true" amount of profits that a bank would have generated without distortionary incentives (Hines and Rice, 1994). Moreover, we control for additional factors that drive profitability, such as macroeconomic variables and the quality of institutions in the host country.

Our baseline model is as follows:

$$\ln(\pi_{gct}) = \beta_0 + \beta_1 T_{gct} + \beta_2 \ln(K_{gct}) + \beta_3 \ln(L_{gct}) + \beta_4 \mathbf{X}_{ct} + \gamma_g + \phi_t + \omega_c + \epsilon_{gct}, \quad (5)$$

where π_{gct} are the earnings before taxes reported by each group g on its operations in a foreign country c at time t . T_{gct} is our measure of tax incentive, calculated as the weighted average of the bilateral tax differentials between country c and all the other group locations, derived from equation (3). As mentioned above, the coefficient for the tax term can be derived from the theoretical setup as the inverse of the parameter in the cost function, $\beta_1 = 1/\psi$. Following Dowd et al. (2017), we calculate the composite tax index using two alternative measures of taxation: the statutory tax rate and the effective tax rate obtained from the amount of taxes paid (for further details see the data section). The weights in the multilateral tax differential are given by the number of employees that the banking group has in each foreign jurisdiction. The theoretical model sketched in Section

2 would require a weighting scheme based on true profits, which are clearly unobserved. Hence, one has to look for a variable that approximates true profitability sufficiently well. For instance, Huizinga and Laeven (2008) use sales. However, Hines et al. (2016) point out that this variable might be fraught with problems as prone to manipulation precisely because of profit shifting. Therefore, we prefer the number of employees as weighting variable, since we believe it better reflects the actual size of foreign operations.

Capital (K_{gct}) and labour (L_{gct}), both in logs, are the inputs in the production function, which are meant to measure the level of “normal” profits. We measure labour as the number of employees (full-time equivalent) employed by each group in each country. In the case of banks, measuring the capital input is less straightforward. A standard proxy used in profit shifting studies for non-financial companies is the amount of fixed capital. By contrast, considering the role of banks as financial intermediaries, the very same definition of what constitutes an input (other than labour) is not as clear and immediate. Hence, following Merz and Overesch (2016), we consider fixed and financial assets as an input. Since the CBCR data do not report information on assets at the country-group level, we use balance sheet data from the Orbis Bank Focus dataset. Specifically, we consider the consolidated value of total assets at the group level and then we apportion it among the different group locales as reported in the CBCR data. Assets are attributed in proportion to the share of turnover that each observation has in the respective group turnover. Indeed, the rationale is that turnover is normally generated where assets are located.

The vector X_{ct} includes two indicators for governance quality, which capture: (i) the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (“Government effectiveness”); (ii) the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development (“Regulatory quality”) (2). The country-specific variables are taken with one year lag to avoid endogeneity issues.

The estimating equation (5) also includes a set of fixed effects. In particular, γ_g indicates group dummies, which allow us to account for the structure of each banking group. Group dummies are enough to control for selection effects if the location pattern of the group is constant over time, or if location patterns change for reasons entirely unrelated to changes in tax rates. Time-varying common shocks are captured by year dummies (ϕ_t). Finally, ω_c are country level fixed effects that control for unobserved time-invariant differences among jurisdictions. Given our composite tax variable, the use of country fixed effects does not imply that we have to rely only on time series variation to identify the impact of corporate taxes, which would be the case if we used the tax rate in the host country as fiscal variable. Finally, ϵ_{gct} is the error term.

4 Data

Our empirical analysis focuses on the largest and systemically relevant international banks based in Europe. In 2016 the Financial Stability Board (FSB), in accordance with the Basel Committee on Banking Supervision (BCBS) and national authorities, identified a list of institutions worldwide as systemically important (3), thirteen of which are also indicated by the European Banking Authority (EBA) as systemically relevant (4). Therefore, we include these banks in our dataset. We also include other international banks among those supervised by the ECB (5) in 2016 with total assets above 150 billion euro. Overall, we gather information on 27 multinationals banks headquartered in 8 European countries (i.e. Belgium, France, Germany, Italy, the Netherlands, Spain, Sweden and the United

(2) For further information on how the indicators are constructed, see Kaufmann et al. (2011). Data can be found at the following link: www.govindicators.org.

(3) See: <http://www.fsb.org/wp-content/uploads/2016-list-of-global-systemically-important-banks-G-SIBs.pdf>.

(4) See: <http://www.eba.europa.eu/risk-analysis-and-data/global-systemically-important-institutions/2017>.

(5) See: https://www.bankingsupervision.europa.eu/ecb/pub/pdf/list_of_supervised_entities_20160331.en.pdf.

Kingdom), and operating in 90 jurisdictions worldwide. The full list is reported in Appendix 1 ⁽⁶⁾.

A definite advantage of the newly available data we use is the information on bank operations in tax havens, as these jurisdictions are not well represented in commercial databases. To single out differences between havens and high-tax countries, however, we must preliminarily adopt a classification to distinguish the two types of jurisdictions. Even if there is not a univocal definition of tax haven (Palan et al., 2013), a number of features have been associated with that concept, such as no or low taxes, lack of effective exchange of information and lack of transparency (OECD, 1998). The policy packages implemented are often called Preferred Tax Regimes (PTRs) which could imply, for specific economic agents, such as foreign financial institutions, a reduction in taxation and removal of regulation. Dharmapala and Hines (2009) uncover a number of characteristics more likely associated to the tax havens status of a country. Among them, size seems to be quite relevant. Given the potentially arbitrary nature of the definition, there are several classifications for tax havens. In our analysis, we rely on the one by Gravelle (2013), which is widely used in the literature and thus allows us to compare our results with the findings from other studies ⁽⁷⁾.

We build our dataset using different sources – the main one being the CBCR data, which we describe in turn.

4.1 CBCR data

Since January 1st, 2015, financial institutions have to publicly disclose, on a consolidated basis and for each financial year, country-by-country data about their affiliates (subsidiaries or branches). Information disclosed under the CBCR obligation consists of: (a) name, nature of activities and geographical location; (b) turnover (net income); (c) number of employees on a full time equivalent basis; (d) profit or loss before tax ⁽⁸⁾; (e) tax on profit or loss; (f) public subsidies received. In this study we rely on three waves of data, covering the 2014-2016 financial years. For each financial institution, we collect CBCR data using consolidated annual reports and information available on banks' official websites.

Banking groups report the required data aggregated at the national level. This implies that, in each year, there is just one observation for each country in which they have at least one affiliate. Overall, we have collected 2,361 observations. Since the data is self-reported, we have carefully checked the quality of the information, to the extent possible. We first drop all observations with a negative turnover, as this might be an indication of inactive banks. This leads us to exclude 220 observations. Next, in 68 cases the reported number of employees is zero, while turnover is positive. In these cases, we corrected the number of employees to one, under the hypothesis that at least one employee on a full time equivalent basis is needed to generate a positive turnover. Finally, we drop further 356 observations reporting negative profits. This is because, since we are investigating profit shifting, we need to limit our sample to observations with positive profitability.

4.2 Tax variables

⁽⁶⁾ The financial institutions included in the dataset are: Abn Amro, Barclays, Bayerische, BBVA, Belfius, BNP Paribas, BPCE, Commerzbank, Credit Agricole, Credit Mutuel, Deutsche Bank, Dz Bank, HSBC, ING, Intesa SanPaolo, KBC, Landersbank Hessen Thuringen, Lloyds, Monte dei Paschi di Siena, Nationwide Building Society, Norddeutsche, Nordea, Rabobank, RBS, Santander, Societe' Generale, Unicredit.

⁽⁷⁾ Gravelle's (2013) list of tax havens combines the following sources: (i) Hines and Rice (1994), more oriented to business issues; (ii) Tax Justice Network, "Identifying Tax Havens and Offshore Finance Centers: http://www.taxjustice.net/cms/upload/pdf/Identifying_Tax_Havens_Jul_07.pdf; (iii) OECD (2000). See Appendix 1 for the list of tax havens countries in our sample, following the classification of Gravelle (2013).

⁽⁸⁾ In the rest of the paper, when we use the word "profits" we refer to reported profit or loss before tax.

As usually done in the literature, we consider the statutory corporate income tax (CIT) rate as a measure for profit shifting incentives. In particular, we collect information on the top statutory rates applicable to financial institutions, including potential surcharges, in all the jurisdictions where the banks in our sample report operations according to CBCR data ⁽⁹⁾. Our main sources are the International Bureau of Fiscal Documentation (IBFD), Trading Economics and the annual corporate tax summaries elaborated by Deloitte & Touch, Ernst & Young, KPMG and PricewaterhouseCoopers. However, as is well documented, the CIT might not properly reflect the marginal rate at which a company is de facto taxed. For instance, certain types of income might be subject to reduced taxation, or companies, particularly multinationals, might be granted tax holidays or be able to negotiate tax rebates ⁽¹⁰⁾. Thus, following Dowd et al. (2017), we employ a measure of the effective tax burden alternative to the statutory rate. Specifically, we exploit the information on taxes reported in the CBCR data to calculate a measure of effective tax rate (ETR). We proceed as follows. First, for each country-year-group observation, we obtain the effective rate of taxation by dividing the amount of taxes on profits by the EBT ⁽¹¹⁾. Then, we aggregate these rates into a profit-weighted average ETR at the country-year level. To avoid endogeneity issues, we assign to each observation the relevant ETR in the host country, calculated excluding the reference observation-specific effective tax rate ⁽¹²⁾. For this reason, we restrict our analysis to jurisdictions where, in each year, at least two banking groups have operations.

Figure 2 plots the distribution of the difference between CIT and ETR. In line with Dowd et al. (2017), we find that the spread between statutory and effective rates has a positive skewness, likely reflecting the fact that countries often provide tax preference arrangements to multinationals. As discussed above, our variable of interest in the econometric analysis is the multilateral tax difference, which captures the full set of incentives and possibilities to shift profits internationally. To get a grasp of the relationship between the tax level and the composite tax indicator, in **Figure 3** we plot the two variables for both the statutory and the effective rates.

4.3 Sample analysis

Table 1 presents summary statistics for the raw CBCR data and the tax rates, as detailed in the previous subsections, for the full estimating sample of foreign operations, as well as for tax havens and other countries, separately. The total number of observations is 1,622. On average, the turnover is 420 million euro. In relation to the number of employees full-time equivalent, while the overall average is 1,751 units, 2,052 workers on average are employed in non-havens, while only 668 in tax havens. In fact, expectedly, banks allocate the bulk of their activity in non-haven countries, which are bigger and mostly developed economies. However, the ratio of turnover over employees is higher in tax havens, specifically 0.49 million euro per employees in tax havens and 0.22 in non-havens. Furthermore, with respect to havens, profits are smaller in non-havens, while taxes are higher. This means that the tax burden in tax havens is lower, as confirmed by the ETR, which is ten percentage points higher in non-havens. In line with the ETR, also the CIT confirm a higher tax burden in non-havens, being in all the three groups higher than the ETR.

⁽⁹⁾ In the case of Jersey, financial institutions may be taxed either at a zero rate (the general rate) or at a 10% rate. The latter rate is applicable to financial institutions classified as such according to national regulations. As we are not able to verify whether the regulatory conditions are met, we assume that the 10% rate applies to all operations located in Jersey.

⁽¹⁰⁾ In fact, as reported by OECD (2015), the “headline statutory tax rates are often not the tax rate applicable at the margin of BEPS behaviour, due to specific country tax rules or administrative practices”.

⁽¹¹⁾ To minimize the impacts of outliers, we winsorize the effective rates using a cut-off of 2.5% in both tails. Taxes on profits is the amount of accrued current tax expense recorded on taxable profits for the reporting fiscal year.

⁽¹²⁾ There are 193 cases in which the amount of the reported taxes paid is negative. This could be due to specific circumstances, such as the effects of loss carry-forward provisions. We consider these negative values as zeros when we calculate the effective tax rate.

Figure 2. Gap between statutory and effective tax rates

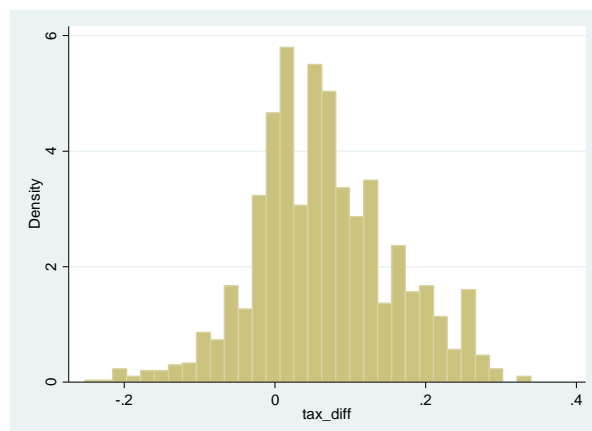
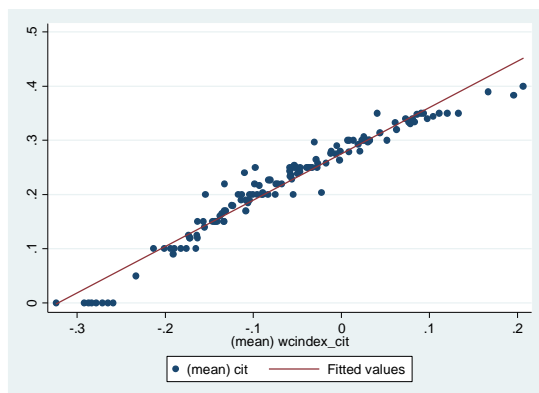


Figure 3. Multilateral tax difference and tax rates

a) Statutory tax rate



b) Effective tax rate

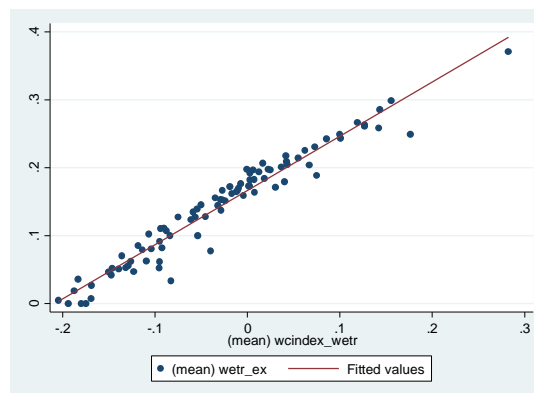


Table 1. Main variables - summary statistics.

Variables	Full sample				Tax havens				Non havens			
	Mean	Std. Dev.	Min.	Max.	Mean	Std. Dev.	Min.	Max.	Mean	Std. Dev.	Min.	Max.
CBCR												
Turnover	420	1,192	0.1	15,616	330	1,383	1	15,616	445	1,133	0.1	11,829
Employees	1,751	4,363	1	31,303	668	2,725	1	29,664	2,052	4,674	1	31,303
Profits	154	493	0	9,806	179	820	0	9,806	148	352	0	3,727
Taxes	30	91	0	1,313	23	114	0	1,313	32	84	0	1,133
TAX RATES												
CIT	0.23	0.09	0.00	0.40	0.15	0.10	0.00	0.35	0.25	0.07	0.10	0.40
ETR	0.17	0.09	0.00	0.50	0.11	0.07	0.00	0.33	0.18	0.09	0.00	0.50
Observations	1,622	1,622	1,622	1,622	352	352	352	352	1,270	1,270	1,270	1,270

Notes: Summary statistics over the period 2014-2016 are reported for the full sample and two subgroup of tax havens and non-havens. CBCR data are in euro/mln, except employees that are in full-time equivalent (FTE) units.

5 Results

This section illustrates the results from estimating model (5) with ordinary least squares. We first present the baseline results, and then perform some robustness checks focusing on the role of the headquarters in income shifting strategies. As discussed above, we use a full set of country, time and banking group fixed effects. In all cases, we cluster standard errors at the group level to account for within-group correlation of the residuals.

5.1 Main results

Table 2 reports our main results. The specifications in columns (1) and (2) use the multilateral tax index calculated with the CIT rate and the ETR, respectively. The results show that both coefficients are negative and statistically significant. Indeed, the higher the tax burden faced by banks in the host country compared to the other foreign jurisdictions, the lower is the level of reported earnings. Specifically, the coefficient of the multilateral tax differential calculated using the CIT rate is -3.13, and significant at the 5% level. The specification in column (2) uses the effective tax rates to calculate the multilateral tax differential. The point estimate is -2.12, and is statistically significant at 1%. As expected, employment and banking assets are strongly significant determinants of bank profitability. By contrast, the impact of institutional quality on earnings is not estimated with precision.

When analysing profit shifting of US multinationals, Dowd et al. (2017) uncover significant heterogeneity in response across the distribution of tax rates, with profits recorded in low-tax jurisdictions being particularly sensitive to the local tax burden. To verify whether this holds also for our sample of EU multinational banks, we split the sample into two subsamples for tax havens and non-havens, respectively. Columns (3) and (4) report the results from estimating our profit equation on the subsample of tax havens, which comprises roughly one-fifth of the total observations. As expected, the magnitude of the estimated coefficients is larger (in absolute value) than that for the full sample, roughly twice as large. In the case of the CIT, the effect is not statistically significant, possibly due to the limited variability of the multilateral tax differential in the subsample. By contrast, the tax measure obtained with the effective tax rates retains its significance, at 5% level. Interestingly, profits recorded in tax havens are significantly affected by the institutional environment in the host jurisdictions. Specifically, reported profits decrease with a higher level of regulatory quality. This result might stem from the fact that an opaque regulatory framework is favouring profits shifting, for instance because of enhanced secrecy and barriers in exchanging information with other countries.

Specifications (5) and (6) estimate model (5) on the subsample of countries that are not classified as tax havens according to Gravelle (2013). Expectedly, the coefficient estimates are only marginally smaller (in absolute value) than those obtained on the full sample, confirming the more muted impact of taxation on earnings recorded in relatively high-tax jurisdictions. Again, factors in the production function are found an important determinant of profits, while we do not find a statistically significant impact of the institutional variables. Finally, it is interesting to notice the different role played by labour and capital across group of countries. While for tax havens the estimated coefficients for the two inputs have a similar magnitude (around 0.3), non-havens seem to rely more markedly on the labour factor than on capital to generate profits. This is in line with the descriptive evidence in Figure 1, where income shifting artificially inflates the figures for labour productivity in tax havens.

The multilateral tax differential is not a policy variable that can be directly observed. In order to interpret the coefficients in a standard way, so as they reflect profit shifting incentives in response to changes in the relevant host country tax rate, we need some additional calculations. In this way, we can also better place our results in the context of the literature. Specifically, for each group-country observation, we calculate the variation of reported profits due to a one percentage point increase of the local tax rate, as $d\pi_c = -\hat{\beta}_1 \pi_c (dT_c/d\tau_c) d\tau_c$, where τ_c is the relevant effective tax rate, our preferred tax measure. Thus, we use the corresponding coefficients $\hat{\beta}_1$ equal to -4.47 and -1.81 for tax havens and other countries, respectively, as obtained in table 2. We evaluate the differential $(dT_c/d\tau_c)$

numerically assuming a 0.01 increase in the effective tax rate. Then, we sum up all the variations in earnings by country, obtaining the change in overall profits recorded in each jurisdiction, $\sum_c d\pi_c$. Finally, we calculate the semi-elasticity of reported profits to the effective tax rate as $-\frac{1}{\sum_c \pi_c} \frac{\sum_c d\pi_c}{d\tau_c}$. These semi-elasticities can be placed in the context of the literature. They are reported in Table 3. As is apparent, the average semi-elasticity of profits to a 1 percentage point increase in the effective tax rate in selected non havens is 1.94, while for tax havens the value increases to 4.22. The estimates for tax havens are in the same ballpark as the recent evidence on US multinationals by Dowd et al. (2017). By contrast, the values for non-havens are somewhat larger than previous findings, and broadly consistent with the results in Merz and Overesch (2016). Broadly, this also corroborates the intuition that modalities and intensity of income shifting in the service sector, including financial institutions, are different from that taking place in the manufacturing sector (Hines et al., 2016).

Table 2. Profit shifting equation – baseline estimates

VARIABLES	Full sample		Tax Havens		Non Havens	
	(1) lnebt	(2) lnebt	(3) lnebt	(4) lnebt	(5) lnebt	(6) lnebt
Tax difference (statutory)	-3.13** (1.37)		-5.58 (8.27)		-2.47* (1.44)	
Tax difference (effective)		-2.12*** (0.32)		-4.47** (1.82)		-1.81*** (0.33)
ln(Labour)	0.50*** (0.05)	0.47*** (0.05)	0.32*** (0.10)	0.31*** (0.10)	0.55*** (0.04)	0.53*** (0.04)
ln(Capital)	0.20*** (0.03)	0.19*** (0.03)	0.31*** (0.07)	0.30*** (0.07)	0.16*** (0.03)	0.15*** (0.03)
ln(Per capita GDP) _{t-1}	-0.22 (1.06)	0.21 (1.17)	0.91 (1.43)	1.85 (1.61)	-1.52 (0.96)	-1.11 (1.15)
Government Effectiveness _{t-1}	0.33 (0.26)	0.33 (0.29)	1.71 (1.11)	1.20 (0.96)	0.18 (0.31)	0.22 (0.33)
Regulatory Quality _{t-1}	-0.42 (0.47)	-0.60 (0.47)	-1.26* (0.70)	-1.21* (0.71)	0.06 (0.52)	-0.11 (0.51)
Time dummies	x	x	x	x	x	x
Bank group dummies	x	x	x	x	x	x
Country dummies	x	x	x	x	x	x
Observations	1,622	1,622	352	352	1,270	1,270
Adjusted R ²	0.68	0.69	0.57	0.59	0.72	0.73

Notes: Dependent variable is the logarithm of earnings before taxes. Estimation method: OLS. Heteroscedasticity-robust standard errors clustered at the group level are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 3. Elasticities of reported profits to the host country effective tax rate

Selected countries	Semi-elasticity
Austria	1.65
Bahamas*	3.86
Bahrain*	3.73
Belgium	1.83
Bermuda*	3.80
Bulgaria	1.55
Cayman Islands*	3.58
Croatia	1.85
Czech Republic	1.66
Denmark	1.40
Finland	1.45
France	2.89
Germany	2.25
Gibraltar*	3.58
Greece	1.56
Guernsey*	4.04
Hong Kong*	3.54
Hungary	2.38
Ireland*	4.14
Isle of Man*	4.08
Italy	2.32
Jersey*	4.08
Latvia	1.78
Lithuania	1.74
Luxembourg*	5.00
Malta*	4.91
Mauritius*	3.89
Monaco*	4.84
Netherlands	2.47
Poland	2.01
Portugal	1.89
Romania	1.77
Singapore*	4.41
Slovakia	1.89
Slovenia	1.69
Spain	2.17
Sweden	2.38
Switzerland*	6.08
United Kingdom	1.90
United States	2.05
Average	2.85
Average tax havens	4.22
Average non-havens	1.94

* Countries classified as tax havens in Gravelle (2013).

5.2 The role of headquarters

Our main results show that international tax differences affect the amount of profits reported in each country. The multilateral tax measure employed in the analysis captures the set of incentives that a multinational bank faces in all jurisdictions where it operates, including the home country. However, the magnitude of income shifting is not necessarily homogeneous across locales. We investigate this issue by splitting the tax variable into two separate components capturing the parent-to-foreign versus the foreign-to-foreign channels of income shifting, as follows:

$$T_{cj} = \frac{1}{(1-t_c)} \left[\frac{\left(\frac{B_p}{1-t_p}\right)(t_c-t_p)}{\sum_j^n \left(\frac{B_j}{1-t_j}\right)} + \frac{\sum_{j \neq c,p}^n \left(\frac{B_j}{1-t_j}\right)(t_c-t_j)}{\sum_j^n \left(\frac{B_j}{1-t_j}\right)} \right] \quad (6)$$

The first term in square brackets indicates the differential between the parent rate and the rate in the host country. The latter summarizes the tax differential between the host and the tax rates in all remaining foreign affiliates.

Table 4 reports the results. Specifications (1) and (2) show the results with the tax variable calculated using the CIT and the ETR, respectively. The tax terms have the expected negative sign. In particular, the tax differential among all foreign locations hovers around -3.5 and is highly statistically significant. By contrast, the differential with respect to the parent is much lower in size (in absolute value) and not statistically significant. Hence, there is evidence that the bulk of tax-induced income shifting takes place among subsidiaries, rather than between the home country and foreign jurisdictions. While this is consistent with previous results in the literature, the explanation is still an open question (Dharmapala, 2014). We thus run further regressions to shed more light on the asymmetry between home country and foreign locales as a source of outward income shifting.

We cannot rule out that business cycle conditions play a role in our findings. In our sample, which spans over a few post-crisis years, a possible explanation concerns the profit position of the headquarter locations. It could be that the more muted impact of the tax differential with the domestic market is due to the fact that the domestic operations have negative profitability. To verify this hypothesis, we estimate the same model using only foreign observations for groups reporting positive profits in their domestic market. The coefficient of the tax difference with the parent is larger (in absolute value) than for the full sample. The tax differentials calculated with the CIT are not significant. However, that with the ETR is significant at 10%.

Another possible explanation lies in the fact that multinationals tend to bias the location of profits and highly profitable assets in favour of the headquarter location (Dischinger et al., 2014a). Dischinger et al. (2014b) find indeed that this affects profit shifting strategies of multinational groups. Specifically, they find that profit shifting between the domestic and foreign operations is significantly larger if the parent has a lower tax rate than the foreign country, and profit is thus shifted towards the home country. Following Dischinger et al. (2014a), we estimate our model on the full sample including also the group-country observations in their home market. In total, 60 observations are added, namely those reporting positive EBT. The model also includes a dummy that takes the value one if the country-group observations is in the home country (i.e. the headquarter observation). In line with expectations, the dummy is positive, and statistically significant.

Table 4. Profit shifting equation - splitting the tax difference

	Baseline sample		Foreign affiliates of loss-making parents excluded		Parents included	
	(1)	(2)	(3)	(4)	(5)	(6)
Tax difference with parent (statutory)	-1.84 (1.80)		-2.70 (2.53)		-2.10 (1.78)	
Tax difference with other foreign affiliates (statutory)	-3.70** (1.40)		-3.33 (2.39)		-4.28*** (1.35)	
Tax difference with parent (effective)		-0.56 (0.52)		-0.94* (0.47)		-0.81 (0.52)
Tax difference with other foreign affiliates (effective)		-3.42*** (0.67)		-3.63*** (0.91)		-3.48*** (0.68)
ln(Labour)	0.50*** (0.05)	0.47*** (0.04)	0.49*** (0.05)	0.47*** (0.05)	0.50*** (0.05)	0.47*** (0.04)
ln(Capital)	0.20*** (0.03)	0.19*** (0.03)	0.18*** (0.04)	0.17*** (0.04)	0.20*** (0.03)	0.19*** (0.03)
ln(Per capita GDP) _{t-1}	-0.20 (1.07)	0.28 (1.20)	-0.61 (0.93)	-0.03 (1.11)	-0.25 (1.06)	0.26 (1.19)
Government Effectiveness _{t-1}	0.33 (0.27)	0.29 (0.29)	0.42 (0.35)	0.37 (0.35)	0.36 (0.27)	0.33 (0.29)
Regulatory Quality _{t-1}	-0.43 (0.47)	-0.58 (0.46)	-0.12 (0.60)	-0.37 (0.61)	-0.44 (0.46)	-0.62 (0.46)
parent dummy					0.55* (0.28)	0.58** (0.28)
Time dummies	x	x	x	x	x	x
Bank group dummies	x	x	x	x	x	x
Country dummies	x	x	x	x	x	x
Observations	1,622	1,622	1,155	1,155	1,682	1,682
Adjusted R ²	0.69	0.69	0.69	0.70	0.72	0.73

Notes: Dependent variable is the logarithm of earnings before taxes. Estimation method: OLS. Heteroscedasticity-robust standard errors clustered at the group level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

5.3 Quantifying income shifting

We can use the coefficients estimated in the previous section, combined with the theoretical framework illustrated in section 2, to quantify the effect of tax planning on the international allocation of bank profits. In this exercise, we consider only the redistribution of corporate tax bases by the banks in our sample, without further implications for profitability in the whole banking sector or more aggregate variables. Likewise, we do not attempt any estimation of the implied tax revenue losses for the countries where the banks operate, as these would be surrounded by even a greater deal of uncertainty than our profit estimates. Nonetheless, we believe the exercise is informative of the order of magnitude of the profit shifting activities we uncover in our econometric analysis.

Our starting point is equation (4), where we assume that the tax differential variable fully captures profit shifting, i.e. the difference between observed and true profits. Thus, true economic profits can be expressed as:

$$B_c = \pi_c / (1 - \hat{\beta}_1 T_c), \quad (7)$$

where π_c is the amount of reported profits in the CBCR data, and $\hat{\beta}_1$ is the estimated coefficient for the multilateral tax difference T_c . As for the latter, we consider our preferred tax measure based on effective tax rates. To fully account for heterogeneous tax effects across tax havens and non-havens, we employ the corresponding coefficient estimates in columns (4) and (6) in Table 2, equal to -4.47 and -1.81 respectively. In turn, profits shifted inward by each multinational can be derived using the accounting identity that reported profits are equal to the sum of true and shifted profits, or $\pi_c = B_c + S_c$. Specifically, substituting the expression for true profits B_c from equation (7), one can express shifted income as $S_{gct} = -\hat{\beta}_1 T_c B_c / (1 - \hat{\beta}_1 T_c)$. Thus, from the group-specific values we calculate the

aggregate amount of income shifted to each jurisdiction by aggregating over the multinational banks operating there. Finally, to limit the influence of extreme values, we average over our sample period.

Table 5 shows the results. The overall amount of profits shifting activities for non-havens is 2.5 billion euro, while tax havens experience inward profit shifting for about 5.8 billion euro. Expectedly, high-tax European countries, such as France, Italy, and Germany, experience outward profit shifting. The ratio of shifted income to true income ranges between 8 and 36%, for an overall amount of lost tax base of around to 1.2 billion euro. The flip side of this is the significant inward profit shifting recorded in tax havens, particularly the small ones. Perhaps counterintuitively, Switzerland records significant outward profit shifting, amounting to about 24% of total true economic profits, potentially to the benefit of other low tax countries. Johannesen and Zucman (2014), assessing the effect of bilateral treaties on information exchange signed between the G20 countries and tax havens, find a significant shift of deposits to havens not covered by a treaty. Thus, the agreement signed between Switzerland and the EU⁽¹³⁾ that put an end to the bank secrecy regime benefitting EU-resident clients, had an influence on banks incentives to record profits there⁽¹⁴⁾. All in all, non-havens experience profit shifting activities equal to the 7% of total true economic profits, while for tax havens this ratio is more than five times higher, equal to 38%.

6 Conclusion

Profit shifting represents a significant source of tax base erosion. While there are many studies on profit shifting made by multinational enterprises, less attention has been given to financial institutions, due to the lack of data. Exploiting country-by-country reporting made compulsory by the EU capital requirement Directive IV, we analyse profit shifting by the largest and systemically relevant European multinational banks. We find that corporate tax differences drive the international allocation of profits, with significant income shifting that takes place among bank subsidiaries. Moreover, profits recorded in tax havens are particularly sensitive to tax variables. Our results suggest the presence of profit shifting especially towards tax havens. Simple simulations indicate that 7% of true profits are subject to profit shifting activities for non-havens countries, while for tax havens this ratio increases to 38%.

⁽¹³⁾ The agreement has been signed on the 27th of May 2015 and under the agreement there will be, from 2018, an automatic exchange of information on the financial accounts of each other's residents (i.e. Switzerland and EU citizens).

⁽¹⁴⁾ Reported profits in Switzerland drop by 11% between 2015 and 2016.

Table 5. Computations of profit shifting activities, aggregated at the national level (mln Euro).

Selected countries	True economic profits (B)	Shifted profits (S)	Ratio between shifted and true profits (%)
Austria	300.05	64.99	21.66
Bahamas*	26.57	14.93	56.16
Bahrain*	47.59	36.91	77.58
Belgium	2746.05	199.04	7.25
Bermuda*	70.94	49.54	69.84
Bulgaria	204.59	54.48	26.63
Cayman Islands*	52.19	50.03	95.86
Croatia	325.80	20.42	6.27
Czech Republic	1478.28	169.29	11.45
Denmark	1198.47	34.31	2.86
Finland	1280.21	52.79	4.12
France	1681.44	-597.65	-35.54
Germany	3958.43	-320.30	-8.09
Gibraltar*	11.10	10.90	98.12
Greece	19.54	4.66	23.86
Guernsey*	147.83	86.36	58.42
Hong Kong*	5936.74	3504.11	59.02
Hungary	374.63	-20.39	-5.44
Ireland*	1534.24	708.59	46.19
Isle of Man*	107.65	57.02	52.97
Italy	2224.14	-264.47	-11.89
Jersey*	351.52	177.13	50.39
Latvia	35.84	1.70	4.75
Lithuania	19.85	1.48	7.48
Luxembourg*	4647.92	465.09	10.01
Malta*	159.87	30.93	19.35
Mauritius*	280.03	199.85	71.37
Monaco*	155.34	42.21	27.17
Netherlands	695.85	-76.45	-10.99
Poland	2522.78	-94.82	-3.76
Portugal	774.61	80.10	10.34
Romania	307.92	49.87	16.20
Singapore*	1191.96	470.33	39.46
Slovakia	369.43	15.86	4.29
Slovenia	72.52	15.21	20.97
Spain	1067.46	13.77	1.29
Sweden	171.40	-22.83	-13.32
Switzerland*	566.20	-136.95	-24.19
United Kingdom	4821.50	269.26	5.58
United States	8836.20	-40.80	-0.46
Total (in absolute value)	50774.68	8525.82	16.79
Total tax havens (in absolute value)	15287.70	5766.97	37.72
Total non-havens (in absolute value)	35486.98	2484.95	7.01

* Countries classified as tax havens in Gravelle (2013).

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Annex 1. List of the countries present in our dataset

Albania, Algeria, Argentina, Australia, Austria, Bahamas*, Bahrain*, Belgium, Bermuda*, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Cameroon, Canada, Cayman Islands*, Chile, China, Colombia, Cote d'Ivoire, Croatia, Curacao, Czech Republic, Denmark, Egypt, Finland, France, French Polynesia, Germany, Ghana, Gibraltar*, Greece, Guernsey*, Guinea, Hong Kong*, Hungary, India, Indonesia, Ireland*, Isle of Man*, Israel, Italy, Japan, Jersey*, Kazakhstan, Republic of Korea, Kuwait, Latvia, Lithuania, Luxembourg*, Madagascar, Malaysia, Malta*, Mauritius*, Mexico, Monaco*, Morocco, Netherlands, New Caledonia, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Saudi Arabia, Senegal, Serbia, Singapore*, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland*, Taiwan, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Vietnam.

*Tax havens, following the classification of Gravelle (2013).

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