Banks in Tax Havens: First Evidence based on Country-by-Country Reporting

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DG ECFIN's Fellowship Initiative 2016-2017 "Challenges to integrated markets" culminates and comes to a successful conclusion with the publication of the fellows' contributed papers in our Discussion paper series. Against the background of increasing strains to economic integration at both the global and the European level, the Initiative has brought together a group of outstanding scholars to re-examine integration challenges at the current juncture and to explore the policy options to address these challenges in a discursive interaction process between the group of fellows and Commission services. The research themes of the fellows have spanned a broad area including topics in the political economy of globalisation and integration, issues of macroeconomic policy making at the zero lower interest rate bound, and market integration challenges not least in view of deepening EMU.

Banks in Tax Havens

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Abstract

Since the Great Financial Crisis, several scandals have exposed a pervasive light on banks' presence in tax havens. Taking advantage of a new database, this paper provides a quantitative assessment of the importance of tax havens in international banking activity.
Using comprehensive individual country-by-country reporting from the largest banks in the European Union, we provide several new insights: 1) Tax havens attract large extra banking activity beyond the standard factors based on gravity equations; 2) For EU banks, the main tax havens are located within Europe: Luxembourg, Isle of Man and Guernsey rank at the top of the foreign affiliates; 3) Attractive low tax rates are not sufficient to drive extra activity; 4) High quality of governance is not a driver, but banks avoid countries with weakest governance; 5) Banks also avoid the most opaque countries; 6) The tax savings for EU banks is estimated between EUR 1 billion and EUR 3.6 billion.

"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 CRD IV.

1   Introduction

In the aftermath of the Great Financial Crisis, several scandals have exposed a pervasive light on the presence of banks in tax havens (UBS, 2008; Offshore leaks, 2013; Luxleaks, 2014; Swissleaks, 2015; Panama Papers, 2016). The leaks documented global banks' intermediation role in setting up shell companies, foundations and trusts to ease tax avoidance for their clients. While the topic made headlines, there is little academic evidence about banks in tax havens. It can be very difficult to document and quantify banking activity in tax havens, mostly due to the obvious lack of data. In addition, there is also a methodological issue to assess how much these banks' activity in tax havens are merely due to tax evasion and other related perks. For example, Luxembourg, which is included in most tax havens lists, ranks first in GDP per capita worldwide, is located in the core of the European Union and benefits from very large and sophisticated financial infrastructures. Attributing the whole presence of banks in Luxembourg to tax havens related motives is misleading. In order to gauge the role played by banks in facilitating tax and transparency avoidance, we need to disentangle standard from tax havens related factors. This is the main objective of this paper. At stake is whether a more stringent regulation of banks' activity in tax havens can reduce tax evasion and money laundering, or if it risks the seizure of international financial transactions.

So far, measuring the size of offshore banking in tax havens was impeded by a lack of information exchange by several jurisdictions. The attention of G-20 leaders in 2012, the OECD and the

European Union ongoing efforts and NGO initiatives have successfully reversed the trend and pushed the transparency agenda. Since 1 January 2015, all European banks regarded as global systemically important institutions are required to publicly disclose country-by-country data, as stipulated by the Capital Requirements Directive (CRD) IV of the EU.[1] This paper precisely exploits newly published data to assess the role of tax havens in international banking.

This new data are individual, regulatory and comprehensive, a fact that allows us to address certain limitations of previous research. So far, papers based on firm-level data only consider non-financial multinational enterprises (MNEs), often focus one country and with some commercial, less reliable sources.[2] For aggregate data, the only available source so far is a restricted dataset from the BIS to which total of 40 jurisdictions report banking statistics. For certain reporting countries however, the breakdown of liabilities on counterpart countries is known by the BIS but remains confidential; it implies that deposits cannot be constructed for these destination countries (Bahamas, Bermuda, Cayman Islands to mention a few). In contrast, the CRD IV requires all the largest banks to report activity in every single jurisdiction where they have a commercial presence. In other words, for the first time, we work on a dataset covering the location choices of banks at the individual level without missing data.

We combine two different strands of the international finance literature. First, to isolate the specific weight of tax havens, we need to control for structural factors of international bank activity. To do so, we draw from the gravity literature applied to financial transactions. This literature emphasizes the influence of bilateral differences of information and bilateral institutional linkages on international banking activity (Portes et al. (2001), Portes and Rey (2005), Martin and Rey

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[1] In particular, in 2013, the OECD has adopted the Base Erosion and Profit Shifting (BEPS) Action Plan as part of larger efforts to promote transparency. This plan has been endorsed by the G20 Finance Ministers in October 2015 and several countries are moving forward, including the UK, Australia, Spain. In 2016, the EU Accounting Directive (Chapter 10) also proposed a public CbCR for large MNEs which are EU-parented or have EU subsidiaries. Other initiatives are currently under discussions for firms in the extractive sector (e.g. Dodd Frank Act − Section 1504; the Extractive Industries Transparency Initiative). For now, the most fully developed CbCR applies to the European banks.

[2] A popular source is Amadeus database compiled by the Bureau van Dijk

(2004) and Okawa and van Wincoop (2012)). We use the well-documented result that bilateral transactions rise proportionately with the economic size of both countries ("mass") and are negatively correlated with frictions ("resistance") to quantify the amount of foreign affiliates activity predicted by standard factors. Second, we draw from the literature on tax-motivated activity of MNEs to include tax havens in the analysis of offshore banking. Which countries are tax havens? What is the most appropriate measure of tax rate faced by MNEs? Are investors sensible to other legal, economic and political conditions beyond tax differences across jurisdictions? The seminal works of Hines and Rice (1994) and more recent works by Bartelsman and Beetsma (2003) and Dharmapala and Hines (2009) among others guide our empirical investigation.

Our data include the reported information for the 36 largest EU banks (in terms of total assets), including 13 Global systemically international institutions (SII) and 23 domestic SIIs.[3] Information disclosed, on a country-by-country level, are: turnover, number of employees, profit or loss before tax, tax on profit or loss, and public subsidies received. In this paper, we focus on activity through the information on turnover. The data set is cross-sectional and concerns 2015, the first year the reports were available. Banks headquarters are located in 10 EU countries; their foreign affiliates have activity in 138 countries in total, including about thirty tax havens jurisdictions. Tax havens represent 0.8% of our sample in terms of population, 2% in terms of GDP, but EU banks record 18% of their foreign turnover and 29% of their foreign profit in these countries.

The absence of activity in a country/ jurisdiction is an insightful information that we want to account for. Therefore, we extend the total sample to 228 countries, the maximum of countries for which controls are available; the presence of *zeros* in the vector of the dependent variable poses a methodological challenge. To address it and estimate a gravity model, we use the Poisson

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[3]We extend a sample collected from financial statements in annual reports. We are grateful to Oxfam staff who kindly shared with us the database initially put together by the Dutch Center for Research on Multinational Corporations. In their study, they consider the twenty largest EU banks and provide some interesting, albeit preliminary, stylized facts on the location of banks in tax havens. We extend their data from the 20 to 36 largest banks in terms of assets (source: Relbanks). A meticulous look at the initial data indicated that missing information in the original annual report had been misreported as *zero*. Therefore, we have corrected the misreportings.

pseudo maximum likelihood (PPML) which has the advantage to avoid a log transformation of the specification. It allows us to properly account for zeros in the endogenous variable; the second advantage is that coefficients are unbiased (Silva and Tenreyro (2006)). We estimate the model within the alternative Negative Binomial Quasi-Generalised Pseudo-Maximum Likelihood estimator (NB QGPML) and OLS estimator for robustness check. A second methodological issue is to keep a stable size of the sample while we add the different measures of tax haven attributes. In fact, while a dummy controlling for whether a jurisdiction is a tax haven or not can be created for the whole sample, data availability can drastically decrease when it comes to effective tax rates or institutions governance quality. Yet keeping a stable size sample is necessary to avoid any sample bias. We run our estimate on two sample sizes, one including the 138 countries in which EU banks declare operating, and a large sample of 228 countries. Our results are consistent across alternative specifications on both samples, a fact that suggests statistical robustness.

A few authors have previously examined the effects of tax and transparency on international financial positions. Grilli (1989) provides preliminary evidence that taxes on interest and bank secrecy influence location choices of cross-border deposits. Hemmelgarn and Nicodeme (2009) and Johannesen (2014) take advantage of the enforcement of European Savings Directive in 2005 and finds that cross-border deposits are motivated by tax evasion. Johannesen and Zucman (2014) exploit information on new bilateral treaties for exchange of bank information. Zucman (2014) combines data from the Swiss National Bank and IMF to assess the amount of unrecorded wealth in international portfolio statistics and concludes that accounting for them would turn rich countries in net creditors. Two papers estimate gravity equations as we do. First, Alworth and Andresen (1992) estimate a cross-sectional gravity model on bilateral deposit flows from the BIS in 1990 and find that tax differential between countries and bank secrecy are key determinants. Huizinga and Nicodeme (2004) estimate a panel gravity equation on BIS data and show that international depositing is driven by interest income taxation and reporting practices.

The main contribution of this paper is to explore the geography of banking and consists in 6 new findings: 1) Ignoring tax havens implies misspecification in a standard gravity model; tax havens attract significant extra banking activity beyond the standard gravity factors; 2) For EU banks, the main tax havens are located within Europe: Luxembourg, Isle of Man and Guernsey rank at the top of the foreign affiliates presence not explained by standard factors; in particular, the presence of foreign banks affiliates in Luxembourg is 8.5 times higher than predictions based on a standard gravity model; 3) Attractive low tax rates are not sufficient to drive extra activity; 4) High quality of governance is not a driver, but banks avoid the countries with weakest governance; 5) Similarly, high level of transparency is not a driver of extra activity, but banks avoid the most opaque countries; 6) The tax savings for EU banks is estimated around €1 billion. Section 2 presents an overview of the previous academic literature on tax havens. Section 3 describes our database and provides some stylized facts. Section 4 explains the different specifications and the PML estimator. Section 5 presents the results. Section 6 provides estimates of the tax saving for the EU banks, and the fiscal losses due to tax havens. Section 7 concludes.

2   Tax havens in the literature

There is very little academic research on tax havens: this topic accounts for less than 0.4% of the academic literature on taxation (see more details in Appendix).[4] The reason is probably related to the scarcity of data on tax havens. A related and somehow more documented topic is international tax competition and profit shifting by multinational enterprises (MNEs).[5] In the following, we review empirical research distinguishing works on country-level versus firm-level data, and non-

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[4]Most of the academic articles about tax havens are published in Accounting (21%), and Public economics/Political economy (18%). Surprisingly, few articles have been published in international economics (8%), development economics (6%) or financial economics (7%).

[5]Comprehensive and stimulating academic surveys on international tax competition, profit shifting by multinational enterprises (MNEs), and tax havens are provided by Devereux (2007), Hines (1999), Hines (2007), Hines (2010), Dharmapala (2008), Dharmapala (2014), and Zucman (2015).

financial versus financial sectors.

2.1 Country-level data

A first part of the literature is based on macroeconomic (aggregated) data and examines the characteristics of the countries or jurisdictions considered as tax havens. Some works on offshore financial centers (OFCs) address, somewhat independently, similar issues. In their seminal paper, Hines and Rice (1994) are among the first to document the importance of tax havens.[6] They identify a list of 41 tax havens and they estimate that US MNEs reported nearly a third of their foreign profits in such countries in the early 1980s. As shown by Hampton and Christensen (2002), offshore financial activities have been very profitable for hosting countries in terms of employment, growth and government revenues.[7] Hines (2005) indicates that between 1982 and 1999, the annual per capita real economic growth was 3.3% in average for tax haven, compared to 1.4% for the rest of the world.[8] Dharmapala and Hines (2009) examine the features of tax havens and find that better-governed countries (measured by the World Bank's indicators for voice and accountability, political stability, government effectiveness, rule of law, and control of corruption) are much more likely than others to become tax havens. Masciandaro (2006) who examined OFC, rather than specifically tax haven, similarly highlights the importance of a high political stability, a low crime level, and a Common Law juridical system, combined with a low resources endowment. Rose and Spiegel (2007) discuss the causes and consequences of OFCs. In particular, they argue that while they may increase tax evasion, OFCs may also have unintended positive consequences, such as providing competition for the domestic banking sector.[9]

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[6] To our knowledge, Johns (1983) produced the earliest academic study on the economics of tax havens.

[7] In Jersey for instance, 90% of the government revenues come from offshore activities, which directly employs up to 20% of the local labor force Hampton and Christensen (2002).

[8] More recently the growth discrepancy has narrowed as Hines (2010) shows that, from 1992 to 2006, this growth was 2.85% for tax havens, compared to 2.26% for OECD countries.

[9] For a theoretical approach, see Desai et al. (2006b), Slemrod and Wilson (2006), Johannesen (2010). Overall, these models suggest that tax havens may have an ambiguous impact on welfare.

2.2 Country-level data with a focus on financial positions

A second stream of papers relies on aggregated data with a focus on cross-border deposits and capital flows. Some works attempt to quantify financial positions in tax havens and/ or OFCs. According to various sources gathered by Hampton and Christensen (2002), the total amount of bank deposits in OFCs was estimated to $11 billion in 1968, $385 billion in 1978, $1,000 billion in the early 1990s, and $6,000 billion in the late 1990s (from 0.5% of world GDP in 1968, to 5% in the 1980s, and 20% in the 1990s). Lane and Milesi-Ferretti (2011) provide rough estimates of the foreign asset and liability positions in OFCs. They consider a group of 32 small OFCs and purposely exclude important financial centers such as Hong Kong, Ireland, Luxembourg, and Singapore. While these countries represent a very small part of the world population and GDP, they account for 8.5% of the world cross-border investment positions − larger than France, Germany, or Japan. Zucman (2013, 2015) uses a restricted dataset on cross-border banking from the BIS, combined with a public survey from the Swiss National Bank, and documents that 10% of the financial wealth of European households is held offshore, which represents a tax revenue loss of $75 billion. Zucman (2015) estimate that the global financial wealth of households held in tax havens in 2013 is about $7.6 trillion.[10] Last, Zucman (2014) evaluates that about 20% of all US corporate profits are held in the main tax havens in 2013, which is a tenfold increase since the 1980s.[11] Some works explore the drivers of financial positions in tax haven and/ or OFC. Grilli (1989) provides preliminary evidence showing that bank secrecy influence location choices of cross-border deposits. Alworth and Andresen (1992) estimate a gravity model and find that tax differential between countries are a key determinant of bilateral deposit flows. Huizinga and Nicodème (2004) also suggest that the location of deposits is likely to be driven by tax evasion concerns and find that information exchange agreements do

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[10]Henry (2012), on behalf of the NGO "Tax Justice Network", reports that between $21 and $32 trillion of unreported financial assets was owned via tax havens in 2010, which represents more than 30% of the world GDP.

[11]The list of tax havens considered in Zucman (2014) is restricted to Netherlands, Ireland, Switzerland, Singapore, Luxembourg, Bermuda, and other Caribbean havens.

not foster cross-border deposits.[12] Using the restricted dataset on cross-border banking from the BIS mentioned above, Johannesen (2014) take advantage of the enforcement of European Savings Directive in 2005 to assess to which extent cross-border deposits are motivated by tax evasion. He finds that deposits owned by EU residents in Swiss banks dropped by 30-40% when the new rule was introduced. Andersen et al. (2016) use the same data and show that an increase in the petroleum rents cause a significant increase in deposits in tax haven held by petroleum-rich countries with very weak political institutions ("autocratic rulers"). Masciandaro (2005) and Masciandaro et al. (2016) examine, both theoretically and empirically, the impact for a country or a territory of being blacklisted as a non-cooperative jurisdiction. Contrary to the "name and shame" intended effect, blacklisting attracts international banking activities. Similarly, Johannesen (2014) examine how bilateral treaties for exchange of bank information impact the amount of bank deposits. They find that when some tax havens commit to exchange information, this does not materialize in a repatriation of deposits; instead, the deposits shift to other tax havens not covered by a treaty.

2.3   Firm-level data

There is a sizable literature on international profit shifting using firm level data.[13] A few papers specifically focus on tax havens. For example, Dyreng et al. (2013) focus on the Delaware as a domestic tax haven. They find that US firms with subsidiaries in Delaware reduce their tax burden by between 15% and 24%. Desai et al. (2006a) adopt a broader approach and examine which firms do establish tax haven operations. Especially, it appears that among firms, the larger, the more productive ones and the ones with sizable foreign operations and a high R&D intensity are

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[12]Buch (2005) does not consider specifically tax haven, but investigates the location of international assets and liabilities of commercial banks from five countries (France, Germany, Italy, the UK, and the US). She uses aggregated data from the locational banking statistics of the BIS and her sample of host countries is limited to 50 host countries, missing most of the tax havens. As expected, she finds that banks hold significantly lower assets in distant markets and that the importance of distance has not declined over the period 1983-1999.

[13]See, for instance, Clausing (2003) and Huizinga and Laeven (2008). For European evidence, see also Dischinger and Riedel (2011) and Vicard (2015).

the most prone to have tax haven affiliates. Hebous and Lipatov (2014) show, additionally, that firms' investment in corrupt countries is positively related to having affiliates in tax havens.[14]. Last, Demirgc-Kunt and Huizinga (2001) specifically examine the banking sector without, however, focusing on tax havens. Using bank level data for the period 1988-1995, they examine the taxation of domestic and foreign-owned banks in 80 countries, including several notorious tax havens (Hong Kong, Luxembourg, Panama, etc.). Most of all, they find evidence that foreign banks are engaged in extensive profit shifting. In total, cross-country studies on tax havens use incomplete datasets, there is no paper which focuses on financial or banking sector at the microeconomic level, using individual data. Our present paper attempts to fill this gap.

3 Data

As the basis of the usual recommendations to preclude aggressive tax planning and profit shifting, country-by-country reporting (CbCR) requires the largest firms to provide detailed information regarding the allocation of their income, profit and taxes. From 2015, according to the Capital Requirements Directive IV of the EU (Article 89), all European banking groups with a consolidated turnover above €750 million are required to publicly disclose the activity of all their affiliates (subsidiaries and branches).[15] More precisely, the public CbCR imposes banks to disclose information on a country-by-country basis together with their financial statements on the following items: turnover (net banking income), number of employees (on a full time equivalent basis), profit or loss before tax, tax on profit or loss, and public subsidies received.

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[14]Differences in international corporate taxation do not impact only the location of foreign direct investment, but also transfer pricing, capital structure, dividend and royalty payments, or R&D. Other empirical works on MNEs and tax haven based on firm-level data include Gumpert et al. (2016), Johannesen et al. (2016) and Johannesen and Larsen (2016), Harris et al. (1993); Hines (1997); Grubert and Slemrod (1998) and Grubert and Slemrod (1998)

[15]This directive has followed the French initiative, adopted in 2013 as part of the *Loi de séparation des activités bancaires*.

3.1 The Sample

The information from the CbCR has been operated first by the NGO Oxfam. In order to put together our dataset, we have extended their database to the 36 largest EU banks in terms of assets. All these banks are large, with a leverage ratio exposure measure above €200 billion, and therefore are considered as either Global- or Local-Systemically Important Institutions (SIIs) by the European Banking Authority.[16] The dataset is therefore cross-sectional and concerns year 2015. The 36 banks are located in 10 EU countries: Austria (1), Belgium (1), Denmark (1) France (5), Germany (7), Italy (3), Netherlands (3), Spain (4), Sweden (4), and the United Kingdom (6).

3.2 Lists of tax havens

As much as Bermuda or the Cayman Islands are notable and uncontroversial examples of tax havens, there is not one single official list of tax havens. Governments, international institutions, NGO and scholars identify tax havens along different criteria. While the European commission identified 30 jurisdictions in 2015 (European Commission, 2015, see *Oxfam for references*), Hines and Rice (1994) listed 41 major tax havens, while the list computed by the Tax Justice Network in 2009 included 60 jurisdictions. In total, Palan et al. (2013) mention 11 lists of tax havens (FSI, OECD, UNCTAD, EP, EC, GAO, FTSE, IMF, BIS, EU Investigations, TJN). In our estimates, we consider the list of tax havens popularized by Hines and Rice (1994). For the sake of robustness we alternatively consider how frequently a country is considered as a tax haven and whether this country is included in the Oxfam Top 15 ranking. It is important to point a potential sample bias due to the exclusive presence of EU banks.

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[16]ABN Amro, Banca Monte Dei Paschi di Siena, Banque Postale, Bayern LB BBVA, BFA, BNPP, BPCE, Crédit Agricole, Commerzbank, Crédit Mutuel, Deutsche Bank, Danske Group, DZ Bank, Este Group, Handelsbanken, Helaba, HSBC, ING, Intesa Saopaolo, KBC, La Caixa, LBBW, Lloyds, Nationwide, Nordea, Nordlb, Rabobank, RBS, Santander, Seb, SG, Standard Chartered, Swedbank, Unicredit. KfW included in the Oxfam study has been excluded because this banks is not considered to be a SIFIs.

3.3 Descriptive statistics and stylized facts

The 36 banks employ 2.3 million people in 138 partner countries and record a total turnover of EUR 575 billion. Figure 2 plots the turnover disclosed by banks, broken down by location (foreign versus domestic). HSBC records the largest turnover of the sample (EUR 58 billion) and Helaba the smallest (EUR 2 billion). Table 8 in Appendix displays descriptive statistics at the bank level. On average, foreign turnover represents 48% of the total turnover. The total number of locations (bank × country) is 845. Banks have foreign affiliates in 1 to 68 countries. For instance, Lloyds declares activity in 7 partner countries while Société Générale declares activity in 68 different partner countries. On average, each bank reports activity in 35 partner countries with a large heterogeneity: some banks operate more abroad than in their own countries (e.g., BBVA in Mexico, Santander in Brazil). The 36 banks of our sample are located in 25 tax havens. As Hines-Rice list includes 41 countries, it means that the EU banks are absent from certain tax havens. For instance, the data report no commercial presence in Samoa, St Kitts & Nevis, or Barbados, while these countries are frequently recorded as tax haven (they are registered in more than 8 lists). In turn, several banks have a commercial presence in Bahamas, Panama and Cayman Islands (which are recorded in 9 lists), in Bermuda (recorded in 8 lists), or in Isle of Man, Jersey, Guernsey or Monaco (7 lists). In particular, 9 banks have affiliates in Jersey, 8 in Monaco and 7 in Guernsey or Mauritius.[17] It confirms a sample bias due to the inclusion of only European banks in the sample. Table 1 displays country summary statistics. It is worth reminding that we extend the number of destination countries to 228 in order to account for the absence of activity. The small tax havens correspond to counties of less than 2 million people. The small tax havens represent 0.1% of our sample in terms of population and 0.3% in terms of GDP while big tax havens represent 0.7% of the

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[17]Multiple British banks have different reporting standards regarding Jersey and Guernsey (together referred to as "the Channel Islands") and Isle of Man. Some report on the Channel Islands as one jurisdiction. Others also include the Isle of Man in this small group. This limits the way in which this research can draw conclusions regarding Jersey, Guernsey and the Isle of Man as three separate jurisdictions. In order to minimize these limitations and avoid double counting for these three islands, we input the average by jurisdiction.

population sample and 1.7% of the GDP. As stated by Dharmapala and Hines (2009), tax havens experienced high level of income per capita (more than twice higher than the rest of the world). Unsurprisingly, the effective tax rate is much lower in tax havens (17% versus 5%) and the financial infrastructures are more developed (measured by the GFSI Index described in the next Section). Last it is worth observing that the level of regulation is similar, a stylized fact suggestion that regulation differences is not a driver.

Table 1: Countries summary statistics

		Non havens	Small havens	Big havens
Nb. countries		185	35	8
GDP (PPP, EUR bn)	Total	112,000	308	1,880
	Av.	605	9	235
	Percent.	98.1%	0.3%	1.6%
Pop. (thousand)	Total	7,260,000	6,942	48,500
	Av.	39,300	198	6,064
	Percent.	99.2%	0.1%	0.7%
GDP/capita (EUR)	Total	15,427	44,369	38,763
	Av.	17,786	36,643	38,763
Effective Tax Rate		17%	5%	5%
GFSI Index		54	67	68
Regulation Index		24	23	25

Source : CbCR (2015). Sample : The 36 largest European banks.

Table 2 displays the turnover, number of employees, profits and tax on profits of foreign affiliates reported by the EU banks included in our sample. The activity is broken down into non tax havens/ small and big tax havens. EU banks in our sample employ about 1.2 million people abroad and a little more than 100,000 people in tax havens. While tax havens represent 9% of the workforce abroad, they account for 18% of the turnover and 29% of the profits recorded abroad. More specifically, small tax havens represent 5% of the turnover recorded abroad, only 2% of the employment, 10% of the profits and 5% of the taxes. Figure 3 compares business ratios across

Table 2: Bank activities in foreign countries

	Non havens (112)	Small havens (18)	Big havens (7)	Tax havens (25)	Total Foreign (137)
Turnover	229,216	13,639	34,959	48,598	277,814
In % of foreign	83%	5%	13%	18%	100%
Employees	1,108,140	22,649	83,460	106,109	1,214,249
In % of foreign	91%	2%	7%	9%	100%
Profits	53,983	7,656	14,492	22,147	76,130
In % of foreign	71%	10%	19%	29%	100%
Tax on profits	15,018	827	1,695	2,521	17,539
In % of foreign	86%	5%	10%	15%	100%
Turnover/GDP	0.2%	4.9%	1.9%	2.2%	0.3%
Turnover/Employees	21%	60%	42%	46%	23%
Profit/Turnover	24%	56%	41%	46%	27%
Profit/Employees	5%	34%	17%	21%	6%
Tax/Profit	28%	11%	12%	11%	23%

Note: Source : CbCR (2015). Sample : The 36 largest European banks. The sample includes only countries where European banks declare subsidiaries.

jurisdictions. Turnover as a ratio of GDP is 9.5 times higher in big tax havens and 24.5 times higher in small tax havens. Productivity calculated as the turnover per employee is twice higher in big tax havens than in non tax havens and 3 times higher in small tax havens. The profit rate is 1.7 higher in big tax havens and 2.5 higher in small tax havens (Profit/Turnover). Last the implicit tax rate in tax havens is 2.5 times lower than in non tax havens (Tax/Profit). In total raw statistics indicate that banks record significantly higher activity and profit per employee in tax havens than non haven countries. In the subsequent econometric exercise, we follow two objectives: i) quantify the extend of extra activity merely due to tax havens attributes; ii) get a better understanding of the drivers.

4   Specification and estimator

We analyze the determinants of banks' commercial presence abroad within a standard gravity framework and we rely on a Poisson pseudo-maximum likelihood to account for zeros.

4.1   The baseline specification: the gravity model

The baseline turnover model is given by:

$$
\begin{aligned}
Turnover_{k,i,j} \;=\; & \exp(\alpha_k + \beta_1 \log(GDP_j^{percap}) + \beta_2 \log(Pop_j) + \beta_3 \log(dist_{i,j}) + \beta_4 Contig_{i,j} \\
& + \beta_5 L_{i,j} + \beta_6 Colony_{i,j} + \beta_7 RTA_{i,j} + \beta_8 Territory_{i,j} + + \beta_9 GFC_j^{Dum} \\
& + \beta_{10} GFC_j^{Rating}) + \varepsilon_{k,i,j}
\end{aligned}
$$

where the subscripts refer to the foreign affiliate of bank k with headquarter in country i that declares turnover in partner country j. The GDP per capita (GDP_j^{percap}) and the population in country j (Pop_j) are used as economic mass variables in the gravity specification. The corresponding variables in country i are not included because of the inclusion of headquarter fixed effects (see below). These data are collected from the World Factbook database provided by the Central Intelligence Agency (CIA).[18] The standard gravity variables also include a set of bilateral country variables that proxy frictions. In the baseline specification, we include the geographical distance ($dist_{i,j}$) and dummy variables indicating the presence of a common border ($Contig_{ij}$), a common language (L_{ij}), a colonial relationship ($Colony_{i,j}$), the signature of a regional trade agreement ($RTA_{i,j}$), and that the partner country (j) is a dependent territory of country i ($Territory_{i,j}$). These variables, except $RTA_{i,j}$ and $Territory_{i,j}$, come from the CEPII distance database. Variable

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[18]The World Factbook database is cross-sectional but covers a larger number of countries (i.e. sovereign states and dependent territories) than other databases as the one provided by the United Nations Statistics Division.

$RTA_{i,j}$ comes from de Sousa (2012) and variable $Territory_{i,j}$ is computed by the authors.[19] In the gravity specification, the distance is considered to be the main friction so coefficient β_3 is expected to be negative. However, the effect of distance can be overestimated for neighboring countries because countries sharing a common border have generally more relationships. Coefficient β_4 associated with the contiguity dummy variable is therefore expected to be positive. Furthermore, the variables $L_{i,j}$, $Colony_{i,j}$, $Territory_{i,j}$ and $RTA_{i,j}$ are expected to positively affect the turnover. Indeed, the same official language makes the commercial presence easier as well as a relationship of former colony and the dependency from the controlling state. In addition, RTAs are meant to promote trade in goods and services activities, including financial services.[20] In addition, GFC_j^{Dum} and GFC_j^{Rating} account for agglomeration economies due to financial infrastructures. We rely on the Global Financial Centres Index (GFCI) computed by the Z/Yen Group that provides profiles, ratings and rankings for financial centres.[21] The variable GFC_j^{dum} is a dummy variable equal to 1 if country j has a city classified among the global financial centres, and 0 otherwise. This first control draws from Park (1982) who distinguished primary off shore centers (OFC) such as London or New York which serve worldwide clientele and act as international financial intermediaries from secondary OFC such as Cayman Islands, Bahamas, Panama which are booking, collecting and funding centers. Furthermore, the global financial centres can record quite different ratings. For instance, New York and London have higher ratings than Paris. Therefore, we also control for the rating recorded by the the global financial centres. The variable GFC_j^{Rating} normalizes the ratings provided by the

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[19]The RTA database used by de Sousa (2012) has been updated by the author (http://jdesousa.univ.free.fr/data.htm). The database covers 199 countries over the time period 1958-2015. In this paper, we can consider up to 228 partner countries while banks' headquarters are located in European Union (EU). Therefore, we rely on the RTA database provided by the World Trade Organization (WTO) to cover all the RTA between EU and the 228 partner countries considered in this paper.

[20]See the RTA database provided by the WTO (http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx) to have information on agreements that have been notified to the WTO.

[21]More precisely, we identify countries that have a financial centre classified as global in the GFCI #17 and #18 (march and sept. 2015). These global financial centres can be "broad & deep", "relatively broad" or "relatively deep". 16 countries have a global financial centre: Belgium, Canada, China, Hong Kong, France, Germany, Ireland, Japan, Luxembourg, Netherlands, Republic of Korea, Singapore, Switzerland, United Arab Emirates, the United Kingdom, and the United States of America.

GFCI in 2015 to range between 0 and 1.[22] Last, the model specification includes a headquarter fixed effect (α_k) to control for unobserved heterogeneity at the bank level.

4.2   The augmented specifications: accounting for tax havens

In order to account for the specificity of tax havens, we alternatively test: TH_j^{Hines} a dummy variable equal to 1 if country j is classified as tax haven by Hines and Rice (1994) and 0 otherwise; TH_j^{Count} a count variable equal to the number lists of tax havens on which country j is recorded; TH_j^{Top15} a dummy variable equal to 1 if country j is ranked in the top 15 of tax havens defined by Oxfam and 0 otherwise.

In a second step we investigate the drivers emphasized in the literature, i.e. a favorable tax rate and financial secrecy. We will test whether the effect associated with the tax haven dummy is driven by these dimensions. In addition, Dharmapala and Hines (2009) have documented that tax havens are better-governed than comparable nonhaven. Low tax rates might not attract MNEs as "only better-governed countries can credibly commit not to expropriate foreign investors (...) or mismanage the economy". To build on this important finding, we control for the quality of governance. We follow Dharmapala and Hines (2009) and use the Worldwide Governance Indicators (WGI) compiled by Kaufmann et al. (2005). In the following, we briefly describe the variables and refer the reader to a more detailed Appendix.

Tax considerations. We first introduce the statutory corporate tax rates which are the most

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[22]There is a usual confusion between tax havens and offshore financial centers, i.e. financial places providing financial services to non-residents (OFC). For example, Switzerland is considered a tax haven (3 lists) and is ranked as 7th largest financial center ranked by banks' external assets (BIS, 2008). A lot of tax havens are indeed large OFC, by nature. Similarly the Netherlands is regarded a tax haven and it is one of the most prominent OFCs by different measures of capital flows. The Netherlands is similar to Luxembourg and Ireland, all can be considered a conduit center with large ingoing and outgoing capital flows related to activities of MNCs. However not all tax havens are OFC: for example Lebanon appears on 5 lists of tax havens but is not in the top 50 financial centers. In turn, some major OFC are not tax havens: United Kingdom and France are not on any list of tax haven and are ranked first and fourth largest financial center. Therefore controlling for the agglomeration economies in financial centers with a binary dummy could result in underestimating tax haven effects while not controlling for them would overestimate it (think of Switzerland).

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obvious and readily available measures of fiscal pressure on corporate profits (STR_j). However, it often does not represent the tax cost of reporting income due to various deductions and specific tax schemes (Dharmapala, 2014).[23] As in previous empirical studies, we alternatively test the actual tax rate, often referred to as effective" tax rate (ETR). Previous works have used the effective tax rate by US firms provided by the Bureau of Economic Analysis available for 50 countries (Hines, 2007). These data have recently been extended from firm-level tax forms to 71 countries by Dowd et al. (2017). In order to fill the gap with our sample size, we design a simple prediction model to estimate the missing ETR for 228 countries in total.

Transparency. An allegedly defining characteristic of tax haven is secrecy. Beyond banks secrecy laws which make it illegal to report financial information, a lot of tax haven jurisdictions offer a lenient regulation environment allowing individuals or corporate to escape the laws, rules and regulations of home jurisdictions.[24] As a serious implication of secrecy is to facilitate laundering criminal proceeds. We use the Basel Anti-Money Laundering Index (AML) developed by the Basel Institute of Governance to test the effect associated with low transparency. The overall score is aggregated from 14 underlying sub-indicators grouped into the following five categories: Money laundering/Terrorist financing risk ; Corruption; Financial transparency and standards ; Public transparency and accountability ; Political and legal risk.

Last, we introduce non linearity to provide a more accurate understanding of the driving forces. More precisely, Var^{q25} (Var^{q75}) takes the value of 1 when the country is in the bottom (top) quartile of measure "Var" and zero instead.

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[23]For example, in November 2014 Luxembourg leaks (or Luxleaks) disclosed Luxembourg's tax rulings and tax avoidance for over three hundred multinational companies based in Luxembourg.

[24]"A high level of bank secrecy is almost invariably used as a selling point by OFCs some of which have been (and are) exploited also for activities related to money laundering?" (Errico and Borrero (1999), p.10).

4.3 The Poisson pseudo-maximum likelihood

Our augmented sample includes 228 countries including a lot of null values of the dependent variable, turnover. To address this statistical issue, we rely on the Poisson pseudo-maximum likelihood (PPML) estimator. In fact the PPML estimator has three main advantages to estimate a gravity model. First, the PPML estimator does not require a log-linear specification of the gravity model. Consequently, the PPML estimator is consistent in the presence of heteroskedasticity, while estimators requiring a log-linear specification, as the OLS estimator, can be bias and inconsistent (Silva and Tenreyro (2006)).[25] Second, the PPML estimator provides a natural way to deal with zero values of the dependent variable. The PPML estimator assumes that the zero and non-zero observations are produced by the same data generating process. [26] In other words, no observation is dropped to estimate the model and PPML estimates are not exposed to a sample selection bias. Conversely, OLS estimates, using log transformation of the dependent variable, imply to drop the zero observations and are particularly exposed to a sample selection bias. A simple strategy to deal with the zero observations might be to arbitrarily add a small positive number (usually 0.5 or 1) to all observations but such ad-hoc approach might perform poorly. Last, interpretation of estimated coefficients is straightforward; estimated coefficients are interpreted as elasticities for covariates entered in logarithms and as semi-elasticities for covariates entered in levels.[27] For robustness check, we also consider the Negative Binomial Quasi-Generalised Pseudo-Maximum Likelihood estimator (NB QGPML) as suggested by Bosquet and Boulhol (2014).[28] This estimator is an alternative to the

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[25]Heteroskedasticity would result from the log transformation of the original nonlinear gravity model used to get a linearized form. Consequently, this kind of heteroskedasticity does not only affect OLS standard errors but also OLS parameter estimates. As a result, OLS estimates might be biased and inconsistent. Alternatively, the PPML estimator provides consistent estimates of the original nonlinear gravity model (Silva and Tenreyro (2006)).

[26]Furthermore, note that the PPML estimator is consistent, as a PML estimator, even if the data are not Poisson-distributed.

[27]Note that estimated coefficients associated with dummy variables (as TH_j^{Hines} for instance) are not directly interpreted. The percentage change of the dependent variable when a dummy variable moves from 0 to 1 is given by $exp(\hat{\beta}) - 1$, where $\hat{\beta}$ is the estimated coefficients associated with dummy variable.

[28]The NB QGPML estimator proposed by Bosquet and Boulhol (2014) is scale invariante, contrary to standard NB QGPML estimators. Therefore, the NB QGPML estimator proposed by Bosquet and Boulhol (2014) can be applied to a continuous dependent variable (for which unit choice is arbitrary by definition).

PPML estimator. More precisely, the NB QGPML estimator encompasses the Poisson assumption as a special case and might be more efficient when the dependent variable exhibit over-dispersion (i.e., the conditional variance of the dependent variable increases more than proportionally with the conditional mean).[29] Last, we will also report the OLS estimates of the log-linear specification for the stake of comparison.

5 Results

5.1 The Baseline Specification

The first column of Table 3 reports the estimate results of specification (1) on the large sample of 228 countries.[30] Most variables are significant and estimated coefficients with the expected sign as we will comment below. The estimates are consistent across both small and large sample, which suggests that our results are robust (see Table 9 in Appendix). The larger the economic size and the population of a country, the larger the local turnover booked by banks foreign affiliates. In addition, a common border, a former status of colony and a current status of dependent territory for country j all positively impact the reported turnover; the effect of a common language is not significant, probably because it is already captured by the previous three determinants. A common regional trade agreement between countries i and j is associated with larger turnover. Moreover, the combination of both estimated coefficients associated with GFC_j^{dum} and GFC_j^{rating} is positive, a consistent result confirming that the higher the financial development of a jurisdiction the larger the turnover reported by foreign banks affiliates. Last, the finding of a non significant distance effect can probably be explained by the sample bias due to the inclusion of European banks only mentioned above.

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[29]The PPML estimator assumes proportionality between the conditional variance and the conditional expectation of the dependent variable.

[30]In the following we comment the estimates on the largest sample only and report in Appendix the results on the shortest sample (see Table 9)

Table 3: Baseline and augmented specifications on the large sample

Dependent variable:	$Turnover_{k,i,j}$		$Turnover_{k,i,j}$		$Turnover_{k,i,j}$		$Turnover_{k,i,j}$	
Estimator:	PPML		PPML		PPML		PPML	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
$\log\left(GDP_j^{percap}\right)$	1.3205***	(0.1042)	1.3875***	(0.1039)	1.3780***	(0.0987)	1.3566***	(0.1027)
$\log\left(Pop_j\right)$	0.6177***	(0.0847)	0.7612***	(0.0758)	0.7562***	(0.0660)	0.7474***	(0.0739)
$\log\left(dist_{i,j}\right)$	0.0693	(0.0835)	0.0660	(0.0858)	0.0168	(0.0810)	0.0401	(0.0856)
$Contig_{i,j}$	1.2495***	(0.4761)	0.8809	(0.5537)	1.1107**	(0.4784)	0.8594	(0.5492)
$L_{i,j}$	0.3276	(0.2430)	0.2719	(0.2477)	0.2963	(0.2354)	0.2454	(0.2475)
$Colony_{i,j}$	0.5781***	(0.1707)	0.6116***	(0.1771)	0.6319***	(0.1807)	0.6588***	(0.1823)
$RTA_{i,j}$	0.7802***	(0.2289)	0.9226***	(0.2056)	0.8924***	(0.2012)	0.8954***	(0.2077)
$Territory_{i,j}$	1.4418**	(0.6155)	1.4773***	(0.5677)	1.1006*	(0.6533)	1.5135***	(0.5838)
GFC_j^{Dum}	-0.4964	(0.3802)	-0.7958*	(0.4392)	-0.7309*	(0.3940)	-1.0154*	(0.5216)
GFC_j^{Rating}	1.5295***	(0.5485)	1.4764**	(0.5777)	1.5106***	(0.5504)	1.7116***	(0.6280)
TH_j^{Hines}			0.9861***	(0.3613)				
TH_j^{Count}					0.1789***	(0.0663)		
TH_j^{Top15}							1.0581**	(0.4156)
No. obs.	7912		7912		7912		7912	
No. positive obs.	811		811		811		811	
No. partners	228		228		228		228	
No. Tax Havens	-		43		56		15	
Log Likelihood	-394278		-386592		-386345		-385348	
BIC	788959		773597		773103		771110	
R2	0.2949		0.3035		0.3174		0.3055	
pseudo-R2	0.6191		0.6265		0.6268		0.6277	
RESET test $_{(p-value)}$	1.12 (0.2895)		0.14 (0.7132)		0.01 (0.9995)		0.04 (0.8325)	

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Heteroskedasticity robust standard errors (using Huber/White/sandwich estimator of variance) are in brackets.

5.2 Introducing Tax Havens

In Table 3, we introduce a dummy capturing whether jurisdiction j is a tax haven. Columns 2, 3 and 4 report the estimate results including three alternatives. Estimated coefficients are consistent with the baseline estimate. The variable of interest, TH_j is significant and the estimated coefficient is positive in the three alternatives. The estimated coefficients associated with TH_j^{Hines} and TH_j^{Top15} in column 2 and 4 resp. are similar. Their marginal effect is respectively an additional activity by 168% and 188%. In turn, the estimated coefficient associated with TH_j^{Count} is lower because it measures the marginal effect of being included in one additional list of tax havens. In sum, the estimates confirm that tax havens attract more commercial presence than non tax haven, once we control for standard factors. Now, we would like to get a more accurate understanding of the driving forces.

Table 4 displays the results for the specific drivers. The first column reports the linear results. First we note an unexpected positive sign of the coefficient associated with the effective tax rate suggesting that the larger the tax rate the larger the activity of banks; in addition, coefficients associated with secrecy and governance are not significant. It is worth mentioning that the tax haven dummy is significant. In sum, financial secrecy and governance taken linearly do not add any new information. We introduce non linearity in the mechanism in the second and third column. We comment the third column only which displays our final results for the sake of brevity[31]. The estimated coefficient associated with the ETR in the bottom quartile is not significant; as our estimate includes a significant tax haven dummy, it means that we do not get any extra valuable information. In turn, the driver associated with financial secrecy affects banking activity in a non linear way: a high level of secrecy is associated with lower activity while a high level of transparency has no effect. In sum, contrary to what is suggested in the literature, our results suggest that

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[31]The second column displays intermediate estimate results. Non significant variables are excluded from the specification in the third column

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financial secrecy is not a deerminant and in turn it tends to divert activity. This might be due to the fact that low financial transparency is also associated with poorly governed countries. And in fact, when we control for the quality of governance, we find that banks tend to avoid countries with weak governance countries. Last but not least, a short comment on the fact that adding the drivers in the specification does not change the result on the tax haven dummy. The majority of countries showing a low level of tax rate are also poorly governed and hence cannot pretend to the status of tax havens. Put it differently tax havens benefit from low tax rates but do not necessarily offer the lowest rates worldwide. Similarly, while financial secrecy is appreciated by tax havens users, it needs to go hand in hand with strong institutions.

Last, Table 5 disentangles the results associated with governance financial secrecy within sub-categories. In fact each measure aggregates sub-indices that we alternatively test. We keep the aforementioned results that non linearity is necessary to properly capture effects. On the one hand, the negative effects of weak governance is driven by the dimensions of voice and accountability, government effectiveness and rule of law. A low performance on these dimensions reportedly diverts activity. In turn, a low level of corruption, political stability and violence do not affect banks activity. On the other hand, every single sub-categories of the transparency measure affects banks activity except money laundering and terrorist financing. Interestingly a low level of financial transparency and standard has a negative effect. This result suggests a threshold of financial opacity under which banking activity can not operate. Now we take a closer look at the individual data to shed some light on the money laundering and terrorism financing result. Removing Luxembourg from the sample turns this dimension significant and negative. In other words, Luxembourg drives the result because it both attracts the largest amount of volume and performs badly on this dimension.

Table 4: ETR, AML scores and WGI scores

Dependent variable:	$Turnover_{k,i,j}$		$Turnover_{k,i,j}$		$Turnover_{k,i,j}$	
Estimator:	PPML		PPML		PPML	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
$\log\left(GDP_j^{percap}\right)$	1.2421***	(0.2332)	0.9574***	(0.1631)	1.0724***	(0.1325)
$\log\left(Pop_j\right)$	0.6482***	(0.0733)	0.5899***	(0.0720)	0.6227***	(0.0795)
$\log\left(dist_{i,j}\right)$	0.0787	(0.0864)	0.1170	(0.0910)	0.0826	(0.0868)
$Contig_{i,j}$	0.8394	(0.5659)	1.0605**	(0.5287)	0.9916*	(0.5342)
$L_{i,j}$	0.2981	(0.2454)	0.1814	(0.2358)	0.2030	(0.2386)
$Colony_{i,j}$	0.5523***	(0.1826)	0.6506***	(0.1753)	0.6237***	(0.1696)
$RTA_{i,j}$	0.8189***	(0.2457)	0.8433***	(0.2664)	0.7302***	(0.2094)
$Territory_{i,j}$	0.5833	(1.1034)	-0.4688	(1.0066)	-0.2130	(0.9766)
GFC_j^{Dum}	-0.8568**	(0.4370)	-0.7602*	(0.4410)	-0.7944*	(0.4501)
GFC_j^{Rating}	1.4794**	(0.6015)	1.5191**	(0.6273)	1.6234***	(0.6051)
TH_j^{Hines}	1.3145***	(0.3501)	1.0121***	(0.3407)	1.1377***	(0.3421)
$ETR_j^{predict}$	0.0734*	(0.0436)				
ETR_j^{q25}			-0.4202*	(0.2434)	-0.3738	(0.2371)
ETR_j^{q75}			-0.0176	(0.3956)		
AML_j	-0.0476	(0.1209)				
AML_j^{q25}			-0.3062	(0.1995)		
AML_j^{q75}			-1.3958***	(0.3430)	-1.3100***	(0.3625)
WGI_j	0.2191	(0.1485)				
WGI_j^{q25}			-0.9247***	(0.3054)	-0.9383***	(0.3036)
WGI_j^{q75}			0.2920*	(0.1755)		
No. obs.	4412		4412		4412	
No. positive obs.	773		773		773	
No. partners	128		128		128	
No. Tax Havens	19		19		19	
Log Likelihood	-366355		-360748		-362789	
BIC	733112		721922		725980	
R2	0.2943		0.3128		0.3137	
pseudo-R2	0.5808		0.5872		0.5849	
RESET test $(p-value)$	0.31 (0.5766)		1.34 (0.2474)		2.22 (0.1362)	

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Heteroskedasticity robust standard errors (using Huber/White/sandwich estimator of variance) are in brackets.

Table 5: Dimensions of transparency and governance

A. Effect of transparency

	Coef.	S.E.
overall score (AML_j^{q75})	-1.5764***	(0.3726)
Dimension used instead of the overall score:		
Money laundering/Terrorist financing risk	-0.2405	(0.2650)
Corruption	-0.8979***	(0.3329)
Financial transparency and standards	-0.8116***	(0.2896)
Public transparency and accountability	-1.1372***	(0.2987)
Political and legal risk	-1.0156***	(0.3338)
Money laundering/Terrorist financing risk (modified for Luxembourg)	-0.9294***	(0.3195)

B. Effect of governance

	Coef.	S.E.
overall score (WGI_j^{q25})	-1.0727***	(0.3139)
Dimension used instead of the overall score:		
Voice and accountability	-0.9625***	(0.2974)
Control of corruption	0.0600	(0.5011)
Government effectiveness	-1.0896***	(0.3610)
Political stability and absence of violence	-0.4212	(0.4270)
Rule of law	-0.7364*	(0.4093)

6 The fiscal loss

What is the tax saving realized by European banks by means of their subsidiaries located in tax havens? Or, to put it differently, what is the fiscal shortfall for the countries (notwithstanding the central role played by banks in the tax optimization)? The CbCR and our previous model might be used to gauge such amount. The results of our calculations are presented in Table 6. According to

Table 6: Estimated tax saving for EU banks

(€billion or %)	Observed data		Predicted data			
	non TH	TH	non TH	TH	non TH	TH
Model	(#0)		(#1)		(#2)	
Turnover	229	49	229	49	**229+15**	**34**
Profit	54	22	54	22	54+3.6	8
(Profit/Turnover)	(24%)	(46%)	(24%)	(46%)	(24%)	**(24%)**
Tax	15	2.5	15	6.1	15+1	2.2
(Tax/Profit)	(28%)	(11%)	(28%)	**(28%)**	(28%)	**(28%)**
Tax saving/Fiscal loss				3.6	1	−0.3

Note: in bold, assumption.

the CbCR data for 2015 (model #0), and considering the list of tax havens established by Hines and Rice (1994), the turnover abroad of the main European banks is €229 billion excluding tax havens, and nearly €50 billion in tax havens. The profit before tax is, respectively, €54 and €22 billion and the tax burden is €15 and €2.5 billion. Unsurprisingly, the implicit tax rate in tax havens is significantly lower than for other foreign subsidiaries (11% versus 28%). Let us assume the same average tax rate applies for all foreign bank subsidiaries (28%), regardless of where they are located (model #1). All things being equal, this would automatically increase the fiscal burden in tax havens, which would reach €6 billion. As a first approximation, the tax saving for EU banks is then €3.6 billion. In total, this represents 21% of the overall tax burden. However, if the presence in tax havens was not so valuable, banks would certainly locate fewer subsidiaries in these jurisdictions and the turnover would be reduced. From the gravity model presented above, we can estimate the turnover in tax havens, in the absence of tax and regulatory benefits (model #2). Given their low

economic weight (only 8 tax havens have a population of more than 2 million inhabitants and none exceeds 10 million inhabitants) and their fringe geographical location (apart from a few countries such as Hong Kong or Luxembourg), in the absence of specific advantages, the total turnover in tax havens for our sample of European banks should be €34 billion. Assuming that productivity in tax havens and non-tax havens is similar, with a same margin rate (i.e. 24%), the total profit estimated in tax havens would be €8 billion. Consequently, with an average tax rate of 28%, the tax burden in tax havens would be €2.2 billion, i.e. €0.3 billion less than the actual amount (€2.5 billion). At the same time, some activities would be repatriated from tax havens to other countries. Assuming a constant worldwide activity, we estimate that the turnover in non-tax havens would be 15 billion higher, which translates into an additional fiscal burden of 1 billion. Under this second set of hypothesis, in total, the tax saving for EU banks is €0.7 billion, which represents 4% of the total tax burden. The previous estimates must be regarded as upper and lower bounds: if we align the fiscal policy of tax havens with what is applied in other countries, the tax burden for EU banks would be between 4% $[=(1-0.3)/(15+2.5)]$ and 21% $[=3.6/(15+2.5)]$ higher. What about the fiscal shortfall for the countries? First, note that we only consider the direct effect associated with the tax position of the banks. That is, we ignore the essential role played in tax havens by bank subsidiaries to facilitate tax evasion for their clients, MNEs and individuals. Second, our estimations make it clear that tax havens have no incentives to align their tax rate. Indeed, in this case, they would lose their comparative advantage and their fiscal revenue would likely decrease. Our estimate is a fiscal loss of 0.3 billion for tax havens, which is 12% of their fiscal revenues. On the contrary, the other countries would increase their fiscal revenue by €1 billion, which represents an increase by 6.7%. This is clearly a non-cooperative game.

7 An early assessment of the CbC reporting quality

As the public reporting of CbC data is at its early stage, we would like to give a tentative diagnosis of their quality and reliability. We would like to go beyond a manual assessment and figure a systematic test. To this end, we use the CbCR data to produce a ranking of tax havens and compare it with existing ones. Any significant gap between our proprietary ranking and existing lists gives indication on the consistence of the data.

We use our baseline estimate from which we exclude the tax haven dummy and we investigate the errors. We compute the abnormal turnover, i.e. a measure of the turnover amount not explained by our model. The computation of such measure is as follows: $AbTurn_{k,i,j} = \frac{\widehat{\varepsilon}_{k,i,j}}{\widehat{turn}_{k,i,j}}$ where $\widehat{\varepsilon}_{k,i,j}$ stands for the residuals and $\widehat{turn}_{k,i,j}$ the estimated values of turnover both taken from the initial specification. We compute the mean and median value of $AbTurn_{k,i,j}$ by country j. The mean value of $AbTurn_j$ computed is 0.92 while the median value is 0.3 (see Table 7).[32] We shall not be surprised by this right skewness which is precisely due to the fact that we have purposely omitted to account for tax haven characteristics. To be sure, we compare the mean and median values calculated for the whole sample with their values calculated for tax havens only. In tax havens, the mean and median values are significantly higher, 1.9 and 0.6 (with resp. t-stat for the mean and median tests of 2.4 and 2). In sum, the large errors in the sub-sample composed of tax havens give a first positive indication that CbCRdata report substantially large activity in these jurisdictions (way beyond the standard gravity factors).

Now we focus on the top 10 countries with the largest errors and compare them with existing lists.

We observe that 6 out of 10 countries are listed as tax haven in at least one of the 11 lists mentioned above. It gives us another positive indication that reporting data are consistent.[33]

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[32]For illustration, the turnover booked by European banks affiliates in the United States is roughly at the prediction
[33]We refer to one of the 11 lists used to construct TH_j^{Count} described in the data Section .

Table 7: Analysis of abnormal turnover values

|	Small Sample			Large Sample		
	All countries (138)	Tax havens Hines (26)	Top 15 (14)	All countries (228)	Tax havens Hines (43)	Top 15 (15)
Mean	0.9184	1.9063	1.9173	0.7077	1.5267	2.2442
Median	0.2951	0.6432	1.1102	0.1080	0.0182	1.1855
Mean t-stat $(p-value)$		2.39 (0.018)	1.69 (0.092)		2.33 (0.020)	2.14 (0.034)
Median t-stat $(p-value)$		2.03 (0.044)	2.52 (0.013)		−1.25 (0.214)	1.95 (0.053)

Note: OLS and quantile regessions are used to implement the mean test and the median test respectively. The standard errors used to implement the mean test and the median test are robust to heteroskedasticity (using the Huber/sandwich estimator). The null hypotheses are no difference in mean/median of abnormal turnover values between tax havens and non tax haven countries.

However the absence of Cayman, Panama or Bahamas is puzzling. in fact these three jurisdictions are listed on 9 out of 11 tax havens lists mentioned above. To make sure, we systematically examine the turnover reported by the 10 largest banks in our sample in the 5 jurisdictions which appear on most lists- Bahamas, Cayman, Panama, Saint-Kitts-et-Nevis and Samoa (see Figure ??). Three banks report zero activity in these jurisdictions (Barclays, HSBC and Lloyds). Only one bank reports activity in Panama (Santander) and two in Bahamas (SG and Santander). Seven banks report activity in Cayman, between 0,02 and 0,4% of their foreign activity.

The very light commercial presence of the largest European banks in the most prominent tax havens comes at a surprise. Could it be due to the geographic bias of our sample implying that European banks have little or no presence in or near the Caribbean? To be sure we look up the case of every single banks in these specific countries. We found evidence of the presence of some them in jurisdictions where they yet report no activity in their annual report.

How can it be? While the data from the CbCR are comprehensive and reliable, there is still a room for interpretation. In particular, Article 89.1 requires information to be disclosed "on a

Figure 1: Reporting in a selection of prominent tax havens
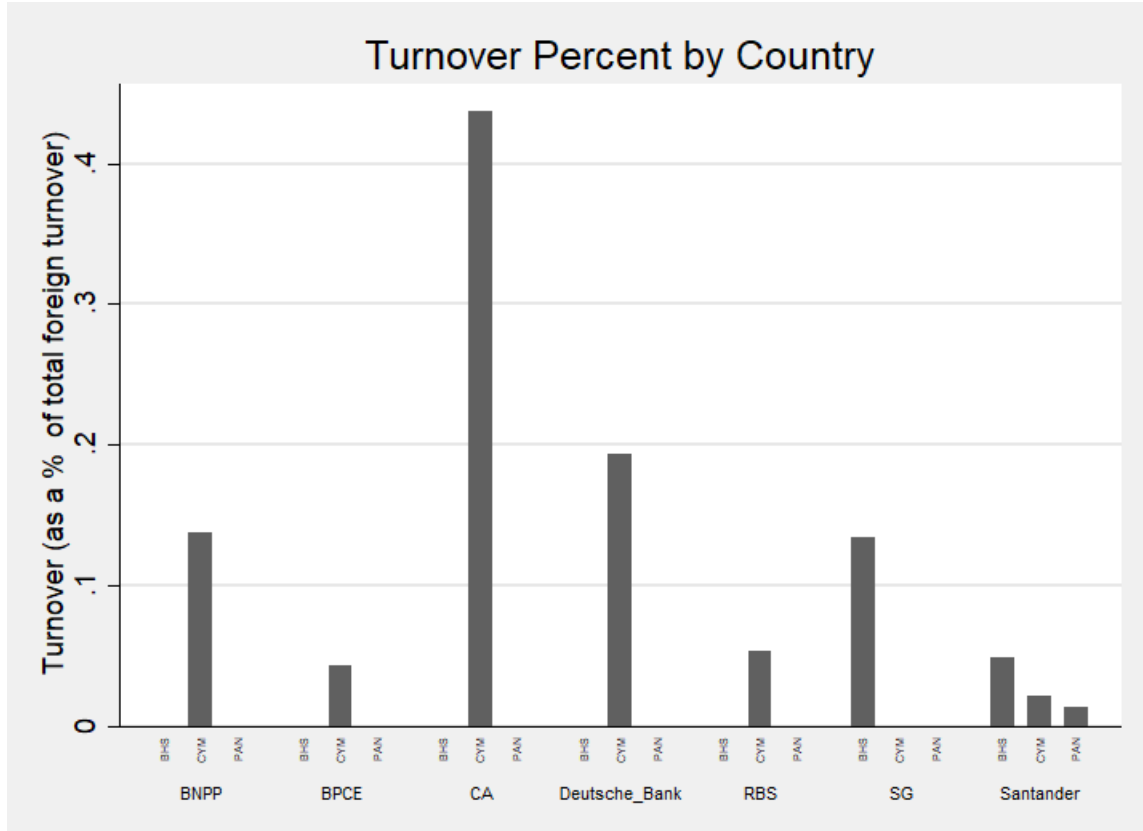
consolidated basis but there is no indication as to which level the consolidation should take place. It is likely that banks have to refer to the Capital Requirements Regulation (CRR) Article 18 (methods for prudential consolidation), but a wide range of interpretations are possible. Therefore, while the CbCR seeks to achieve a consolidation at the country-level, we cannot rule out certain consolidation over several countries. Moreover, Article 89.1 requires "each institution to disclose annually, specifying by Member State and by third country in which it has an establishment. But, the notion of establishment might be vague for some entities like trusts, partnership, SPVs, etc.

In sum, an early assessment of the data indicate that they fairly reflect a substantial activity in tax havens. However we point to misreporting issues in some specific jurisidctions which might be due to too a vague definition of consolidation.

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8   Conclusion

The main contribution of this paper is to explore the geography of banking: this is the first paper to take advantage of the CbCR data set which offers a comprehensive and reliable coverage of firm location choices. Overall, our results uncover that tax havens attract extra banking activity beyond regular gravity factors. Low tax rates are however not sufficient to attract extra activity; governance and transparency matter but as diversion not attraction forces. By providing a number of new stylized facts on the drivers of banks activity in tax havens, our paper underlines the value of such data. As expected by its proponents, the CbCR is an effective tool to enhance transparency. This new data set raises subsequent research avenues. First, the CbCR under CRD IV also applies to investment firms, i.e. mainly broker dealers and asset management entities. A natural continuation is to focus on these entities much less documented. Second, only 2015 data are so far available. There is no requirement to report prior year comparative figures, but in the future we shall be able to examine changes in banking locations by exploiting exogenous changes of environment. Last, the CbCR has first been applied to financial institutions, but there are currently strong pressures in Europe and the US to impose the CbCR to all large MNEs. Such extension would constitute a highly valuable source in corporate finance research. It is possible to improve the dispositive, without significant costs. For now, the data need to be manually and separately collected and for each bank. The data are usually provided within the financial reports, not readily available, and with notable differences across banks. Several recommendations of the International Open Data Charter could be applied.[34] First, the data need to be provided in open, multiple, and standardized formats, so that it can more easily be processed and used by a wide range of parties (scholars, journalists,

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[34]In July 2013, G8 leaders signed the G8 Open Data Charter, which outlined a set of core open data principles. See http://opendatacharter.net/.

NGOs,). Second, additional information reporting could be required without additional costs: the number of subsidiaries and some aggregate items of the balance sheet to better reflect affiliates underlying activity such as total asset. Third, the data need to be published on a central portal managed for example by the European Central Bank or the European Banking Authority.

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Appendix
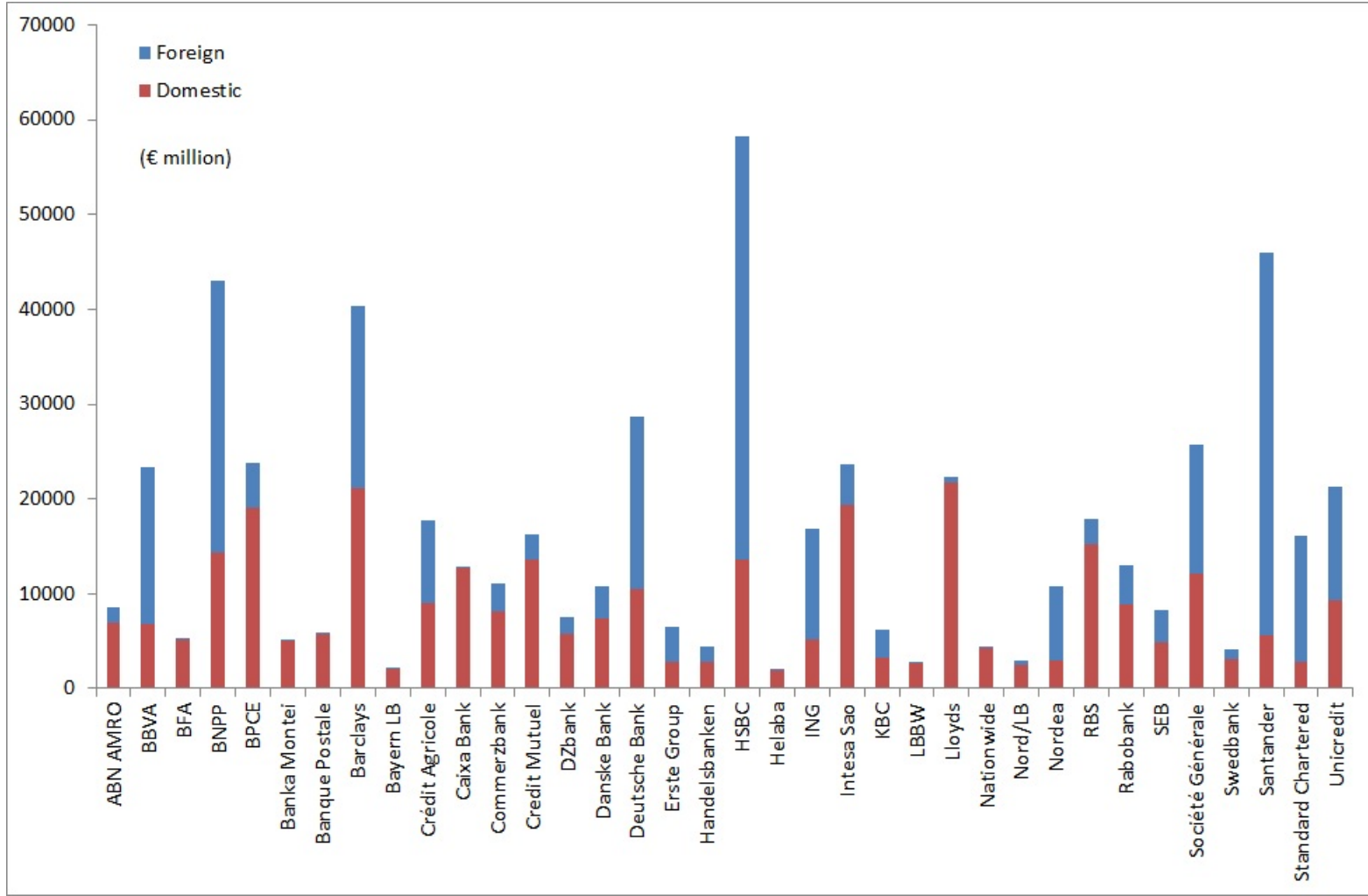
Figure 2: Turnover by banks

Table 8: Descriptive statistics at the bank level

Bank	HQ location	Nb of countries	Foreign turnover		Domestic turnover	Foreign employees		Domestic employees
			Mean	Max		Mean	Max	
ABN AMRO	NLD	15	108	332	6896	268	966	18112
BBVA	ESP	21	788	6983	6785	4926	38499	32903
BFA	ESP	2	64	128	5155	n.a.	n.a.	13558
BNPP	FRA	63	454	4950	14305	1977	17973	56981
BPCE	FRA	55	86	2548	19118	209	2796	91232
Banka Montei	ITA	6	20	53	4974	85	302	25201
Banque Postale	FRA	1	1	1	5744	n.a.	n.a.	4321
Barclays	GBR	37	520	8488	21090	2181	31221	48622
Bayern LB	DEU	4	55	128	2050	54	89	6223
CA	FRA	41	212	2790	9021	891	10348	37559
Caixa Bank	ESP	2	8	9	12666	14	17	29854
Commerzbank	DEU	10	298	1086	8082	938	6251	33925
Crédit Mutuel	FRA	14	198	1203	13535	926	7071	65828
DZ Bank	DEU	19	91	791	5738	227	1153	25123
Danske Bank	DNK	13	260	1007	7404	639	2021	10098
Deutsche Bank	DEU	52	349	6307	10510	1064	11368	45757
ERSTE Group	AUT	6	612	1409	2838	n.a.	n.a.	n.a.
Handelsbanken	SWE	16	101	577	2779	407	1904	7263
HSBC	GBR	57	782	14079	13602	3760	33062	44559
Helaba	DEU	4	59	109	1879	65	103	5460
ING	NLD	32	364	3123	5185	1229	9645	14586
Intesa Sao	ITA	29	149	780	19323	969	5035	61243
KBC	BEL	16	178	1197	3286	1024	7556	10646
LBBW	DEU	7	26	91	2636	36	71	9748
Lloyds	GBR	7	85	128	21780	157	316	87652
Nationwide	GBR	2	15	36	4226	41	60	16117
Nord LB	DEU	5	77	110	2491	88	208	5580
Nordea	SWE	16	495	2605	2893	1420	8288	6957
RBS	GBR	43	61	763	15161	681	14567	64567
Rabobank	NLD	36	115	1461	8873	330	3989	35041
SEB	SWE	20	172	604	4838	n.a.	n.a.	n.a.
SG	FRA	68	199	1710	12097	1232	16005	51612
Santander	ESP	35	1152	11720	5551	4676	44957	29838
Standard Chartered	GBR	56	238	2774	2736	1642	19731	1853
Swedbank	SWE	5	196	353	3107	1197	2303	7789
Unicredit	ITA	24	503	3452	9252	3833	17653	47865

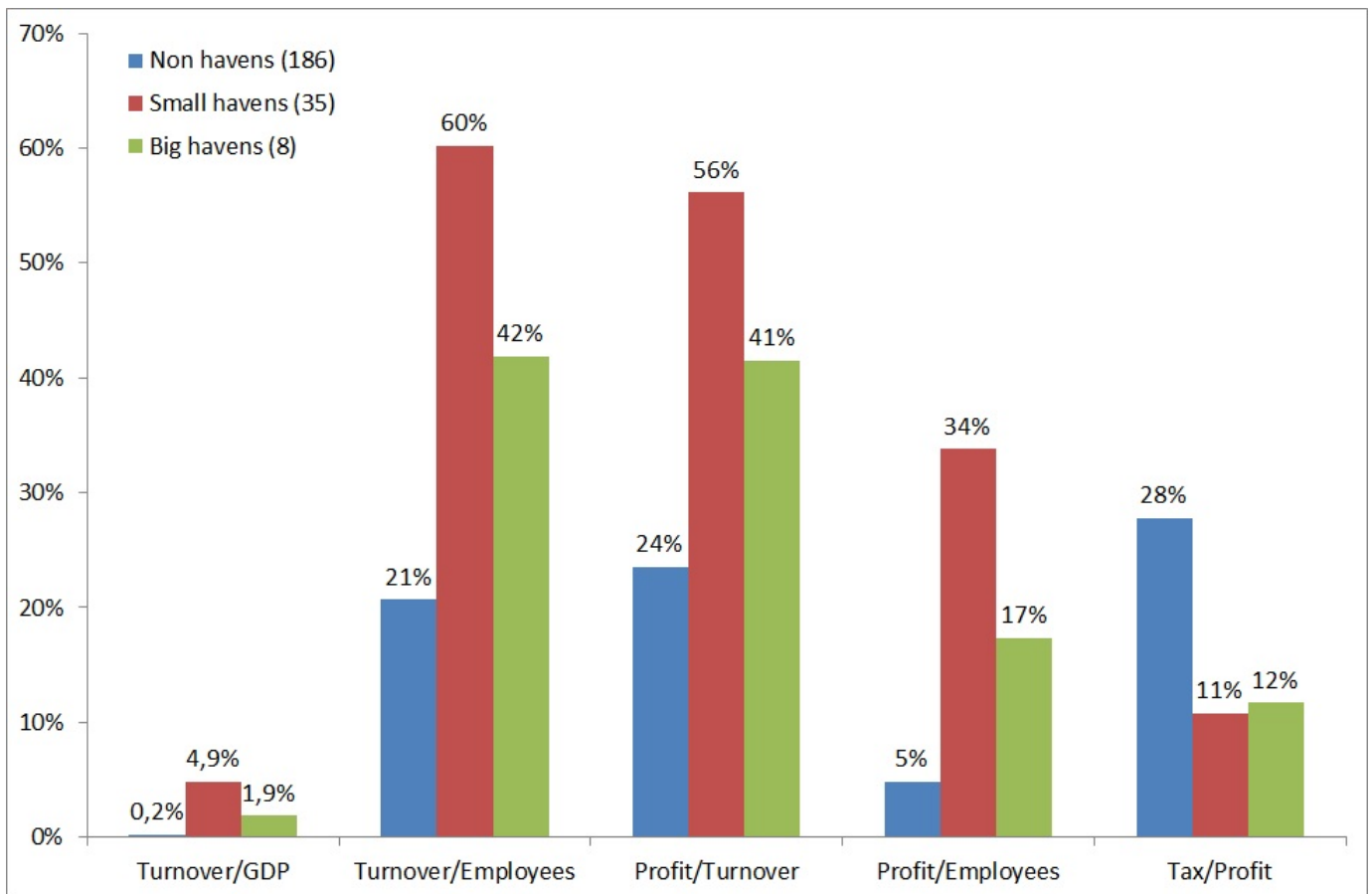Figure 3: Business ratios across jurisdictions

Table 9: Baseline and augmented specifications on the small sample

Dependent variable:	$Turnover_{k,i,j}$		$Turnover_{k,i,j}$		$Turnover_{k,i,j}$		$Turnover_{k,i,j}$	
Estimator:	PPML		PPML		PPML		PPML	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
$\log\left(GDP_j^{percap}\right)$	1.1330***	(0.1117)	1.2074***	(0.1083)	1.1985***	(0.1035)	1.1860***	(0.1056)
$\log\left(Pop_j\right)$	0.5493***	(0.0874)	0.6766***	(0.0789)	0.6776***	(0.0685)	0.6721***	(0.0769)
$\log\left(dist_{i,j}\right)$	0.0626	(0.0837)	0.0575	(0.0845)	0.0165	(0.0796)	0.0323	(0.0842)
$Contig_{i,j}$	1.2657***	(0.4835)	0.9526*	(0.5461)	1.1429**	(0.4825)	0.9183*	(0.5434)
$L_{i,j}$	0.2614	(0.2433)	0.2230	(0.2460)	0.2351	(0.2355)	0.1991	(0.2462)
$Colony_{i,j}$	0.5932***	(0.1678)	0.6180***	(0.1734)	0.6408***	(0.1776)	0.6578***	(0.1779)
$RTA_{i,j}$	0.7057***	(0.2246)	0.8314***	(0.2010)	0.8154***	(0.1959)	0.8104***	(0.2031)
$Territory_{i,j}$	1.1979*	(0.6232)	1.2703**	(0.5725)	0.9440	(0.6463)	1.2946**	(0.5809)
GFC_j^{Dum}	-0.5036	(0.3847)	-0.7530*	(0.4387)	-0.7092*	(0.3984)	-0.9477*	(0.5178)
GFC_j^{Rating}	1.6849***	(0.5570)	1.6226***	(0.5780)	1.6519***	(0.5553)	1.8124***	(0.6219)
TH_j^{Hines}			0.8176**	(0.3489)				
TH_j^{Count}					0.1565***	(0.0645)		
TH_j^{Top15}							0.9079**	(0.4077)
No. obs.	4762		4762		4762		4762	
No. positive obs.	811		811		811		811	
No. partners	138		138		138		138	
No. Tax Havens	-		26		32		14	
Log Likelihood	-382104		-376758		-375973		-375613	
BIC	764589		753906		752336		751616	
R2	0.2970		0.3044		0.3180		0.3066	
pseudo-R2	0.5726		0.5785		0.5794		0.5798	
RESET test (p−value)	0.08 (0.7764)		0.31 (0.5749)		0.98 (0.3228)		0.58 (0.4458)	

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Heteroskedasticity robust standard errors (using Huber/White/sandwich estimator of variance) are in brackets.

Table 10: Robustness check: alternative estimators

Dependent variable:	$Turnover$		$Turnover$		$\log\left(1+Turnover\right)$		$\log\left(1+Turnover\right)$		$\log\left(Turnover\right)$		$Turnover$	
Sample:	Baseline		Large		Baseline		Large		Positive obs.		Positive obs.	
Estimator:	NB QGPML		NB QGPML		OLS		OLS		OLS		PPML	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
$\log\left(GDP_j^{percap}\right)$	1.3260***	(0.0905)	1.5760***	(0.0885)	0.2498***	(0.0186)	0.1799***	(0.0115)	0.3220***	(0.0829)	0.6746***	(0.1194)
$\log\left(Pop_j\right)$	0.6713***	(0.0543)	0.7788***	(0.0496)	0.1498***	(0.0114)	0.0867***	(0.0052)	0.2043***	(0.0412)	0.3851***	(0.0668)
$\log\left(dist_{i,j}\right)$	-0.0096	(0.0727)	-0.0272	(0.0731)	-0.0970***	(0.0276)	-0.0595***	(0.0179)	-0.0376	(0.0646)	0.1491*	(0.0831)
$Contig_{i,j}$	1.2222***	(0.3738)	1.1660***	(0.3724)	0.4481*	(0.2452)	0.2661*	(0.1507)	0.9414**	(0.3763)	0.9499*	(0.5039)
$L_{i,j}$	0.1798	(0.2021)	0.2321	(0.2048)	-0.0172	(0.1096)	0.0395	(0.0715)	0.0406	(0.2017)	0.1730	(0.2267)
$Colony_{i,j}$	0.8065***	(0.1961)	0.8329***	(0.1999)	0.2891***	(0.1056)	0.1839***	(0.0692)	0.5244**	(0.2073)	0.4588**	(0.1819)
$RTA_{i,j}$	1.0390***	(0.1444)	1.1684***	(0.1385)	0.2864***	(0.0437)	0.1740***	(0.0308)	0.3097**	(0.1293)	0.4707**	(0.1874)
$Territory_{i,j}$	1.5766***	(0.3886)	1.9186***	(0.3838)	0.9157***	(0.2682)	0.5510***	(0.1705)	0.7364**	(0.3569)	0.4184	(0.5015)
GFC_j^{Dum}	-0.2712	(0.3476)	-0.2703	(0.3424)	0.2372	(0.2123)	0.5326**	(0.2201)	-0.1409	(0.2505)	-0.8033*	(0.4258)
GFC_j^{Rating}	1.0837**	(0.4877)	0.8924*	(0.4796)	2.4382***	(0.3589)	2.4321***	(0.3766)	1.4269***	(0.3593)	1.4864***	(0.5598)
TH_j^{Hines}	0.6531***	(0.2150)	0.8079***	(0.2056)	0.1257**	(0.0630)	-0.0169	(0.0358)	0.0501	(0.2231)	0.4553	(0.3747)
No. obs.	4762		7912		4762		7912		811		811	
No. positive obs.	811		811		811		811		811		811	
No. partners	138		228		138		228		137		137	
No. Tax Havens	26		43		26		43		25		25	
Log Likelihood	-168649		-150983								-226591	
BIC	337687		302380								453477	
R2					0.3321		0.3007		0.2697		0.2941	
RESET test	0.09 (0.7610)		1.12 (0.2905)		360.02 (0.0000)		481.68 (0.0000)		0.54 (0.4625)		12.37 (0.0004)	

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Heteroskedasticity robust standard errors (using Huber/White/sandwich estimator of variance) are in brackets.

Additional appendix - not intended for publication

Table A: Specification with alternative tax rates

Dependent variable:	$Turnover_{k,i,j}$		$Turnover_{k,i,j}$		$Turnover_{k,i,j}$		$Turnover_{k,i,j}$	
Estimator:	PPML		PPML		PPML		PPML	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
$\log\left(GDP_j^{percap}\right)$	1.1278***	(0.1383)	1.1501***	(0.1902)	1.1031***	(0.0968)	1.1329***	(0.1254)
$\log\left(Pop_j\right)$	0.4777***	(0.1126)	0.5398***	(0.0639)	0.5084***	(0.0709)	0.5496***	(0.0767)
$\log\left(dist_{i,j}\right)$	0.0644	(0.0922)	0.0610	(0.0865)	0.0435	(0.0876)	0.0626	(0.0828)
$Contig_{i,j}$	1.1808**	(0.5411)	1.2654***	(0.4805)	1.2398***	(0.4637)	1.2652**	(0.4920)
$L_{i,j}$	0.2612	(0.2639)	0.2722	(0.2245)	0.3302	(0.2286)	0.2613	(0.2370)
$Colony_{i,j}$	0.6852***	(0.2606)	0.5871***	(0.1798)	0.5602***	(0.1741)	0.5933***	(0.1716)
$RTA_{i,j}$	0.5403**	(0.2675)	0.7065***	(0.2281)	0.7369***	(0.2414)	0.7061***	(0.2043)
$Territory_{i,j}$	-0.2234	(1.0240)	1.2070**	(0.6581)	1.2082*	(0.6246)	1.1986**	(0.5807)
GFC_j^{Dum}	-0.6041	(0.4975)	-0.5001	(0.3839)	-0.5282	(0.3706)	-0.5040	(0.4012)
GFC_j^{Rating}	1.7645**	(0.7808)	1.6867***	(0.5515)	1.7026***	(0.5520)	1.6852***	(0.5816)
ETR_j^{Downd}	0.7542	(1.3058)						
$ETR_j^{predict}$			0.6824	(4.0521)				
STR_j					1.5496	(1.2756)		
ETR_j^{Dum25}							0.0016	(0.2772)
No. obs.	2282		4762		4762		4762	
No. positive obs.	621		811		811		811	
No. partners	71		138		138		138	
No. Tax Havens $_{(TH_j^{Hines}=1)}$	10		26		26		26	
Log Likelihood	-329899		-382061		-380625		-382103	
BIC	660138		764512		761641		764597	
R2	0.1852		0.2962		0.2947		0.2970	
pseudo-R2	0.4599		0.5726		0.5742		0.5726	
RESET test $_{(p-value)}$	0.02 (0.8952)		0.16 (0.6934)		0.37 (0.5413)		0.09 (0.7616)	

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Heteroskedasticity robust standard errors (using Huber/White/sandwich estimator of variance) are in brackets.

Additional figures

In order to characterize the geographic dispersion of tax havens and their country profile, we display two cartograms scaled by turnover. Figure A plots a worldwide map: we observe that tax havens are wealthy countries scattering around advanced countries in Europe, the North American continent

and a few in Asia. The red circles scale the reported turnover. Figure B focuses on Europe and confirms a high concentration of tax havens of both large and small size.

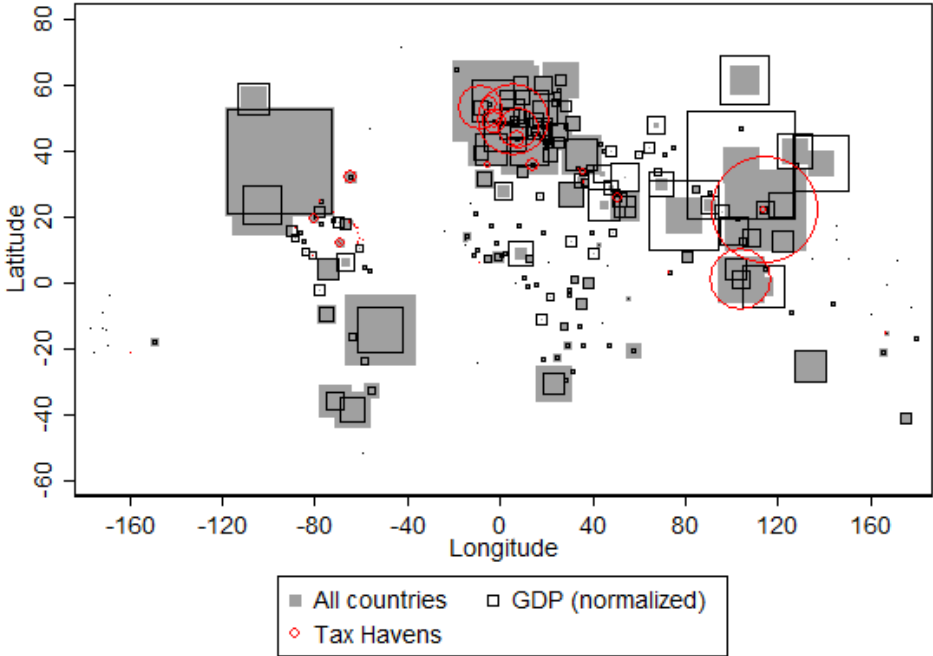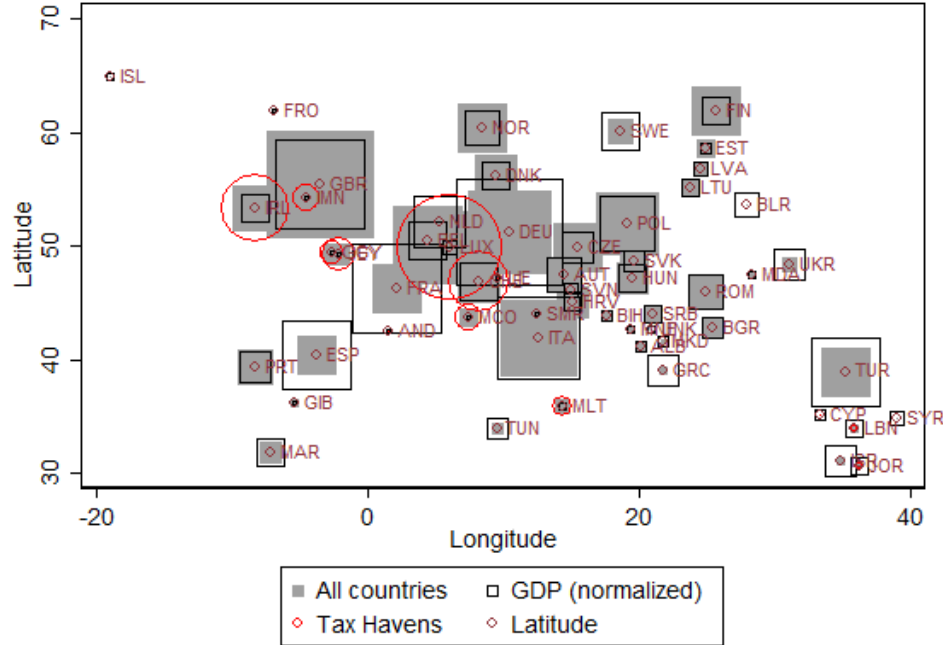Figure A: Cartogram: Worldwide View

Figure B: Cartogram: European View

Tax havens in the academic literature in economics

We searched for academic articles using online archive collections provided by Elsevier (ScienceDirect), Wiley and Jstor. These platforms give access to the most influential academic journals worldwide. We searched in titles, abstracts and keywords , and restricted our query to journal articles in Business, Economics, and Finance. We also used Econlit, Ideas and the Google Scholar. All the queries have been made in February 27-28, 2017.

Figure C: Number of academic articles in economic journals about tax haven
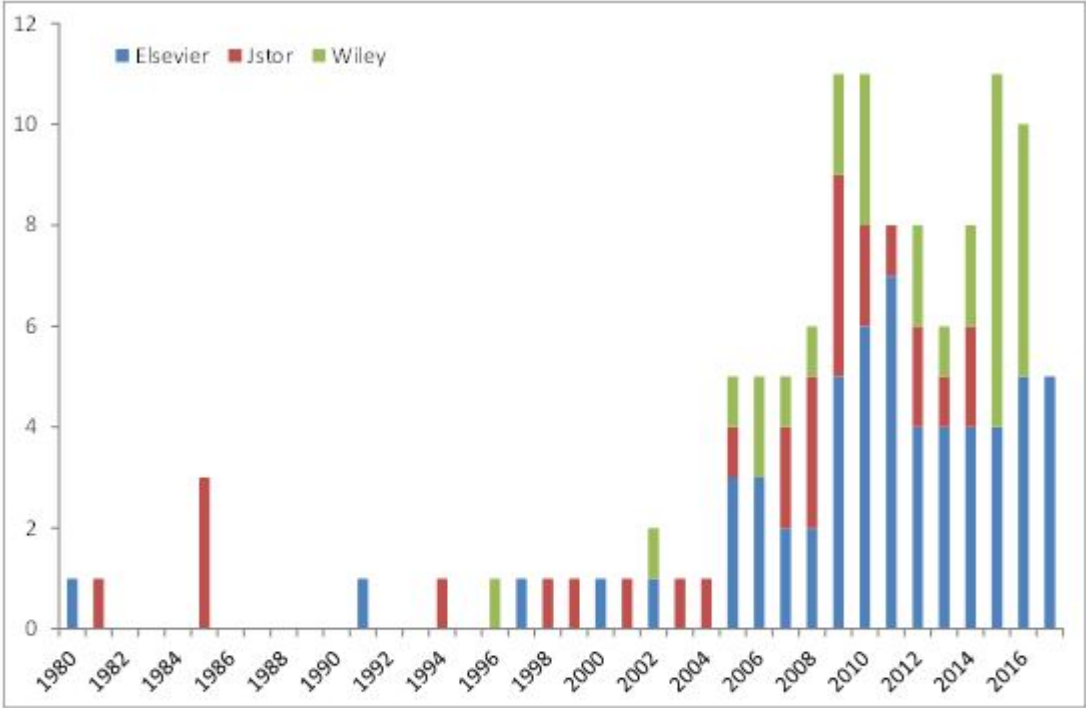
Note: The query is based on the wording "tax haven" in "Abstract, Title, Keywords" for the categories "Economics, Econometrics and Finance" and "Business, Management and Accounting" for "Journal" between 1980-2017. Queries have been made in February 27-28, 2017. Academic articles are collected from ScienceDirect-Elsevier, Wiley, and Jstor (only journal articles are considered).

Table B: Academic articles in economics about tax haven, breakdown by sub-discipline

	Elsevier	Jstor	Wiley	Total	%
Accounting	16	3	5	24	21%
Public Economics & Political Economy	9	9	3	21	18%
Law & Economics	3	0	1	4	3%
International Economics & Eco. Geography	5	0	4	9	8%
Development Economics	4	0	3	7	6%
Financial & Monetary Economics	6	1	1	8	7%
Business & Management	4	5	4	13	11%
General & miscellaneous	12	10	9	31	26%
Total	59	28	30	117	100%

Note: The queries is based on the wording "tax haven" in "Abstract, Title, Keywords' for the categories "Economics, Econometrics and Finance" and "Business, Management and Accounting" for "Journal" between 1980-2017. Queries have been made in February 27-28, 2017. Academic articles are collected from ScienceDirect-Elsevier, Wiley, and Jstor (only journal articles are considered)

Table C: Articles about tax haven in Top 100 academic journals in economics (IDEAS)

Rank	Top 100 Academic Journals in economics	Search
21	Journal of Public Economics, Elsevier	8
20	Journal of International Economics, Elsevier	4
46	Journal of International Business Studies, Palgrave Macmillan	4
2	The Quarterly Journal of Economics, Oxford University Press	2
4	Journal of Financial Economics, Elsevier	2
14	Journal of Economic Perspectives, American Economic Association	2
33	World Development, Elsevier	2
53	Journal of Economic Behavior & Organization, Elsevier	2
54	Economics Bulletin, AccessEcon	2
8	Journal of Finance, American Finance Association	1
16	The Review of Economics and Statistics, MIT Press	1
18	Journal of Banking & Finance, Elsevier	1
26	European Economic Review, Elsevier	1
38	Economics Letters, Elsevier	1
39	American Economic Journal: Econ. Policy, American Economic Association	1
42	Energy Policy, Elsevier	1
52	Journal of Economic Dynamics and Control, Elsevier	1
87	Scandinavian Journal of Economics, Wiley Blackwell	1
98	Journal of Business Research, Elsevier	1

Note: The queries is based on the wording "tax haven" in "Abstract, Title, Keywords' for the categories "Economics, Econometrics and Finance" and "Business, Management and Accounting" for "Journal" between 1980-2017. Queries have been made in February 27-28, 2017. Academic articles are collected from ScienceDirect-Elsevier, Wiley, and Jstor (only journal articles are considered)

Figure D: Literature Review: A Typology

	General		Focus on the banking/financial sector
	Tax Havens	*OFC*	
Macro (country-level)			
First evidence	Hines & Rice (1994)	Hampton & Christensen (2002)	Grilli (1989); Alworth & Andresen (1992); Huizinga & Nicodème (2004); Buch (2005).
Which countries?	Dharmapala & Hines (2009)	Masciandaro (2006); Lane & Milesi-Ferretti (2011)	
What impact?	Hines (2005, 2010)	Rose & Spiegel (2007)	Zucman (2013, 2015); Andersen, Johannesen, Lassen & Paltseva (2014)
What public policy?	Masciandaro (2005); Masciandaro & Balakina (2016); Zucman (2014, 2015)		Johannesen (2014); Johannesen & Zucman (2014)
Micro (firm level)			
First evidence	Harris, Morck, Slemrod & Yeung (1993); Hines (1997); Grubert & Slemrod (1998)		Demirgüç-Kunt & Huizinga (2001)
Which firms?	Desai, Foley and Hines (2006a); Dharmapala & Riedel (2013); Dyreng, Lindsey & Thornock (2013); Hebous & Lipatov (2014); Gumpert, Hines & Schnitzer (2016); Johannesen, Tørsløv & Wier (2016)		
What impact?	Hebous & Vilen (2014)		
What public policy?			Johannesen & Larsen (2016)

Definitions

List of tax havens

The list of tax havens is derived from Hines and Rice (1994). Andorra, Anguilla, Antigua and Barbuda, Bahamas, Bahrain, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Channel Islands (Jersey, Guernsey), Cook Islands, Cyprus, Dominica, Gibraltar, Grenada, Hong Kong*, Ireland*, Isle of Man, Jordan*, Lebanon*, Liberia*, Liechtenstein, Luxembourg*, Macao, Maldives, Malta, Marshall Islands, Monaco, Montserrat, Netherlands Antilles (Aruba, Curaao, Sint Maarten), Panama*, Saint Kitts and Nevis, Saint Lucia, Saint Martin, Saint Vincent and the Grenadines, Singapore, Switzerland*, Turks and Caicos Islands, Vanuatu. Note: * Population > 2 million.

The Country-by-Country Reporting

Recital (52) of CRD clearly presents the motivations behind the CbCR[35]:

- "CBCR will help stakeholders to get a better understanding of groups' structures, their activities and geographical presence. In addition CBCR should help understanding of whether taxes are being paid where the actual business activity takes place. Disclosure and transparency are seen as key regulatory tools which help to ensure that firms effectively implement their obligations and are accountable for the business strategies which they adopt."

- "The new CBCR obligations must be seen against the background of the recent financial crisis, in which unprecedented levels of public support were necessary in order to restore financial stability and the trust of citizens in the financial sector was heavily affected. This led to strong demands for banks to show greater accountability and increased transparency in their relations with the public."

- "Independently from the financial crisis, there are increasing calls on companies to take responsibility for their impact on society and the contribution that businesses make in the form of taxation is increasingly seen as part of corporate social responsibility. This has increased demand for more transparency in the tax affairs of large enterprises in particular where they have significant cross-border activities."

Institutional Indicators

- ETR_j^{Downd}: we use the data provided by Dowd et al. (2016). They calculate an average based on individual firm rates by dividing taxes paid by profits. They then create country-

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[35]See also http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014DC0676.

year average tax rates by taking the profit-weighted average of the firm-specific rates within a country and year.

- $ETR_j^{predict}$: we run an ETR determination model including the statutory corporate tax rate and a vector of controls. We rely on a sample of 80 countries and obtain a determination model with an R^2 statistics of 40%. In a second step, we collect all available statutory corporate tax rates and controls from different sources and we predict the missing ETR for a total of 228 countries.

- AML: We use data provided by the BaselInstitute of Governance (expert edition) based on 14 different indicators coming from 14 different sources. They are aggregated using a weighting scheme based on a qualitative expert assessment, implying that the individual indicators are not weighted equally. A countrys overall score is calculated based on available data only, and missing values are not replaced (for details, see Basel AML index (2016).

- $Governance$: we use the WGI compiled by Kaufmann et al. (2011). The overall measure of countries' governance institutions is aggregated from 352 different underlying governance-related variables grouped into six categories: voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption.

- $GFCI_j$: The GFCI was created in 2005 and first published by Z/Yen Group in March 2007. The GFCI is updated and republished each September and March. It includes 84 financial centres. Using clustering and correlation analysis they determine a financial centre?s profile along 5 different dimensions of competitiveness: Business Environment, Financial Sector Development, Infrastructure, Human Capital and Reputational and General Factors.

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