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MASTER'S THESIS

The Role of Tax Havens for Banks: Evidence from Two Firm-Level Datasets

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Declaration of Authorship

The author hereby declares that she compiled this thesis independently, using only the listed resources and literature, and the thesis has not been used to obtain a different or the same degree.

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Prague, May 11, 2018

Signature

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Abstract

The thesis focuses on the base erosion and profit shifting in the banking sector, a topic that has not been studied much so far. We are the first to compare Orbis data with recently available country-by-country reporting data on banks' economic activities. In Orbis data, we identify underreporting of the number of countries where bank groups operate, tax, or the number of employees while some of the profits seem to be missing in country-by-country reporting data. In the second part, we study the tendency of banks to shift their profits due to two incentive – either low taxation or high financial secrecy. We find that the locations of banks' profits are sensitive to statutory tax rates and that this elasticity is higher at higher levels of statutory tax rates while effective tax rates do not seem to affect banks behavior. For the first time in this context, we use the secrecy score of the Financial Secrecy Index to analyze the secrecy incentive to shift the profit but we do not find any significant evidence that financial secrecy influences banks' behavior. Finally, we provide the first analysis of whether the obligation to disclose information on the country basis from the year 2014 has any effect on the location of banks' profits. However, we find only some inconclusive evidence that EU banks reduce the profit in tax havens while non-EU banks do not change their behavior.

JEL Classification	G20, G28, G38, H25, H26, M48
Keywords	Tax Havens, Multinational Banks, Country-by-country Reporting, Base Erosion and Profit Shifting

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Abstrakt

Práce se zaměřuje na erozi daňových základů a přesouvání zisků v bankovním sektoru, tématu, které dosud nebylo příliš prozkoumané. Jako první porovnáváme data Orbis s nově dostupnými daty ekonomické aktivity z reportů podle zemí. V datech Orbis jsme rozpoznali podhodnocení počtu zemí, kde banka působí, daní a počtu zaměstnanců, zatímco v případě reportů podle zemí je podhodnocen zisk. V druhé části zkoumáme tendenci bank přesouvat zisky z následujících důvodů: kvůli nízkým daňovým sazbám, či kvůli vysokému finančnímu

utajení. Zjistili jsme, že umístění zisků je citlivé na statutární daňovou sazbu, kde citlovost roste s výší sazby, zatímco efektivní daňová sazba chování bank zřejmě neovlivňuje. Poprvé v této souvislosti používáme skóre tajemství indexu finančního tajemství ke zkoumání efektu finančního tajemství na přesouvání zisků. Avšak nenašli jsme průkazné známky toho, že by finanční tajemství ovlivňovalo chování bank. Na závěr uvádíme první analýzu, zda zavedení povinnosti v roce 2014 sdělovat informace po zemích má vliv na umístění bankovních zisků. Avšak dospěli jsme pouze k neprůkazným výsledku, že evropské banky snižují zisky v daňových rájích, zatímco mimoevropské banky své chování nemění.

Klasifikace JEL	G20, G28, G38, H25, H26, M48
Klíčová slova	Daňové ráje, Mezinárodní banky, Reporting podle zemí, Eroze daňových základů a přesouvání zisků

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Acronyms

BEPS Base Erosion and Profit Shifting

CRD IV Capital Requirement Directive IV

CCCTB Common Consolidated Corporate Tax Base

CBCR Country-by-Country Reporting

EU European Union

FSI Financial Secrecy Index

FDI Foreign Direct Investment

GUO Global Ultimate Owner

IFRS International Financial Reporting Standards

IMF International Monetary Fund

MNEs Multinational Enterprises

OECD Organisation for Economic Co-operation and Development

Master's Thesis Proposal

Author	Bc. Eliška Jelínková
Supervisor	Petr Janský, Ph.D.
Proposed topic	The Role of Tax Havens for Banks: Evidence from Two Firm-Level Datasets

Motivation Base erosion and profit shifting is a well-known issue discussed by several governments. The tendency of multinational compaties to reallocate their profits to low-tax jurisdictions also concerns financial institutions namely banks. The thesis focuses on banks since banks are one of the most important financial intermediary of each economy and their profitability is crucial for stable economy.

In 2011 European commission proposed so called Common Consolidated Corporate Tax Base (CCCTB) which should give opportunity to multinational companies to declare their profits on consolidated basis. The profits would be then redistributed back to each country using the apportionment factors which reflect the economic activity of each subsidiary. The new version of this proposal was published in 2016. The thesis analyses impact of CCCTB on banks' profits as well as on country tax revenue.

In 2014 the Capital Requirements Directive (CRD IV) came into effect (European Parliament, 2013). The CRD IV states that financial institutions are obliged to declare basic accounting details on country-by-country basis. In the second part of my thesis I will examine if there is change in banks' behaviour after the introduction of the CRD IV.

As mentioned above, we analyze the possible misalignment of banks' profits. Taxes are the main source of governments' incomes; therefore, it is important that institutions declare their profits in jurisdictions where the economic activity takes place. Otherwise, governments are losing their income. The thesis focused on the influence of tax rate of each jurisdiction and so called tax havens on banks declared profit and paid tax.

Hypotheses

Hypothesis #1: Introducing CBCR cause change in banks' behaviour in declaration of profits.

Hypothesis #2: More detailed CBCR data give us different results of simulation CCCTB than Bankscope data.

Hypothesis #3: Banks tend to misalign profits to low-tax jurisdictions.

Methodology Dataset for analysis consists of two single data sources. First source was already used in my bachelor thesis (Jelínková, 2016). It is based on the Country-by-country reports which banks must publish since 2014 when the Capital Requirements Directive (CRD IV) came into effect (European Parliament, 2013). The dataset is extended for newly collected data from recent years. The second data source are data from Orbis Data Focus which are collected by Bureau van Dijk.

Many analyses focus the impact of new CCCTB on multinationals' profits and on countries tax income. The objective of the thesis is to simulate analysis of Cobham et al. (2017) using three different datasets. First dataset will be the Bankscope data with as many available banks as possible. Second dataset will be also Bankscope data only for approximately 50 larger European multinational banks. The last dataset will be the newest available data on country-by-country basis which banks are obliged to report. Results for each dataset will be compared in order to find possible weakness of Bankscope data and show that these data might not be detailed enough.

Using the resulting CCCTB for each bank in each country we analyze whether banks tend to reallocate their tax base to low tax jurisdictions. Using the panel data with difference between reallocated profit and declared profit as dependent variable I will focus on tax rate as an independent variable and test its significance. Similarly, we compare the results of CBCR data and Bankscope data in analysis of how the banks misalign their profits.

Using the Bankscope data we analyze whether introducing the Country-by-country reporting in 2014 had any effect on banks' performance. We compare the performance of banks couple of years before 2014 and the years after. We use panel data analysis with profit as a dependent variable. The we use dummy variable for the years before 2014 and test its significance. As a control group, We analyse the performance of such a group of banks which are not effected by CBCR obligation.

Expected Contribution Country-based data are used to find th evidence about banks misalignment of profit to low-tax jurisdictions and tax havens. The data are newly available and thus, it will be one of the first studies based on this dataset. We also uncover if preventive measures of EU have any measurable effect. Whether

making banks to publish their detailed accounting will prevent them from misalignment of their profit.

Using the CBCR dataset we simulate CCCTB and compare the simulation with results obtained using Bankscope dataset and analyse the quality and possible shortage of Bankscope data.

Outline

1. Introduction: Introduction to the topic and motivation of the thesis.
2. Literature review: covers the overview of existing literature and compares used method of my analysis with ones used in the previous research.
3. Dataset: In this section, the dataset will be described in detail. Since the part of the dataset was collected by author a detailed dataset description is provided.
4. Methodology: The method, regression and test used in the analysis.
5. Analysis: Presentation of results.
6. Discussion: Comparison of analysis results with existing literature.
7. Conclusion

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Author Supervisor

Chapter 1

Introduction

The Base Erosion and Profit Shifting (BEPS) is relevant and widely discussed topic nowadays. Many researchers focus on the analysis of Multinational Enterprises (MNEs), therefore, this thesis focuses on financial institutions (banks) and their possible tendencies to shift profits to low-tax jurisdictions The associated research found evidence that MNEs shift their profits and reduce their tax burden. Therefore, the role of tax havens for MNEs is unquestionable; however, it is known very little about its effect on banks. Even though financial institutions can be concidered as a crucial part of the economy which is the subject of strict regulations, we find the current state of research as unsatisfactory. Therefore, we decided to provide the insight to this issue and analyze the role of tax havens for banks behavior.

Our analysis is divided into three parts. The first part focuses on the evaluation of the quality of widely used database – Orbis Bank Focus by Bureau van Dijk. We compare data from the database with the CBCR data. The CBCR dataset is unique data source which we obtained from Country-by-country reports

In the second part of the analysis, we examine the effect of tax havens on banks' behavior related to the profit shifting. We consider different measurements of the tax burden as well as different lists of tax havens. We estimated the semi-elasticity of banks' profits with respect to the net of the tax rate as a measurement of tax incentive to shift the profit. Following the idea introduced by Hines Jr & Rice (1994) and later by Dowd *et al.* (2017), we assume the relationship to be quadratic.

We also analyze the second incentive to shift the profit which is the secrecy of target country. We use secrecy score which is a part of the Financial Secrecy

Index (FSI) to measure the secrecy incentive to shift the profit. The FSI is published every two years by Tax Justice Network (2018) since 2009. Although it is quite valuable and unique measurement, it has not been used much so far.

The last part of the analysis focuses on the effect of the CRD IV which was introduced by (European Parliament, 2013). This directive is one of the actions of Organisation for Economic Co-operation and Development (OECD) and European Union (EU) as a part of the BEPS Action Plan (Organisation for Economic Co-operation and Development/G20, 2015). Therefore, we analyze whether the directive has desired effect.

The thesis has the following structure. In chapter 2 we provide an overview of relevant literature, the motivation, and state our hypotheses. In chapter 3 4 and we describe the datasets and the methodology. We explain the choice of variables, introduce models which we use for our analysis, and describes possible difficulties which can arise during the analysis.

In chapter 5 we provide the results of the analysis showing quantitatively in tables as well as qualitatively in graphs. We also provide the discussion with relevant literature.

A final chapter 6 summarizes our results. We provide the conclusion of the research and highlight the contribution.

Chapter 2

Literature review

BEPS is s global concern which is discussed by governments and several international organization. Due to globalization people and companies have easier access to foreign countries including tax havens. Now, why can this be a problem? The existence of tax havens and BEPS itself brings several consequences. First and probably the most obvious one is that governments, where the tax avoidance or tax evasion take place, are losing money. Total loss of government income was calculated i.e. by Jansky & Palansky (2017), Torslov *et al.* (2017) and UNCTAD (2015). Results differ from USD 100 billion to EUR 200 billion, however, they all show us that there is significantly large income shifted from countries where economic activity takes place to low-tax jurisdictions. In other words, this is the amount which these countries are losing. Jansky & Palansky (2017) considered low-income and middle-income countries. They estimated that these countries lose up to 1% of their GDP in a worse case.

This yields several consequences. Johannesen *et al.* (2016) pointed out that tendency to shift the profits might be negatively correlated with the level of development of the country. In other words, developing countries suffer from BEPS the most.

Another consequence of tax haven or low-tax jurisdictions is that overall tax rate is constantly decreasing. This phenomenon can be explained by the existence of tax havens. If a company is choosing where it should establish its entrepreneurship and it can choose between low-tax or higher-tax countries, it is naturally better to choose the one with the lower tax burden. Now, setting the tax rate became a similar problem as setting a price of a product in the classical market for goods and services. Therefore, due to globalization, the national level of the tax rate is pushed down.

Johannesen (2010) questions this theory. He says that due to asymmetric equilibria and crowding effect it becomes less attractive for some low-income countries to compete with tax havens and they increase the taxes. Therefore, the effect of tax havens is the opposite. This theory, however, does not seem to be credible, Figure 2.1 shows that tax rate is generally decreasing. It shows the development of average tax rate for years 2003 to 2018. It depicts development for different regions including global average, EU average or OECD average. We can see that all averages start between 25% and 35% in the year 2003 and nowadays, they are between 20% and 30%. Thus, the global average decreases by 5 percentage points in last 15 years. The dotted line is a linear trend of the global tax rate which shows us the downward tendency. The dotted line is a linear trend of the global tax rate which shows us the downward tendency of development of tax rate. Of course, this downward trend can have several causes; therefore, we cannot be sure whether the reason is the existence of tax havens.

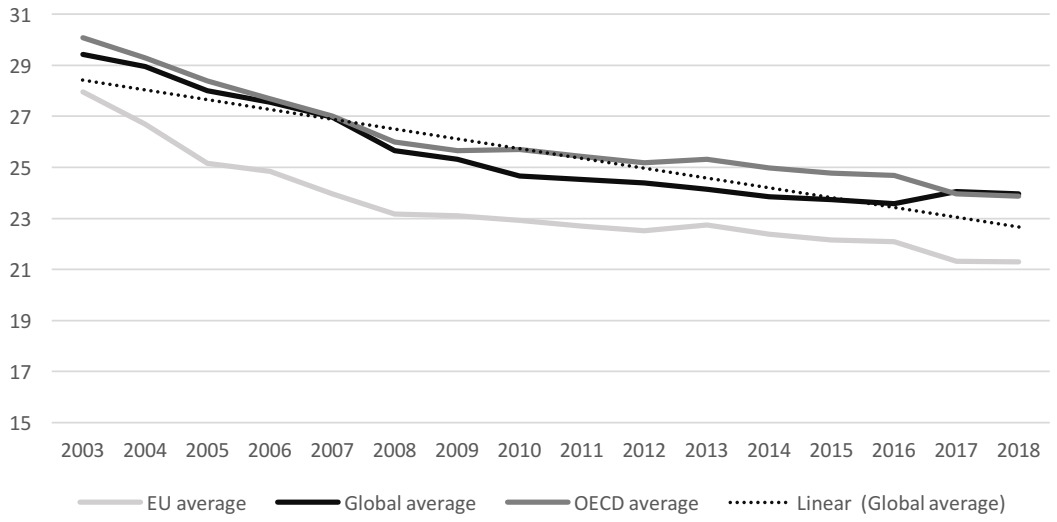


Figure 2.1: Graph of the development of global tax rates

Source: Author computations based on KPMG data.

Now, as we summarized reasons why this is a relevant issue we can go through related literature. The issue of BEPS was considered by many researchers. One of the oldest one and probably the most relevant one is an analysis done by Hines Jr & Rice (1994). They introduced basic idea of determining whether company tends to shift profit to a low-tax jurisdiction. They distinguished between a true income and a shifted income. The true income is

the one which is generated in a certain country using labor and capital. The Common Consolidated Corporate Tax Base (CCCTB) introduced by European Commission (described in appendix B) is based on the same idea. On the contrary, shifted income reflects the tax incentive of a company to shift its profit to the tax haven.

They have many followers who developed more advanced models based on this theory. Cobham *et al.* (2017) analyze the impact of various apportionment factors on the tax base in case of unitary taxation including the proposed CCCTB formula. They found several differences in the computed tax bases which suggest it is not an easy task to decide which factors capture real economic activity. In a similar manner, it is not straightforward which factors use to measure economic activity in the similar model as was introduced by Hines Jr & Rice (1994) since there are more options. Similar issue related to apportionment factors and apportionment formula was analyzed a couple of years earlier by Devereux & Loretz (2008) or by Cobham & Loretz (2014).

The reason of need for unitary taxation is discussed by Desai & Dharmapala (2009). They analyzed the opportunity of tax avoidance MNEs have and discussed the policy implication relating to financial reporting. Later De Simone (2016) analyzed whether introducing the International Financial Reporting Standards (IFRS) accounting standards have an impact on company tendency to shift profit to low-tax jurisdictions. She found the evidence that there is tax motivated profit shifting for MNEs which adopted IFRS.

The incentive to shift profit can come either from the parent company or from the group as a whole. In general, there are two approaches to analyze the incentive to shift the profit. Since parent companies have usually the largest economic activity it seems legible to assume that the incentive comes from the parent company. To analyze this incentive, the difference between parent company tax rate and subsidiary tax rate is widely used. This approach was used by Hines Jr & Rice (1994) and later by Dyreng & Markle (2016) or Huizinga & Laeven (2008).

The second approach analyses the incentive of the whole group to shift the profit. It is measured as a difference between the tax rate of subsidiary and an average of statutory tax rates of all countries where the group operates. This approach is more general and it was also used by Huizinga & Laeven (2008) and Clausing (2016). They estimated semi-elasticity across European countries. In other words, for each country, they computed the general incentive of companies to shift the profit from (or into) the particular country.

This summarizes the different approaches to tax incentive to shift profit. Dharmapala & Riedel (2012) introduced a new approach which uses exogenous earning shock. They estimate the impact of the shock to a parent company and its subsidiaries. They analyze how this shock spread across subsidiaries and analyze the effect of low-tax jurisdictions as well as high-tax jurisdictions.

Another incentive to shift the profit can be a secrecy of target country. The secrecy is usually not the only reason to shift the profit. It is combined with the tax incentive. If MNEs shift their profits to low-tax jurisdiction the certain level of secrecy is desirable so there will not be any punishment for tax avoidance. The secrecy can serve also to criminal activities or business or personal confidentiality Walter (1985). Grilli (1989) analyzed so-called financial hot spot – a place where financial capital is cumulating. He introduced three incentives to cumulate money in hot spots and analyzed the behavior of bank deposits as the intermediary of financial flows. He assumed that there are three incentives of cumulation of money. Beside of the secrecy laws of the country, there is capital requirements and tax regulations. All these country specifications seem to have an impact on bank deposits flows.

The channels which are commonly used by MNEs are the use of internal debt, choosing a tax-efficient financial structure, or transfer pricing Heckemeyer *et al.* (2013). There are several studies which discuss which channel is the crucial one. Buettner & Wamser (2013) found the evidence on German MNEs that the of internal debt is commonly used and reallocated from low-tax jurisdictions. On the contrary, tax incentive did not seem to be relevant for German MNEs. Heckemeyer *et al.* (2013) concluded that internal debt is not as important as transfer pricing.

Hines (1999) analyzed the Foreign Direct Investment (FDI) and its responsiveness to international taxations. He found the evidence that taxation influance volume and location of FDI and assumed that FDI is responsible for most of the tax avoidance.

In 2009, the FSI was introduced by Tax Justice Network (Tax Justice Network, 2018). The FSI ranks countries according to multiple criteria such as secrecy, offshore activities or tax rates. It became a useful tool which opens new opportunities to analyze tax havens. The recent analysis by Cobham & Janský (2015) discussed benefits of FSI and possible extension. They mostly appreciated the outcome in the form of ranking which FSI offers since until now all rankings were binary – determining a country a tax haven or not.

Langenmayr *et al.* (2017) suggested that banks reallocate profit through

different channels than companies from other industries. They assumed that bank could reduce tax base using proprietary trading. Using dataset which includes German banks only, they found the evidence that proprietary trading is negatively correlated with the corporate tax rate. Since the proprietary trading is very mobile, it can quickly respond to any changes in tax rate or regulations.

One of the latest research related to the topic was written by Bouvatier *et al.* (2017). They produced probably the first study using CBCR data and provide the analysis about importance of tax havens for banks. They found the evidence that for EU banks the most important tax haven are located within Europe. The decisive factor is not only low tax rate but also other factors such as quality of the government. The savings from reallocation of the profit are estimated between EUR 1 billion and EUR 3.6 billion.

From the overview of the literature which we provided above, we discovered some gaps which can be filled. Therefore, in the thesis, we are going to focus on banks tendency to reallocate profits to tax havens since this industry is insufficiently explored. Our research can be summarized by following hypotheses:

1. There are significant differences between dataset from Orbis Bank Focus database and dataset which was collected from Country-by-country reports.

2. Banks tend to misalign profit to low-tax jurisdictions.

3. Introducing the Country-by-country reporting causes changes in banks' behavior in the declaration of the profits.

The first hypothesis is analyzed by comparison of the dataset. We compare rough data from both datasets. We split each dataset into different categories which we are going to compare. This way we provide unique evaluation of quality of the both datasets.

The second hypothesis is analyzed using regression analysis. We estimate semi-elasticity of the profit with respect to the net of the tax rate as well as provide the estimation of the role of secrecy and tax havens using Orbis dataset. We use secrecy score from the FSI for the first time to analyse the secrecy incentive to shift the profit.

For the last hypothesis, we provide the first estimation of the impact of the CRD IV on banks behavior. We are going to split the Orbis dataset into two

parts according to the location of the headquarters. Then we will analyze the impact of Country-by-country reporting on EU bank groups and the results will be compared with the behavior of non-EU bank groups as a control group.

Chapter 3

Data

Tax avoidance is a global issue which arose decades ago and lasts until today. It harms countries all over the world and mainly the developing ones. There are many actions introduced by government institutions or global organizations which supposed to ensure the transparency of tax. One of these actions is the BEPS Action Plan which was developed by Organization for Economic Co-Operation and Development (OECD) (Organisation for Economic Co-operation and Development, 2013). The BEPS Action Plan was adopted by OECD and countries of G20[1] in 2013. It was designed for MNEs with consolidated group revenue of more than EUR 750 million.

The EU adopted a modified version of the BEPS Action Plan (Organisation for Economic Co-operation and Development/G20, 2015) called Capital Requirement Directive IV (CRD IV) in 2013 (European Parliament, 2013). According to the CRD IV, all financial institution which were established in one of the EU member states and which operate in more than one state are obliged to publish information about their performance on the country-by-country basis (European Commission, 2016). They have to annually publish information as

- Name, activities, geographic location
- Turnover
- Income before tax (profit/loss)
- Tax Paid

[1] Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russian Federation, Saudi Arabia, South Africa, South Korea, Turkey, United Kingdom, United States, and the EU

- Public subsidies received
- Number of full-time equivalents (FTE)

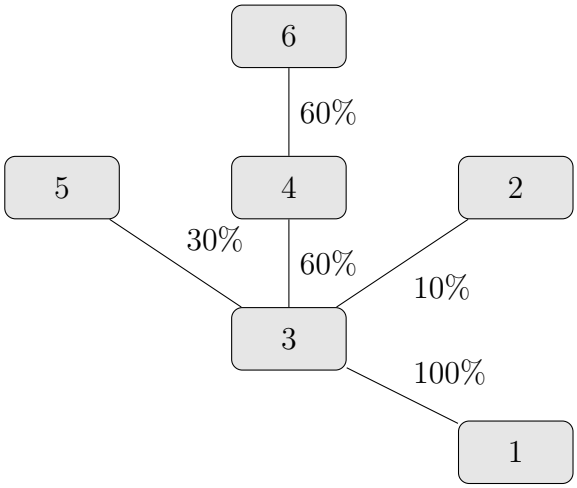
As mention above, the subject of the directive were financial institutions. This changed in 2016 when the EU adopted amendments to the directive and extend the obligation also to MNEs. All EU members should transpose this directive to their national law until 2017 (European Commission, 2017).

Thus, the main aim of the thesis is, besides of analyzing banks and their tendency to reallocate their profits to low tax jurisdictions, to analyze the impact of the EU directive from the year 2014. We are going to analyze multinational banks where we have a couple of years long period data since the directive came into effect. Then we can discuss on how does the directive affect MNE in the following years.

In our analysis, we are going to use two data sources. The first source is Orbis Bank Focus database by Bureau van Dijk (BvD) which replaced Bankscope database at the beginning of 2017. This database collects the data about private companies, banks, and other financial institutions included. Data for the years 1988 up today are published every year. They have a wide range of information about almost 40 000 banks located around the world. The database includes data about financial accounts, credit scores, and details of mergers and acquisitions activity as well as some basic ranking.

For our analysis, we need information about parental banks and their subsidiary companies. BvD database offers information about Global Ultimate Owner (GUO). It is important to know how GUO is determined. Let's imagine a situation where there is a bank A which is owned by B. In other words, bank B owns 100% shares of bank A. There is also bank C which owns 60% of shares of bank B and bank C is not owned by anybody else. Thus, bank B is not the GUO of bank A since it is owned by another bank. In this case, the GUO is bank C (Bureau van Dijk, 2018). In other words, The GUO indicates the bank which owns a majority of a subsidiary bank and which is not owned by anybody else.

As depicted in the following picture, bank 1 is owned by bank 3. Bank 3, however, is not the GUO since it is owned by bank 5, bank 2, and bank 4. Bank 4 is the majority owner of bank 3. Subsequently, it owns a major part of bank 1. Still, it is not our GUO since it has another owner – bank 6. Bank 6 is the major owner of bank 4, subsequently of bank 3, and finally of bank 1. Bank 6 has no other owner; thus, bank 6 is GUO of bank 1, bank 3, and bank 4.



Source: Author.

We were able to collect data about turnover, assets, tax, a number of employees, profit before tax, and GUO for the years 1988 to 2016 from BvD database. Data were collected in millions of Euro currency, so we have the same units as in the second dataset. Naturally, this does not apply to information about employees where we have information in integers.

Although, BvD database offers data for a wide number of years only a couple of banks have the most historical data completed. Thus, in most of the cases the data only for years 2010 to 2016 are completed, and for fewer cases, there are data for 1991 to 2016. More historical data are rare. One of our research questions is analyzing the impact of introducing the CRD IV directive on banks. Since the directive was introduced in 2014 we will need data for a couple of years before and years after. Because the information for years 2010 to 2016 is available for most of the banks we are going to use this range of the years for our analysis.

Data for banks from different regions are available in the BvD database. For each bank, there is information about its country of origin. Moreover, there is information about GUO and its country of origin. Thus, we are able to recognize the bank group and also the country of origin of the particular group.

The second source are data which are available the last couple of years. In 2014 the European Commission published CRD IV. This directive introduced the obligation for banks to publish their performance on the country basis. This obligation applies to banks which have their establishment in EU and have subsidiaries in more than one country.

This so-called CBCR was the second source of my data. These data were collected by myself as a part of my bachelor thesis and was again used and

widen by Bartonová (2017) in her thesis. We were able to obtain unconsolidated information about employees, turnover, profit/loss before tax, and tax on the profit on the country basis.

Up to now, we were able to collect data for years 2014 to 2017. The year 2017 is completed only partly because not all bank groups have already disclosed their results. The deadline for publishing Country-by-country reports is always at the end of the following year. We cannot obtain earlier data since the directive came into effect in 2014. To ensure that we have a consistent dataset, we collected the data for nearly 60 largest banks with the foundation in a member country of EU. To determine which banks are within the largest banks, I used the rank published by SNL Finance (2016).

The CBCR dataset is continuously extended every year for the newest available data. This way we obtained quite unique and detailed dataset. Data were collected in millions of EUR. For data published in a different currency than EUR, we use the average exchange rate for the particular year which is published by European Central Bank (2016). The dataset contains many data and it would be difficult to present it in a single table.

Unfortunately, although the dataset is very detailed there remained some inaccuracies. These are described and discussed in my bachelor thesis (Jelínková, 2016). I will mention only the main weaknesses of the dataset which are relevant to the analysis.

Many banks published their data incompletely. There were several imperfections, for example, almost all banks tend to cluster several countries in a group “other", so they make the data partly consolidated. The directive clearly says, that the data supposed to be published on a country level thus, this is insufficient reporting of CBCR data. Another example can be Commerzbank AG which reported information about China together with Hong Kong. This is again inaccurate reporting because China and Hong Kong are different jurisdictions and have nothing in common and even tax rate is different in each jurisdiction.

These are considerable weaknesses of the dataset mainly because we would like to analyze whether tax havens influence bank performance. In other words, we would like to see whether banks tend to reallocate their profit to low tax jurisdictions to reduce their tax burden. Since banks, however, tend to cluster some countries in one group it makes the analysis more difficult. The issue is that banks cluster usually countries which are considered as a tax haven, e.g. Netherlands, Curacao or the Cayman Islands. For that reason, we should

analyze also this common category called “other" and see whether there is an economic activity or significant profit declared. If we find the evidence that there is an economic activity or declared profits we can conclude that banks want to reallocate their profit to low tax jurisdictions or hide their performance from higher authorities.

Before we start with the analysis, we need to adjust the data so they are in the form we need. We have information about turnover, profit/loss before tax, tax on the profit, and the number of employees. We enlarge our dataset about some country characteristics. To determine which tax jurisdiction is a tax haven, we will use dummy variable in our regression.

Identification of tax haven is troublesome. There are many studies and theories how to determine whether a country is tax haven or not and each usually yields a different outcome. That is because almost any country can be considered as a tax haven for another country as was noted for example by Cobham & Janský (2015).

We can see the issue in the following example. Any country with lower tax rate than 19%, which is a statutory tax rate of Czech Republic, can be considered as a tax haven for companies from the Czech Republic. This is in accordance with definition introduced by (Picciotto, 2013). Moreover, the tax rate is not or rather it should not be the only indicator of tax havens. Another indicator important for profit shifting is a secrecy of target country (Gordon, 1981). In the last decade, the common ranking was developed by (Tax Justice Network, 2018). It is called FSI and it uses several criteria to produce a ranking of countries according to their secrecy and of shore activities. This ranking is published every two years and it is developed over time.

For reasons mentioned above, we can see that definition of the tax haven is not an easy task and that we think that working with only one ranking is too restrictive. Therefore, we decided to use several rankings in the analysis so we can compare results from different sources. As a source of tax havens, we can use either an official list from any independent organization or we can use any results of a credible study.

The first source which we are going to use is the official list of tax havens which was published by EU. It consists of 47 countries which were recognized by EU as a tax haven. Since our base model is based on Dowd *et al.* (2017) analysis, we are going to use the same list of tax havens as they did so the comparison of our results will be possible. Therefore, our second source of

tax havens is list by Gravelle (2015). Summary of tax havens can be seen in appendix in table A.1.

We would like to analyze the semi-elasticity of profit with respect to the tax rate. However, choosing a correct measure of the tax rate is a crucial part of the analysis. Dowd *et al.* (2017) suggest that the most accurate measure of incentive to shift the profit to low-tax jurisdictions is average tax rate (or effective tax rate). They assume that only average tax rate reflects true tax cost.

However, according to Dharmapala (2014) statutory tax rate is more suitable than the effective tax rate even though effective tax rate probably better characterizes the cost which bank is facing. It is because effective tax rate might be endogenous because it can be influenced by banks choices about debt or other transfers. On the contrary, the statutory tax rate is given by tax jurisdictions and therefore is reckoned as exogenous (firstly noted by Grubert and Mutti,1991).

On the contrary, Huizinga & Laeven (2008) pointed out that tax policy could be also endogenous for several reasons. First, higher profit before tax can shift the tax level because of immobile rents which can be generated through natural resources. Secondly, tax policy can be influenced by stages of a business cycle. When the economy is at its peak, governments can decide to raise tax level because of higher profitability and because of countercyclical tax policy. Lastly, developing countries, where the majority of economic activities takes place, often have an extensive number of public goods which have to be financed from the government budget. That is the reason why they may need to levy higher corporate taxes. All mention above showed us that choosing the methodology of tax rate measurement is not as straightforward as it might seem.

We decided to use statutory tax rate and effective (average) tax rate in our analysis. The statutory tax rate is taken from KPMG (2017). They publish every year a table with the tax rate of each jurisdiction. We can find the information about the current tax rate and also the historical values. Unfortunately, not all countries were listed in the table thus, some information must be supplemented from another source (Trading Economics, 2018).

The effective tax rate is calculated only in a case when both – profit before tax and tax – are positive numbers. Otherwise, the resulting tax rate might be negative, which does not have economic meaning and it would be misleading. Therefore, for each bank which has positive profit before tax and tax we use

the following simple formula to calculate the effective tax rate:

$$Effective\ Tax\ Rate = \frac{Tax\ on\ Profit}{Profit\ before\ Tax} \tag{3.1}$$

As mentioned above, the effective tax rate is not optimal for estimation because it brings endogeneity to our model. However, we think it captures the real incentive of bank groups to reallocate their profits. To deal with the endogeneity issue, we use the country average of tax rates of banks which operate in this country using the results from equation 3.1. Thus, the country effective tax rate will not be directly connected with bank group and therefore the endogeneity issue should not arise or at least should not be as strong.

Our datasets do not include any country characteristics and thus, we need to supplement this information from a different source. Information about GDP and population for years 2010 to 2016 were obtained from World Bank (2018). Unfortunately, the World bank database does not include the information for the year 2017. Therefore, we need to use the different source of the data for the last year. The only credible source we found was International Monetary Fund (IMF) which includes this information (International Monetary Fund, 2018). The GDP was published in American dollars. To have the data consistent with the rest of the dataset, we convert in such a way that we obtain the information in millions of EUR. We again use the average exchange rate published by European Central Bank (2016).

As discussed in Chapter 2 the important aspect of profit shifting is the secrecy incentive. We already mention the FSI where several criteria are combined to produce a single ranking. Using total FSI could cause multicollinearity of our model since the information about tax haven or tax rate would be in the model twice. Therefore, we are going to use only a part of the FSI. One of the criteria which creates the FSI is secrecy score which captures information about secrecy rules of the certain country. We are going to use this score in our analysis as the secrecy incentive to shift the profit.

In the following tables, we offer some summary statistics of our data.

	Min.	Median	Mean	Max.	# Obs.	NA's
Profit before Tax	-13,973	20	429	48,727	15,104	14,224
Asstes	0	2,506	51,551	4,691,810	15,664	13,664
Employees	1	554	7,555	503,082	9,047	20,281
Declared Tax	-3,131.37	4.572	115.22	24,504.3	13,850	15,639
GDP	149	565,654	1,987,570	17,199,462	28,568	824
GDP per Capita	0.0001	0.022	0.024	0.1517	28,568	824
Population	27,224	46,447,697	107,501,432	1,390,080,000	28,933	336
FSI - Secrecy Score	31	61	59	92	29,328	0
Effective tax rate	0	0.22	0.36	33	26,107	3,221
Statutory tax rate	0	0.25	0.25	0.55	28,800	528

Profit before tax, declared tax, GDP and GDP per capita are in EUR million.

Source: Author computations.

Table 3.1: Summary of the Orbis dataset

Table 3.1 provides summary statistics for Orbis data. All information is in million EUR. We can see that effective tax rate, as well as the statutory tax rate, is zero in some cases. The effective tax rate is generally smaller than statutory tax rate which could be caused by tax deductions. That confirms our assumption that each tax measurement capture different information about incentive to shift the profit.

As we look at the basic data which we obtained from Orbis Bank Focus database such as Profit before tax, total assets or number of employees, we can see that there are a lot of missing values. For all of these variables, we can see large differences between median and mean which suggests that we have a lot of smaller banks in our dataset and a few several times larger banks. The profit (loss) before tax might be negative in some cases. Since we use a logarithmic form of the profit the negative values will be dropped. In some cases, the zero assets were reported.

The highest secrecy score is 92 for the Maldives and the lowest secrecy score is 31 for Denmark. This means that the Maldives have the most benevolent secrecy rules on contrary Denmark has the strictest rules. The highest GDP belongs to USA and highest population is in China.

The high number of NA is caused by missing data. There are a lot of data missing for the year 2010. We have already mentioned this fact above. For some small countries, we were not able to find GDP, population, and tax rate mainly for the year 2017.

Following table 3.2 summarises data from Country-by-country reports.

	Min.	Median	Mean	Max.	# Obs.	NA's
Profit before Tax	-12,422	21	135	8,841	3,144	168
Employees	1	277	2,712	103,788	3.121	189
Declared Tax	-2,348.79	7	47.13	7,975	2,613	731
GDP	138	344,585	1,555,480	17,199,462	3,033	310
GDP per Capita	0.00034	0.02669	0.02802	0.0938	3,033	310
Population	34,038	17,762,681	94,384,852	1,390,080,000	3187	159
FSI - Secrecy Score	31	58	57	89	3,142	108
Effective Tax Rate	0.0145	0.271	0.325	3.733	3,142	206
Statutory Tax Rate	0	22.5	22.69	64.8	3,204	0

Profit before tax, declared tax, GDP and GDP per capita are in EUR million.
Source: Author computations.

Table 3.2: Summary of the CBCR dataset

Table 3.2 provides summary statistics of data which were collected from the country-by-country reports. Information about GDP, GDP per capita, population, secrecy score, and statutory tax rate should not differ a lot because this information was added to each dataset from the same source. The only difference between these two tables can be caused by differences in countries where bank groups operate. As we already stated, the difference between the number of countries where banks operate is crucial because it will successively cause differences in other categories. However, in table 3.1 and table 3.2 are a different set of banks, therefore, the differences are natural.

More interesting is information which was extracted from the country-by-country reports – profit before tax, number of employees, tax, and effective tax rate (which reflects ratio between profit before tax and tax). Differences among these categories seem quite high; however, we will discuss them in detail later in chapter 5.

The secrecy score is quite interesting. It is a ranking which considers secrecy law of countries and assigns them a score between 0 and 100. Comparing to table 3.1 the minimum secrecy score is the same, on the contrary, the maximum secrecy score is lower in table 3.2. It could be connected with the issue of clustering the countries to one group. We assume that if banks have the tendency to cluster some results of several countries to a single group they will do so for countries where they do not want to show detail. In other words, we can suppose that countries which are generally considered as tax havens and therefore perform high on the FSI scale will be clustered into a single group.

This way banks can prevent us to see detail about countries which they do not want to.

Following tables provide the correlation matrices of both datasets on the bank level. The number of observation is denoted by n and $p - values$ are in the brackets. Table 3.3 provides the correlation matrix of variables from Orbis dataset.

	Profit before Tax	Assets	Number of Employees	GDP per Capita	Population	FSI Secrecy Score	Effective Tax Rate
Assets	0.750 n=15,069 (0.000)						
Number of Employees	0.860 n=9,116 (0.000)	0.800 n=9,016 (0.000)					
GDP per Capita	0.040 n=14,802 (0.000)	0.063 n=15,348 (0.000)	-0.029 n=8,882 (0.009)				
Population	0.240 n=15,032 (0.000)	0.230 n=15,584 (0.000)	0.320 n=8,981 (0.000)	-0.130 n=28,784 (0.000)			
FSI Secrecy Score	0.041 n=15,118 (0.163)	-0.001 n=15,678 (0.000)	0.026 n=9,052 (0.038)	-0.124 n=28,592 (0.000)	-0.090 n=29,016 (0.000)		
Effective Tax Rate	-0.005 n=15,214 (0.834)	0.002 n=15,752 (0.553)	-0.009 n=9,108 (0.433)	0.102 n=25,608 (0.000)	-0.013 n=25,975 (0.004)	0.023 n=26,122 (0.000)	
Statutory Tax Rate	0.122 n=26,122 (0.000)	0.134 n=15,534 (0.000)	0.116 n=8,997 (0.000)	0.170 n=28,306 (0.000)	0.239 n=28,688 (0.000)	-0.250 n=28,824 (0.000)	0.050 n=25,969 (0.000)

Source: Author computations based on data from Orbis Bank Focus database.

Table 3.3: Correlation Matrix – Orbis data

Variables such as Assets, the number of employees are positively correlated with profit before tax. The correlation makes economical sense since we assume that profit is generated by factors of productions such as employees and assets. Statutory tax is positively correlated with GDP per capita which suggests that richer countries tend to have a higher tax rate. We can also see that GDP per capita is positively correlated with assets which suggest that large banks operate in richer countries. On the contrary, the number of employees is negatively correlated with GDP per capita. The negative correlation can mean

that people are more productive in richer countries which can be caused by higher education.

The effective tax rate is the only insignificant variable. On the contrary, the statutory tax rate is highly significant; however, it shows us opposite correlation with profit before tax than we would expect. We can again argue, that most of the income is generated in richer countries which we can conclude from the positive correlation between GDP per capita and profit before tax. We also noted, that richer countries tend to have the higher tax rate. Therefore, there is a positive correlation between profit before tax and statutory tax rate.

	Profit before Tax	Number of Employees	GDP per Capita	Population	FSI Secrecy Score	Effective Tax Rate
Number of Employees	0.49 n=2,954 (0.000)					
GDP per Capita	0.06 n=2,834 (0.003)	-0.02 n=2,846 (0.316)				
Population	0.02 n=2,973 (0.307)	0.05 n=2,963 (0.005)	-0.21 n=2,975 (0.000)			
FSI Secrecy Score	-0.07 n=3,018 (0.000)	-0.16 n=3,002 (0.000)	-0.11 n=2,930 (0.000)	-0.05 n=3,081 (0.002)		
Effective Tax Rate	0.02 n=2929 (0.34)	0.06 n=2917 (0.001)	-0.08 n=2817 (0.000)	0.13 n=2931 (0.000)	-0.07 n=2972 (0.000)	
Statutory Tax Rate	0.08 n=3,117 (0.000)	0.13 n=3,096 (0.000)	0.11 n=2,975 (0.000)	0.19 n=3,126 (0.000)	-0.18 n=3,177 (0.000)	0.26 n=3079 (0.000)

Source: Author computations based on data from Country-by-country reports.

Table 3.4: Correlation Matrix – CBCR data

Table 3.4 provides correlation matrix of CBCR data. We can see that in general, we have fewer variables than we have in Orbis dataset. Despite the fact, all results are significant – even the effective tax rate. However, correlations among variables tend to be smaller. For example, the number of employees and profit before tax are positively correlated as in the previous case; however,

the correlation is approximately half of the Orbis correlation. Beside this, both datasets show similar correlations.

Chapter 4

Methodology

The first part of our analysis will focus on the comparison of the dataset. We can compare only common variables such as turnover, profit/loss before tax, tax on profit, and employees. The comparison will be done only on bank group level so we are going to compare only consolidated results. We would like to compare the most recent data, however, the year 2017 is not completed either in CBCR dataset or in Orbis dataset. Therefore, we conclude that it will be most appropriate to compare the year 2016 since these are the most recent and also the complete data.

The second adjustment which we need to do to be able to compare datasets is to subset both datasets so they consist of same banks. In case of Orbis dataset, we need information about GUO. However, not all banks have this information included; therefore, we try to substitute the information from the name of the bank. As it sounds, it is not an easy task and considering the size of the dataset we were not able to deal with each bank. Therefore, we only deal with those banks which are included in the CBCR dataset. We try to find the bank group name in the name of the bank and if we are successful, we recognize the bank as a subsidy of this bank group. This was the case of ABN AMRO, Banca Monte dei Paschi di Siena SpA, Belfius Banque SA, Dexia SA and the Royal Bank of Scotland Plc. Other banks groups' names are different from the name of its subsidiary and therefore we are not able to link them up.

It is important to note, that this does not yield the most accurate results since the bank name does not necessarily correspond with the GUO name. However, we are able to recognize at least some bank groups this way, which we think is better than do not have them at all.

One of the crucial categories which we are going to compare is whether the

number of countries of operation is same in each dataset. In CBCR dataset there is only a single information per country, e.g. information is consolidated on the country basis. Thus, in case that bank group has more companies in one country their results would be consolidated on the country basis. On the contrary, the Orbis dataset includes information about each entity; thus, there might be more than one company per country.

We can expect that categories such as turnover, profit/loss before tax or tax on profit might yield several differences due to the different methodology. There is no information about methodology which was used in Orbis database. Therefore, small differences can be caused for example by differences in the exchange rate. On the contrary, the category of number should not be equal in both datasets in the same way as the number of countries where bank groups operate.

The difference in the number of countries of operation might cause the difference also in other categories. We assume that if there are missing countries in the data it would proportionally reduce other categories. Therefore, as we already mention previously the difference in the number of countries of operation is the crucial difference which we need to analyze.

After we describe the main differences based on the rough data we are going to estimate the semi-elasticity of profit with respect to tax rate using each dataset and we will compare the results. For estimation of elasticity, we are going to use the model which was developed by Hines Jr & Rice (1994).

The model is based on the theory that profit declared consists of two parts. First is the profit which is generated in the declared country and second is the shifted profit. We can distinguish the profit which is originally generated in target country from the shifted profit using the factors of production which should be our true economic activity. We assume that profit is generated by labor and capital which are standard production factors. Therefore, we assume that profit declared in the country corresponds to labor and capital which is assigned to this country. Any other profit below or above this amount is considered as shifted profit from or into this country.

As we discussed in Chapter 2 there are several incentives to shift the profit and probably the most obvious one is the tax incentive. Therefore, we will analyze the semi-elasticity of profit before tax with respect to the tax rate as the main incentive to shift the profit. We will use the same model as Hines Jr & Rice (1994) work. He estimated following model:

$$\begin{aligned} Log(pbt_{it}) = \beta_0 + \beta_1 log(Capital_{it}) + \beta_2 log(Labout_{it}) + \beta_3(1 - tax_{it}) + \beta_4(1 - tax_{it})^2 \\ + \beta_5 GDP\ per\ capita_{it} + \beta_6 GDP\ per\ capita_{it}^2 + \beta_7 Population_{it} + \beta_8 Population_{it}^2 \\ + Year\ FE_t + Bank\ FE_i + \epsilon_{it}, \end{aligned} \tag{4.1}$$

where i denotes bank entity, t denotes time (years) and ϵ denotes error term.

The original model includes labor and capital; however, labor is hard to observe. Therefore, labor was proxied by wages. We do not have information about wages in our dataset, therefore, we are going to use the number of employees instead. Moreover, wages tend to be dependent on country characteristics – more developed countries usually have higher wages and vice versa. Therefore, we assume that the number of employees are even better proxy. We also do not have information about capital. For that reason, we used assets as a proxy as suggested for example by Huizinga & Laeven (2008).

For the comparison of datasets, we need to use a slightly modified version of this model (equation 4.1). In CBCR dataset, we do not have the information about assets or any other information which could be used as a proxy for Capital. Therefore, to be able to compare the results we are going to exclude this information even in Orbis dataset which will probably result in the weaker estimate. The model will look as follow:

$$\begin{aligned} Log(pbt_{it}) = \beta_0 + \beta_1 log(Labout_{it}) + \beta_2(1 - tax_{it}) + \beta_3(1 - tax_{it})^2 \\ + \beta_4 GDP\ per\ capita_{it} + \beta_5 GDP\ per\ capita_{it}^2 + \beta_6 Population_{it} + \beta_7 Population_{it}^2 \\ + Year\ FE_t + Bank\ FE_i + \epsilon_{it}, \end{aligned} \tag{4.2}$$

where again i denotes bank entity, t denotes time (years) and ϵ denotes error term.

However, as the second part of our analysis, we are going to focus on the tendency of banks to misalign profits. Here we are going to use the same model as in equation 4.1 and we provide slide modification of this model. For this analysis, we are going to use a large dataset as possible using data from BvD database. As we already stated above, we are going to use the number of employees as a proxy for labor and assets as a proxy for capital.

The model also includes country characteristics as GDP per capita and population and its square. We assume that profit is generated in countries

which are generally richer. Therefore, we assume that the GDP per capita will be positively correlated with profit before tax. Moreover, tax havens can be also considered to be richer which supports our assumption that higher the GDP per capita the higher profit declared.

On the contrary, the relationship between profit before tax and population are not so straightforward. Large economies such as USA, Germany or China will presumably record higher declared profits before tax. Therefore, we can assume that population will be positively correlated with profit before tax. However, considering tax havens it does not seem like a certain assumption. Moreover, developing countries which have usually large population does not have favorable economic conditions or developed market thus, we can assume that these countries with a large population will record lower declared profits before tax. Tax havens are usually small although rich economies such as islands or small jurisdictions. Populations of tax havens are therefore small. Considering all arguments which we stated above, it is hard to say what relationship between profit before tax and population should we expect.

Probably the most important variable is tax rate. We use in our model the expression one minus tax rate where the tax rate is between 0 and 1. This expression represents net of tax rate and serves as an indicator of tax incentive to shift the profit. We can measure the semi-elasticity of profit with respect to the net of the tax rate. The semi-elasticity is determined by the following expression:

$$Semi-elasticity\ of\ profit\ with\ respect\ to\ tax\ rate = \frac{\%change\ in\ profit}{one\ p.p.\ change\ in\ net\ of\ tax\ rate} \tag{4.3}$$

We are also interested in the effect of tax haven on the profit declared. Therefore, we are going to include the interaction variable of tax haven and net of the tax rate. We will estimate the similar model as Dowd *et al.* (2017) which assume linear semi-elasticity. Moreover, we are going to modify the model so we allow the semi-elasticity to be quadratic. Therefore, we are going to estimate following two equations. For the linear relationship between net of tax rate and profit before tax, we are going to estimate equation 4.4.

$$\begin{aligned} Log(pbt_{it}) = \beta_0 &+ \beta_1 log(Capital_{it}) + \beta_2 log(Labout_{it}) + \beta_3(1 - tax\ rate_{it}) \\ &+ \beta_4 GDP\ per\ capita_{it} + \beta_5 GDP\ per\ capita_{it}^2 + \beta_6 Population_{it} \\ &+ \beta_7 Tax\ Haven \cdot (1 - tax\ rate_{it}) + Year\ FE_t + Bank\ FE_i + \epsilon_{it}, \end{aligned} \tag{4.4}$$

where again i denotes bank entity, t denotes time (years) and ϵ denotes error term.

For the quadratic relationship between net of tax rate and profit before tax and interaction coefficient tax havens and net of tax rate we are going to estimate equation 4.5

$$\begin{aligned} Log(pbt_{it}) = \beta_0 + \beta_1 log(Capital_{it}) + \beta_2 log(Labout_{it}) + \beta_3(1 - tax\ rate_{it}) \\ +\beta_4(1 - tax\ rate_{it})^2 + \beta_5 GDP\ per\ capita_{it} + \beta_6 GDP\ per\ capita_{it}^2 + \beta_7 Population_{it} \\ +\beta_8 Tax\ Haven \cdot (1 - tax\ rate_{it})^2 + \beta_9 \cdot Tax\ Haven \cdot (1 - tax\ rate_{it}) \\ +Year\ FE_t + Bank\ FE_i + \epsilon_{it}, \end{aligned} \tag{4.5}$$

where again i denotes bank entity, t denotes time (years) and ϵ denotes error term.

Another part of our analysis will focus on secrecy incentive to shift the profit. We obtain secrecy score using one of the FSI measurements. A couple of countries does not have the information about secrecy score included in the data, therefore, we substitute this information using the overall average of existing secrecy scores. In the analysis, we are going to use this extended FSI secrecy score as well as original one. Using the original secrecy score will result in dropping several observations since they do not have this information included. We are going to use following model in equation 4.6 to analyze the role of secrecy:

$$\begin{aligned} Log(pbt_{it}) = \beta_0 + \beta_1 log(Capital_{it}) + \beta_2 log(Labout_{it}) + \beta_3(1 - tax\ rate_{it}) \\ +\beta_4(1 - tax\ rate_{it})^2 + \beta_5 GDP\ per\ capita_{it} + \beta_6 GDP\ per\ capita_{it}^2 + \beta_7 Population_{it} \\ +\beta_8 Secrecy\ score_{it} + Year\ FE_t + Bank\ FE_i + \epsilon_{it}, \end{aligned} \tag{4.6}$$

where again i denotes bank entity, t denotes time (years) and ϵ denotes error term.

The last hypothesis focuses on the effect of CRD IV. To estimate the effect we decided to split our dataset into two subsets. One includes only bank groups with headquarters in EU country which are affected by CRD IV. The other one includes rest of the bank groups which will serve as a control group. Then we are going to estimate model in the equation 4.7 for both subsets and compare the results.

$$\begin{aligned} Log(pbt_{it}) = \beta_0 + \beta_1 log(Capital_{it}) + \beta_2 log(Labout_{it}) + \beta_3(1 - tax\ rate_{it}) \\ +\beta_4(1 - tax\ rate_{it})^2 + \beta_5 GDP\ per\ capita_{it} + \beta_6 GDP\ per\ capita_{it}^2 + \beta_7 Population_{it} \\ +\beta_8 Tax\ havens \cdot After\ 2014 + Year\ FE_t + Bank\ FE_i + \epsilon_{it}, \end{aligned} \tag{4.7}$$

where again i denotes bank entity, t denotes time (years) and ϵ denotes error term.

The interaction term $Tax\ havens \cdot After$ 2014 capture the information about changes in profit declared in tax havens countries since 2014 when the CRD IV came in effect. We compare the estimate from two datasets to see whether the changes are due to natural changes or whether it is truly the change in the behavior of banks. As discussed above we are going to use two sources of tax havens – lists by Council of the European Union (2018) and Gravelle (2015).

Now, since we describe all variables which are included in the model, we need to decide what methodology do we use. Standard analyses of panel data are fixed effect regression (FE), random effect regression (RE) or pooled OLS (POLS). Consider the nature of the data we have it does not seem reasonable to use the POLS. Since our dataset includes independent entities – banks – we can assume that each entity works differently even country characteristics might do the difference. Therefore, FE estimation seems as the most reasonable option and several literature sources confirm this assumption.

Now, we need to decide which of the fixed effects include in our estimation. We can include either individual fixed effect, time fixed effect or both. As we already mentioned, each bank has its fixed effect characteristics. For that reason, we can use FE estimation including individual effect. However, time effect can also influence our results so it should be included in the regression as well. Considering all these reasons, the fixed effect estimation with both – time effect and individual effect – will be used. Our assumption about the significance of time effect can be tested using basic tests. Including only time effect and neglect, the individual does not seem correct because we assume that the individual effect is strong in our data.

For our panel data analysis, we are going to use R software. The panel data package and its use are described in Croissant & Millo (2008). They suggest using some standard test to decide whether the model includes fixed effect or random effect or whether simple POLS best fits the data. Therefore, we are going to estimate our model using all technics mention above and use Housman

test and F test to decide which type of estimation is the most appropriate one. Moreover, we perform some basic test to check the basic properties of our model.

Chapter 5

Results

5.1 Qualitative analysis of Orbis data

In the following chapter, we give a reader overview of the results. As was already mentioned in the description of data (chapter 3), we have used two datasets which should be comparable. As a first step of the analysis, we are going to show the differences between these two datasets. One dataset is Orbis Bank Focus (Orbis) which we assume to be more accurate since it is largely used data source which includes worldwide information about banks and financial institutions. The second dataset is Country-by-country reporting data which are collected from annual and CBCR reports of each bank separately.

To be able to compare datasets we need to ensure that we have same years and same banks in each. Therefore, we adjust Orbis data so it includes only banks which are in CBCR and similarly we exclude banks from CBCR data in case we cannot find them in Orbis data. At the same time, we include only years 2014 to 2016.

After this data clearing, we obtain two datasets each consists of 33 bank groups and 3 years' data. Following graphs show comparisons of different categories. We can clearly see that datasets are not comparable at all. Differences in profit before tax can be explained by differences in measurement. In other words, there might be several ways of measuring income before tax for different purposes. On the contrary, the number of countries where bank group operates should be same under any circumstances. As mention in the description of the data, there were some inaccuracies in the identification of the global ultimate owner. The information was missing in some cases and needed to be extracted from the name of the bank. This might cause some inaccuracies; however, this

apply only to a small number of banks and from the graphs, we can see that almost all categories show different numbers for each dataset.

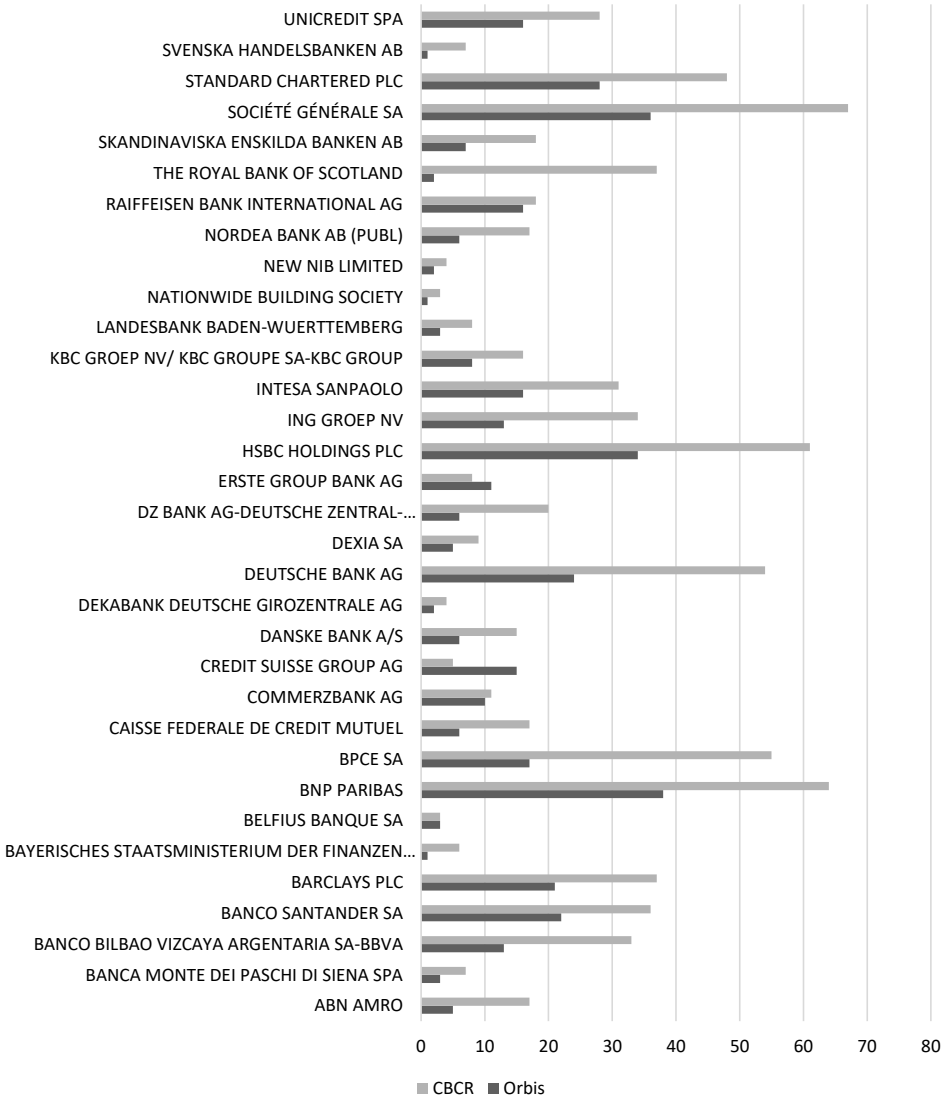


Figure 5.1: Graph of the number of countries of operation for CBCR and Orbis dataset.

Source: Author.

We start our comparison from the first and probably most general category which is the number of countries where the group operates. From the graph 5.1, we can see there are significant differences between dataset. We can notice that CBCR dataset dominates the Orbis dataset in a majority of cases. It seems like in the Orbis dataset approximately 30% data are missing. Only Belfiuse Banque SA has the same number of countries of operation in each

dataset. Erste group bank AG and Credit Suisse Group AG have some missing countries in CBCR dataset. As we check the differences in detail we find out that it is actually true; however, we can explain this phenomenon quite simple.

As already mention in chapter 3, although countries should report their results on a country level, not all countries follow the rule properly. In many cases happened that companies report part of their results consolidated in common group called “other" instead of describing them in detail. This is exactly the case of Erste group bank AG. They reported results of four countries consolidated. The consolidated group of countries consists of Montenegro, Moldova, UK, and Malta. They can argue that the results from each of these countries are insignificantly small that it makes sense to report them consolidated; however, the regulation clearly says that results supposed to be reported on the country level so there should be no exceptions.

The case of Credit Suisse Group AG is more complex. The group has its parent company in Switzerland. Since Switzerland is not a member of European Union companies established in this country do not have the obligation to disclosed their results on the Country-by-country basis. However, Credit Suisse International is a subsidiary of Credit Suisse Group AG located in the UK and it has several subsidiaries elsewhere. This bank has obligation to publish CBCR. Therefore, in Orbis dataset, we recognize Credit Suisse Group AG as a GUO of the group and on the contrary, the CBCR dataset consists of information only about the part of the group with EU headquarters.

This causes inaccuracies in the CBCR dataset; however, Switzerland already adopts a similar regulation of Country-by-country reporting in 2017 which should come into effect in 2018 (State Secretariat for International Finance SIF, 2018). Consequently, we will be able to make our data more accurate. Since any multinational company can voluntarily disclose their results on the country-by-country basis we did not have the same issue with rest bank groups which are established in Switzerland. One example is UBS bank which disclosed its results voluntarily since 2013.

These are three bank groups which either have same or larger number of countries in case of Orbis dataset compared to CBCR dataset. The rest thirty bank groups have more countries in CBCR dataset. This shows us significant inaccuracy of Orbis dataset. There can be several reasons why there is such a different information in each dataset. We present them later in this chapter but first we but first we will discuss differences in other categories.

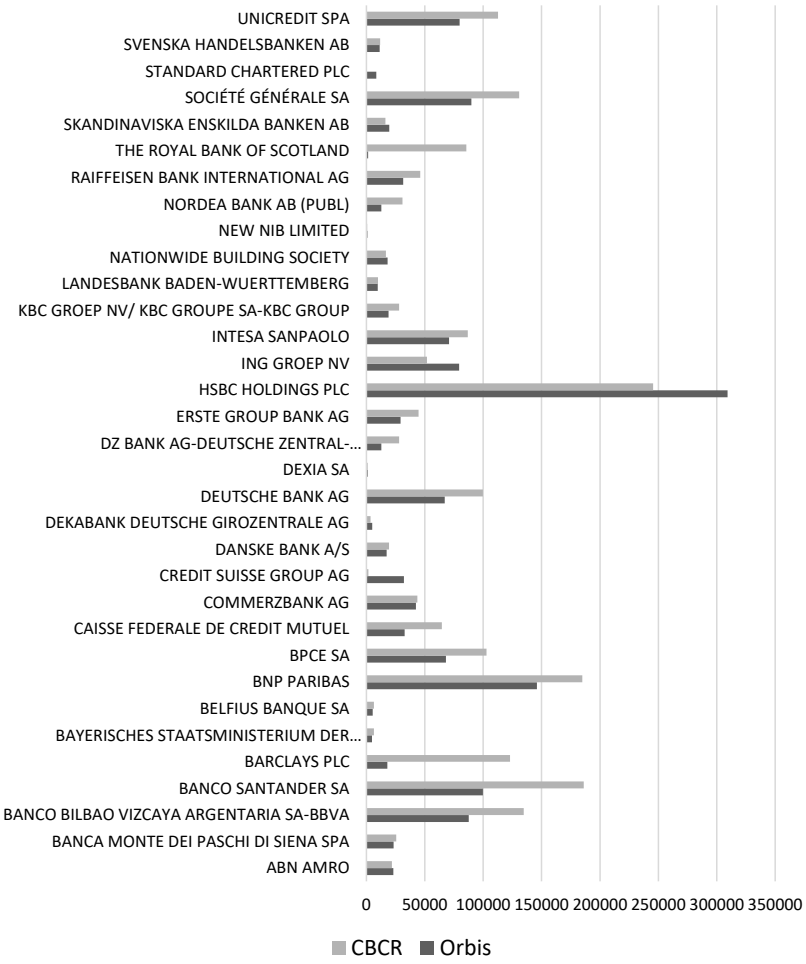


Figure 5.2: Graph of the number of employees for CBCR and Orbis dataset

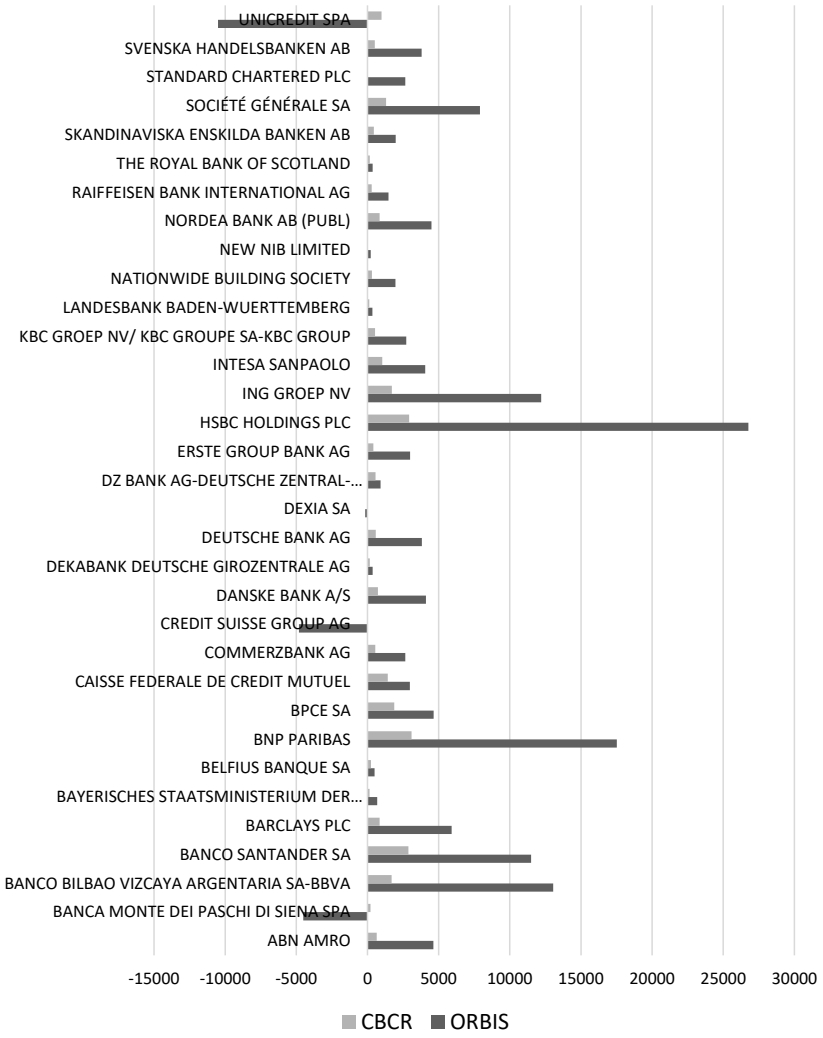
Source: Author.

Next category where interpretation is straightforward is the number of employees which is depicted in the graph 5.2. Since we already find out that often there are several countries missing in Orbis dataset it is not surprising that also the number of employees is higher for most of the cases in CBCR dataset. Although there are some bank groups where the number of employees is lower in CBCR dataset. This is the case of HSBC Holdings plc where the number of employees is approximately 20% lower in CBCR dataset than in Orbis dataset and similarly for Skandinaviska Ensklida Banken AB, ABN AMRO or Nationwide Building Society. Not surprisingly even in this category, the Credit Suisse Group AG have multiple times larger number of employees in Orbis dataset. We already commented on this issue.

However, this raises new issues. We have inconsistent information for these four banks. One source tells us that there are more countries of operation but fewer employees and the other source tells the opposite. There can be credible reason for data to be different in a different source. We measure employment as full-time equivalent (FTE). The Country-by-country reports usually state the average FTE; however, the Orbis Bank Focus database can state the number of employees at the end of the period. This can cause small variation of results nevertheless the variation in our results seems to be much higher.

However, most of the bank groups seem to have more employees in CBCR data than in Orbis data. This again suggests that there are some data missing or that some data are impossible to match with any GUO in Orbis database.

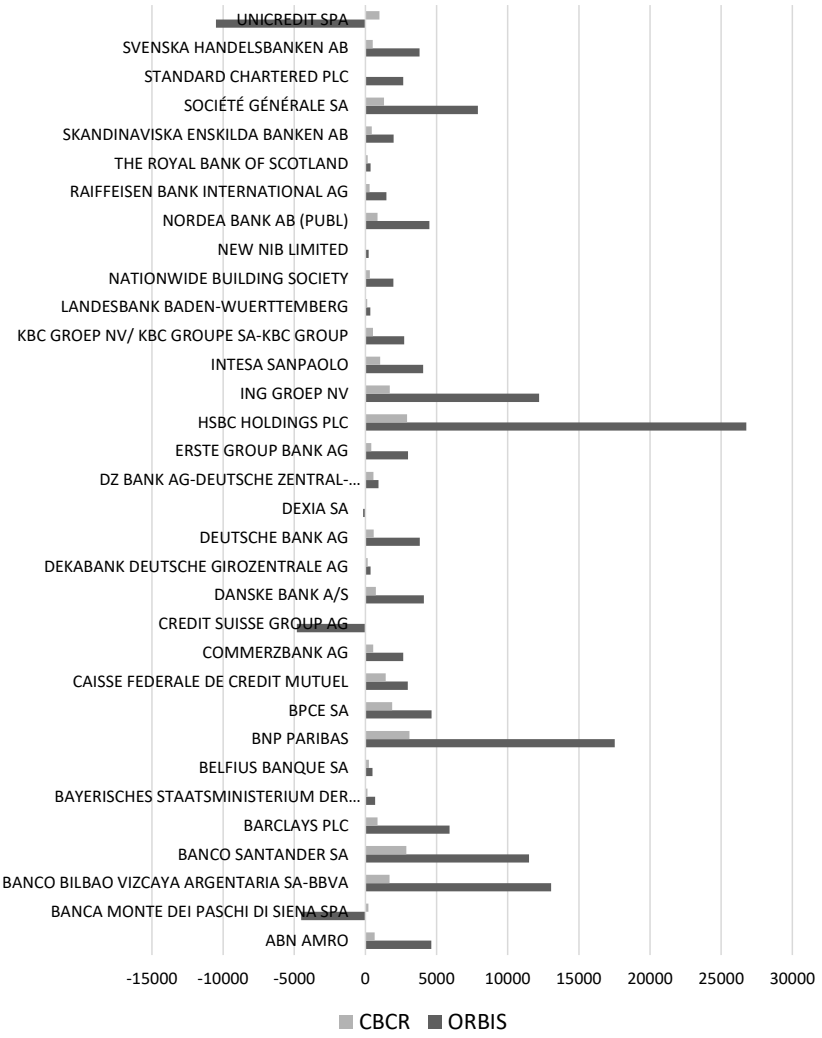
Probably the most interesting results are shown by categories tax and profit before tax. We can start with profit before tax where we can clearly see that there are multiple times higher numbers in CBCR dataset than in Orbis dataset. On the contrary, taxes were reported multiple times higher in Orbis dataset in comparison with CBCR dataset. This is a surprising and inconsistent result since profit before tax and tax should be proportional. Although, we have expected that datasets would not be identical and that there would be some differences we did not expect such an inconsistent result. On one hand, there are higher profits before tax in CBCR as we can see in the graph 5.3 and on the other hand, there are lower taxes in the same dataset in comparison with the other one as we can see in the graph 5.4.



Graph shows the results in EUR milion.
Source: Author.

Figure 5.3: Graph of the profit before tax for CBCR and Orbis dataset

If we look at the differences in taxes, we can see that we obtain opposite differences than in any other category. In other words, we obtain higher numbers for CBCR dataset than for Orbis dataset in all categories except the taxes. This suggests that there is a crucial difference in the measurement of this variable. Country-by-country reports include information about tax paid which can include deferred taxes from previous periods. However, it is stated that MNEs should disclaim their taxes on income, production or profits according to the scope of the directive. Since companies report a different measurement of tax than they supposed to it brings inaccuracies in CBCR dataset and therefore, it might be different from the Orbis dataset.



Graph shows the results in EUR milion.
Source: Author.

Figure 5.4: Graph of the declared tax for CBCR and Orbis dataset

Source: Author.

Regarding the differences in profit before tax and tax categories, we should also point out that there is an interesting phenomenon in each case. In case of profit before tax, there are no negative values in Orbis data and on the contrary there are a couple of negative values in CBCR data. Reversely in case of taxes, there are a couple of negative values in Orbis data and no negative values in CBCR data.

If we look at the rough data, we can find out that there are banks and countries where the tax was negative in CBCR data as well. However, as we can see from consolidated results there is no bank which would have consolidated

tax negative as shows us the Orbis dataset. The same is true for Orbis dataset and profit before tax. If we look at rough data, there are some cases where income is negative – loss. However, the loss in some countries is not so high to make consolidated profit negative as we can see in some cases of CBCR dataset.

The last category is turnover. Graphical results of differences in turnover are in the appendix in the graph A.1. This category seems to be relatively balanced. Neither dataset has significatly more turnover declared than the other.

As we try to explain the differences in many ways, the most probable reason can be the inaccuracy of either dataset. In favor of this theory speaks the fact that we found more information in CBCR dataset than in Orbis dataset in most of the cases.

This was the comparison of rough data which show us that datasets are not identical. Now, we will continue with comparison using the regression analysis to see whether these two datasets can give us comparable results. Again, the crucial step in the procedure is to use identical datasets in a way that we have same banks and same years in both datasets. Adjusting the Orbis data results in a dataset which consists of data for 4 years – 2014-2017 and 527 panels – banks' subsidiaries. In case of CBCR data, we obtain dataset, which includes data for 4 years (2014-2017) and 728 panels. The first issue to notice is the different number of panels in each case. As was already mention above, there are differences in the number of countries where bank groups operate which can be seen in the graph 5.1.

In the analysis, we will use a slightly modified version of the model introduced by Dowd *et al.* (2017) which was based on the model developed by Hines Jr & Rice (1994). They assumed that profit is generated by capital and labor. Therefore, according to this assumption, country, where the significant amount of labor and capital is allocated, should generate the corresponding amount of profit. Since labor and capital are difficult to measure they used proxy variables. Employees are proxy for labor and assets are proxy for capital.

Beside of the company variables, there are included also country characteristics such as GDP per capita, population, tax, and their squares as we can see in equation 4.1. The dependent variable is profit before tax in logarithmic form. As already mention above, we have two possibilities for taxes. We can use either statutory tax rate or average tax rate for each company, however, each of these approaches might bring endogeneity in our model.

Variable (1-tax) captures information about the net of a tax rate. If we in-

clude only the linear term the interpretation is following. Coefficient β_2 is semi-elasticity of profit with respect to the net of the tax rate, which corresponds to the percentage change in profit before tax as a reaction to one percentage point change in tax (Equation 3.1) keeping all other variables unchanged.

However, we include also the second power of this variable which was suggested already by Hines Jr & Rice (1994). In this case, the interpretation is not so straightforward as in the linear case. It means that the relationship between profit before tax and net of the tax rate is not linear. The best representation of this result is in the graphical form.

We have to exclude variable $log(Assets)$ (Equation 4.2) which is a proxy for capital because it is not included in CBCR data and we want to obtain comparable results for both datasets. That is why we do not use it even in case of Orbis data although this dataset includes information about assets. This exclusion of one important variable will result in a weaker model.

Following table 5.1 summarize results. We can see four sets of results for two different datasets and two different measures of the tax rate. We can see that results are quite weak usually insignificant and with low R^2. The $p-value$ of $F-statistic$ is, fortunately, lower than 0.05 which suggests that results are statistically significant.

Resulting model is tested for standard properties and we find out that our model is weak from several perspectives. It suffers from cross-sectional dependencies according to Breusch-Pagan test and Pesaran test. Moreover, it suffers also from serial-correlation and heteroskedasticity as suggested by Breusch-Pagan test for homoskedasticity and Breusch-Godfrey test for serial correlation. Fortunately, our model is stationary. We perform the same test for all models used and we obtain the same results. Thus, this weakness applies to all our models.

To deal with associated difficulties such as invalid t-statistics we need to use robust standard errors. We are going to use robust standard errors which were introduced by Driscoll & Kraay (1998). Application of this theoretical approach is described by Newton *et al.* (2010) and Croissant *et al.* (2017). It should be heteroskedasticity-consistent, autocorrelation-consistent, and it should be robust to general forms of cross-sectional dependency.

Log(Profit before tax)								
	Statutory tax rate				Effective tax rate			
	Orbis data		CBCR		Orbis data		CBCR data	
Log(Employees)	0.2523	***	0.4030	***	0.2417	***	0.3567	**
	(0.0158)		(0.1123)		(0.0182)		(0.1159)	
(1-Tax rate)	18.1388		0.1395		0.7016	***	0.4721	***
	(13.6930)		(0.2478)		(0.2003)		(0.1267)	
(1-Tax rate))^2	-10.8549		0.0298		-0.4865		0.2058	**
	(8.2694)		(0.1198)		(0.3707)		(0.0707)	
GDP per Capita	59.2692		-52.3172	*	52.4340		-30.4675	
	(57.0430)		(36.4373)		(55.8796)		(37.6982)	
GDP per Capita)^2	-535.9318		397.4125		-490.4024		158.7889	
	(617.7389)		(359.2826)		(604.9485)		(369.4993)	
Population	-0.0118		-0.0561		-0.0125		-0.0233	
	(0.0275)		(0.0350)		(0.0210)		(0.0371)	
Population)^2	0.0000		0.0000		0.0000	.	0.0000	
	(0.0000)		(0.0000)		(0.0000)		(0.0000)	
R-Squared	0.0388		0.02176		0.043955		0.0266	
Number of groups	527		764		527		764	
Number of observations	1363		2175		1363		2175	

Fixed effect estimation using time and individual fixed effects. Driscoll & Kraay (1998) robust standard errors are in the brackets.

Significance levels: *** – < 1%, ** – 1%, * – 5%, . – 10%

Source: Author computations based on Orbis and CBCR data.

Table 5.1: Resut of regressions using comparable substes

The effect of employees on profit differes among cases, however, differences are not large – at least it has the same sign in all cases. However, other results as country specifications are not significant and therefore cannot be compared properly. Coefficients which measure the elasticity of profit with respect to tax are quite varying. Each elasticity seems to have a different shape as we can see in the graph 5.5. This suggests that each dataset describes a different relationship between the profit before tax and the net of the tax rate. The model, where we used effective tax rate and CBCR data, results in the quadratic relationship as we expected. Estimating the same model with same data and using the statutory tax rate results in the quadratic relationship as well, however, the relationship is moderate compared to the effective tax rate. This confirm our assumption that effective tax rate better describes the real tax burden of the bank.

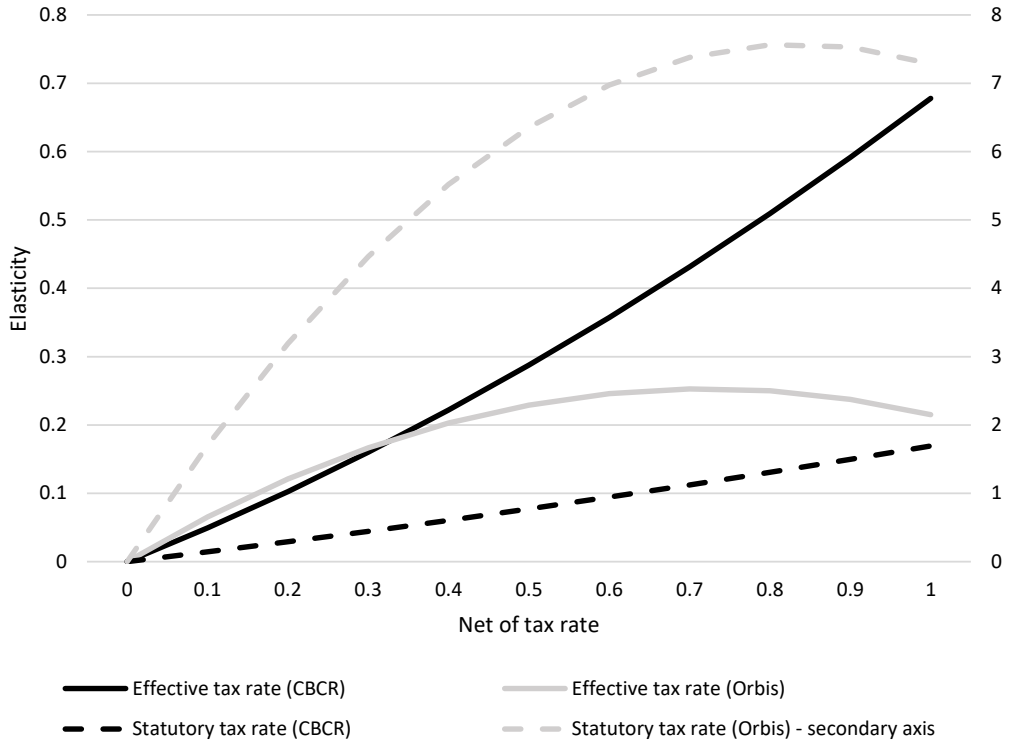


Figure 5.5: Graph of the elasticity using subsets of CBCR and Orbis data.

Source: Author.

On the contrary, using the Orbis data results in different results. The use of the statutory tax rate results in very high elasticity. The elasticity is described in secondary axis and we can see that the results are approximately ten times higher than for the rest of the estimate. Nevertheless, the effective tax rate using the same dataset results in more comparable results with the results from CBCR dataset, although the shape is different. Since the effective tax rate is computed as a ratio between tax and profit before tax the difference can be explained by fundamental differences in rough data, such as multiple times larger tax and multiple times lower profit before tax in case of Orbis data.

Considering all facts above the CBCR data and Orbis data do not seem to bring similar information. However, if we check the description of the data from the sources there is no evidence of any differences in definitions between Orbis and CBCR datasets so there is no reason for such differences. Information reported in country-by-country reports might be different from Orbis data for several reasons. For example, we have no information about exchange rate which was used in Orbis database. In country-by-country reports data were

either in EUR or we use the corresponding year average. There might be used different measurement methods which we have no chance to find. We have also already noted the issue about GUO in Orbis data where we needed to fill the empty space with the information about bank name. We could do this only in a few cases which were known to us and we were not always successful in finding the missing information. Taxes reported in each source can be measured differently. It can be either tax paid, or tax on income which includes also deferred tax.

Therefore, there are some differences which can be justifiable. This is not true in case of the number of employees or number of countries where the bank operates which can be seen from graphs 5.1 and 5.2. In these cases, there cannot be differences in exchange rates or measurement. In the majority of cases, CBCR data reports higher number than Orbis data which indicates that there are missing data in Orbis database or they are included there but we cannot correctly match the information due to the missing indication of GUO.

5.2 The Role of Tax Havens

Following part focuses on our second analysis. Now, we use only Orbis data which consists of banks operating all over the world. Although the original dataset includes years 1988 to 2017 we are going to use only data for years 2010 to 2017. This is because data for years older than 2010 are quite rare and only a couple of banks has filled this information. Thus, we assumed that including older data in the analysis will result in the inaccurate estimate because the low number of panels and moreover, the panel would be highly unbalanced.

We make only a couple of restriction to our data. First, since we analyze the tendency of banks to reallocate their profits to low tax jurisdiction we need bank group to operate in more than one country. Thus, we restrict our data to banks which have more than one country of operation. The second restriction we need to make is the information about the GUO so we drop all banks which do not have fulfilled this information and where we are not able to substitute this information from the name of the bank.

We start with the same simple model which we used in the comparison of datasets and which is described in equation 4.1. Again, we will use both effective tax rate and statutory tax rate and we will compare results and discuss the economic intuition. In the model, we will cover bank characteristics as

capital and labor proxied by assets and employees in a logarithmic form and country characteristics as *GDP per capita*, tax rate, and population. It is generally assumed that tax havens are richer and small countries; therefore, we will expect that higher *GDP per capita* leads to higher profit declared in that country.

Log(Profit before Tax)

	Statutory tax rate		Effective tax rate	
Log(Assets)	0.4092	***	0.4178	***
	(-0.0292)		(0.029)	
Log(Employees)	0.227	***	0.2281	***
	(-0.0237)		(0.0237)	
(1-Tax rate)	10.1319	*	0.0399	
	(-4.8105)		(0.0253)	
$(1\text{-Tax}))^2$	-5.5365	.	0.0005	
	(-2.9191)		(0.0008)	
GDP per Capita	-0.9809		3.3274	
	(-9.0863)		(9.1182)	
GDP per Capita)^2	52.4621		-6.0595	
	(-82.5637)		(83.5988)	
Population	-0.0031		-0.0009	
	(-0.0068)		(0.0069)	
Population)^2	-0.0000		-0.0000	
	(-0.0000)		(0.0000)	
R-Squared	0.078121		0.07913	
Number of group	2026		2051	
Number of observations	7417		7485	

Fixed effect estimation using time and individual fixed effects. Standard errors are in the brackets.

Significance levels: *** – < 1%, ** – 1%, * – 5%, . – 10%

Source: Author computations based on Orbis data.

Table 5.2: Estimation of semi-elasticity

We report our results in the form of the table as well as graphical representation. However, as we tried to compute robust errors for results in table 5.2 we failed to do so because we have strongly correlated variables. We find out that our troublesome variables are $(GDP\ per\ capita)^2$ and $Population^2$. Unfortunately, we cannot include both variables in our model since we are not able to produce robust standard errors and therefore, the model will be biased because of cross-sectional dependencies. This issue did not appear in the previous analysis (table 3.4) probably because we used adjusted dataset.

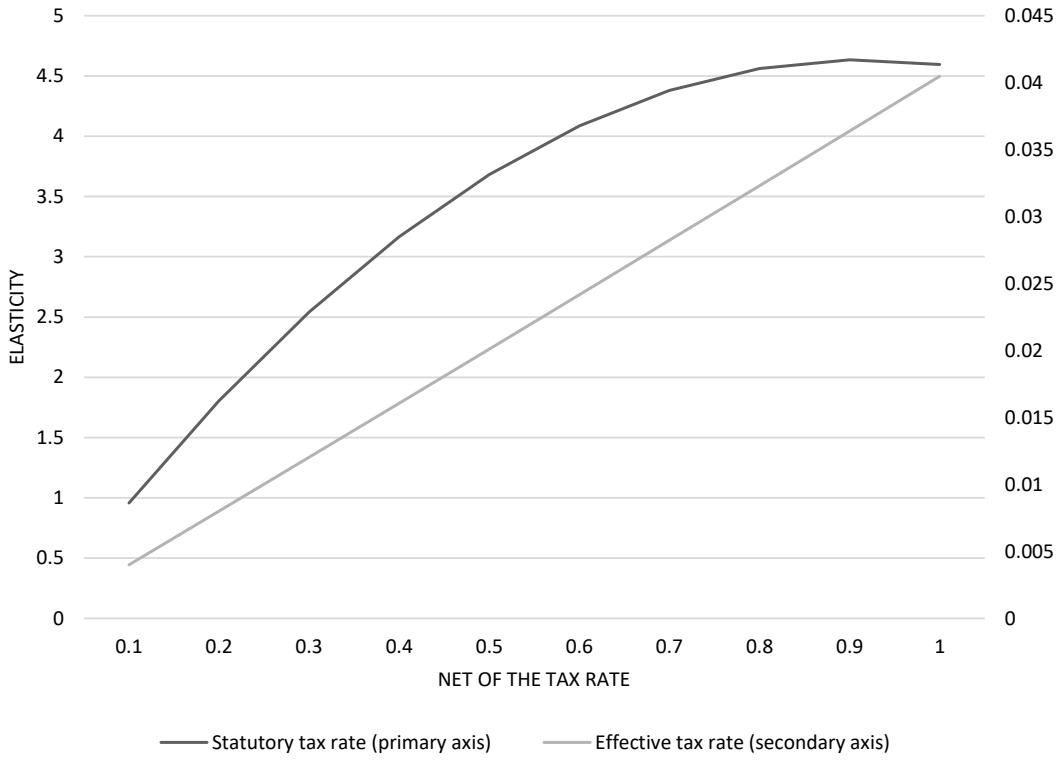
In table 5.2 we can see resulting coefficients and associated statistics of the model in equation 4.1. As was described in detail in chapter 3 we estimate the Fixed Effect model with individual and time effect. Our panel is unbalanced since some banks have missing information of either earlier years or the current year (2017).

We estimated the same model using the Random Effect estimation and Pooled OLS. Then we tested which model best describes the data using Hausman test and F test. Both tests suggested that Fixed Effect is most appropriate which confirms our intuition. Therefore, we show only results of Fixed Effect estimation. However, as mention above, we are not able to produce robust standard errors since some variables are strongly correlated. Thus, the model might be biased.

We introduce estimation with the effective and statutory tax rate in one table for ease of comparison. Therefore, both reported models differ only in the type of the tax rate used and we can see that there are large differences in $(1 - Tax)$ and its square. These coefficients give us the elasticity of profit with respect to the net of the tax rate as defined in equation 3.1.

The interpretation of the quadratic form of semi-elasticity can be seen in the graph 5.6. We already said that we assume the quadratic relationship between the profit before tax and the net of the tax rate. However, from the graph 5.6 and from the value of coefficients in table 5.2 we can see that relationship seems more like linear in the case when we use effective tax rate. On the contrary, the shape of relationship resulting from the use of statutory tax rate is quadratic. What is also interesting is that effective tax rate seems to have a much lower impact on profit before tax. Moreover, it is not significant at all so it seems that the effective tax rate does not influance banks' profits before tax.

On the contrary, the statutory tax rate tax is concave. On the horizontal axis is the net of the tax rate and on the vertical axis is a corresponding elasticity. As we assumed, the relationship is quadratic. For the higher statutory tax rate, there is stronger respond of declared profit on a change in the tax rate. On the contrary, for the lower tax rates, the respond is moderate.



Source: Author.

Figure 5.6: Graph of the elasticity for statutory and effective tax rate

We can compare our results with results of Dowd *et al.* (2017) They based their model on Hines Jr & Rice (1994) who introduced the idea about the quadratic relationship between profit before tax and tax. Dowd *et al.* (2017) used also effective and statutory tax rate and their results of these two model are comparable. Both are upward sloping and convex. The difference between our and their model with effective tax rate can be caused by the nature of their data. In their dataset, they have only aggregate tax so the information is not as accurate as our since we have detail on the country-firm level. Moreover, they analyzed different period than we do, so the differences can be explained by some macroeconomics changes. For example, they analyzed period before and during the recession in 2009 and we have the period after the recession. The major difference is that we use data only for financial industry while they used data for US MNEs

Now, we try to estimate adjusted models so we can produce a more robust result using Driscoll & Kraay (1998) robust standard errors. Table 5.3 summarizes the results of models where we exclude either $Population^2$ or $GDP\ per\ capita^2$ or both since these are our troublesome variables.

	Log(Profit before tax)											
	Statutory tax rate						Effective Tax Rate					
	Regression1		Regression2		Regression3		Regression4		Regression5		Regression6	
Log(Assets)	0.4075	***	0.4088	***	0.4077	***	0.4175	***	0.4171	***	0.4179	***
	(0.0631)		(0.0634)		(0.0628)		(0.0648)		(0.0648)		(0.0644)	
Log(Employees)	0.2263	***	0.2262	***	0.2271	***	0.2269	***	0.2270	***	0.2281	***
	(0.0344)		(0.0344)		(0.0347)		(0.0333)		(0.0333)		(0.0335)	
(1-Tax rate)	9.9642	.	9.8941	.	10.2036	.	0.0330		0.0332		0.0399	.
	(5.5523)		(5.5562)		(5.5663)		(0.0244)		(0.0244)		(0.0238)	
(1-Tax rate))^2	-5.4430	.	-5.3966	.	-5.5846	.	0.0003		0.0003		0.0005	
	(3.2266)		(3.2285)		(3.2405)		(0.0008)		(0.0008)		(0.0008)	
GDP per Capita	5.7398	.	1.2506		4.2754		4.7598		6.0858		2.7248	
	(3.4032)		(3.5881)		(3.6227)		(3.0731)		(4.4089)		(2.9777)	
GDP per Capita)^2			45.3043	.					-13.4402			
			(27.4842)						(15.2683)			
Population	-0.0110	***	-0.0109	***	-0.0035		-0.0115	***	-0.0115	***	-0.0008	
	(0.0015)		(0.0015)		(0.0055)		(0.0013)		(0.0013)		(0.0041)	
Population)^2					0.0000	.					0.0000	***
					(0.0000)						(0.0000)	
R-Squared	0.07782		0.077872		0.078052		0.078674		0.078678		0.079129	
Number of groups	2026		2026		2026		2051		2051		2051	
Number of observations	7417		7417		7417		7485		7485		7485	

Fixed effect estimation using time and individual fixed effects. Driscoll & Kraay (1998) robust standard errors are in the brackets.

Significance levels: *** – < 1%, ** – 1%, * – 5%, . – 10%

Source: Author.

Table 5.3: Results of adjusted regressions.

We can see that effect of the *Log(Assets)* and the *Log(Employees)* are equivalent in all cases. The coefficients show us the percentage change in *Profit before tax* as a reaction on the one percentage point increase in *Assets* or *Employees*. For example, increase by one percentage point in *Assets* causes the increase in *Profit before tax* by 0.4% according to regression 1, 2, and 3. The effect of net of the statutory tax rate and the net of effective tax rate differe. However, the effect of the statutory tax rate is similar in regressions 1, 2, and 3 and the same applies to the effective tax rate and regressions 4, 5, and 6.

Coefficents of second power of *net of effective tax rate* are insignificant and almost equal to zero, therefore, the relationship between *Profit before tax* and *net of effective tax rate* seems to be linear. Moreover, linear coefficients of the effective tax rate are insignificant in most of cases, and the value is also close to zero. Therefore, it seems like there is no relationship between effective tax rate and *Profit before tax*.

On the contrary, coefficients of statutory tax rate are significant on at least 10% level. Linear coefficients are equal approximately to 10 and quadratic coefficients are approximately -5.5. Graphically, the results would look similar as is depicted in the graph 5.6

The effect of *GDP per Capita* differes. Although it is not statistically significant, we can conclude that the effect is positive which confirms our assumption that profit is generated in richer countries. The *GDP per capita* squared is not statistically significant in any case and results vary a lot. Therefore, we cannot conclude anything about the quadratic relationship between *Profit before tax* and *GDP per capita*.

The coefficient of *Population* was very small and therefore, we have decided to use this variable in millions instead of units. The second power of variable *Population* seems to have no effect on *Profit before tax*. Coefficients are in both cases equal to zero (in regression 3 and regression 6 in table 5.3). Moreover, the result of regression 6 is highly significant. That does not apply to the result of regression 3, however, we have statistical significance at least on 10% level. Therefore, we can assume that the relationship between *Population* and *Profit before tax* is linear. Moreover, we can assume that the *Profit before tax* decreases as *Population* increases.

We can adjust our model taking into account all mention above. We can assume that the relationship between *Profit before tax* and *Population* is linear. The effective tax rate probably does not have any effect on *Profit before tax*. Nevertheless, we are going to include it in the regression so we can compare the results and possible effects. We cannot conclude anything about *GDP per capita*. The R^2 does not differe among regressions, therefore neither regression is prefered to others.

We are going to slightly develop the model so we can directly see the effect of tax havens. Again, we use the model by Dowd *et al.* (2017) which can be seen in equation 4.4 as well as our modified version which is shown in equation 4.5. Dowd *et al.* (2017) estimated the model with the interaction of *tax havens* and *Net of the tax rate*, however, he assumed only linear relationship. We assume that the relationship between *Profit before tax* and *Net of tax rate* is quadratic, therefore, we should include the interaction term of *tax havens* and quadratic form of *Net of the tax rate*.

As a source of tax havens, we are going to use two lists. The first is the list which was created by EU (Council of the European Union, 2018) and the second was as a result of the analysis by Gravelle (2015). We decided to use two sources so we can compare more results and get the better image about the importance of tax havens for banks.

Log(Profit before tax)								
	List of 64 countries by EU				List by Gravelle (2015)			
	Regression 1		Regression 2		Regression 3		Regression 4	
Log(Assets)	0.4146	***	0.4084	***	0.4150	***	0.4081	***
	(0.0652)		(0.0634)		(0.0653)		(6.4628)	
Log(Employees)	0.2247	***	0.2262	***	0.2248	***	0.2269	***
	(0.0347)		(0.0345)		(0.0347)		(6.5993)	
(1-Tax rate)	1.2649	***	9.7691	.	1.1081	***	10.6462	.
	(0.3819)		(5.3227)		(0.2944)		(1.7380)	
(1-Tax rate)^2			-5.2228	.			-5.8604	
			(3.0545)				(-1.6260)	
GDP per Capita	-0.3926		1.0864		-0.3756		1.0528	
	(3.6139)		(3.6300)		(3.5004)		(0.3012)	
GDP per Capita)^2	51.4655	.	47.0331	.	51.1223	.	48.7890	.
	(27.6396)		(28.3220)		(26.9411)		(1.6694)	
Population	-0.0117	***	-0.0108	***	-0.0117	***	-0.0108	***
	(0.0014)		(0.0015)		(0.0014)		(-7.3256)	
(1-Tax rate)*Tax haven	-1.0707	*	-8.4195		-0.8039	***	-26.3248	
	(0.4746)		(13.1563)		(0.1785)		(-1.5535)	
(1-Tax rate)*Tax haven)^2			4.5090				14.6373	
			(7.8144)				(1.5640)	
R-Squared	0.0774		0.07796		0.077323		0.077985	
Number of groups	2026		2026		2026		2026	
Number of observations	7417		7417		7417		7417	

Fixed effect estimation using time and individual fixed effects. Driscoll & Kraay (1998) robust standard errors are in the brackets.

Significance levels: *** – < 1%, ** – 1%, * – 5%, . – 10%

Source: Author.

Table 5.4: Estimated effect of tax havens.

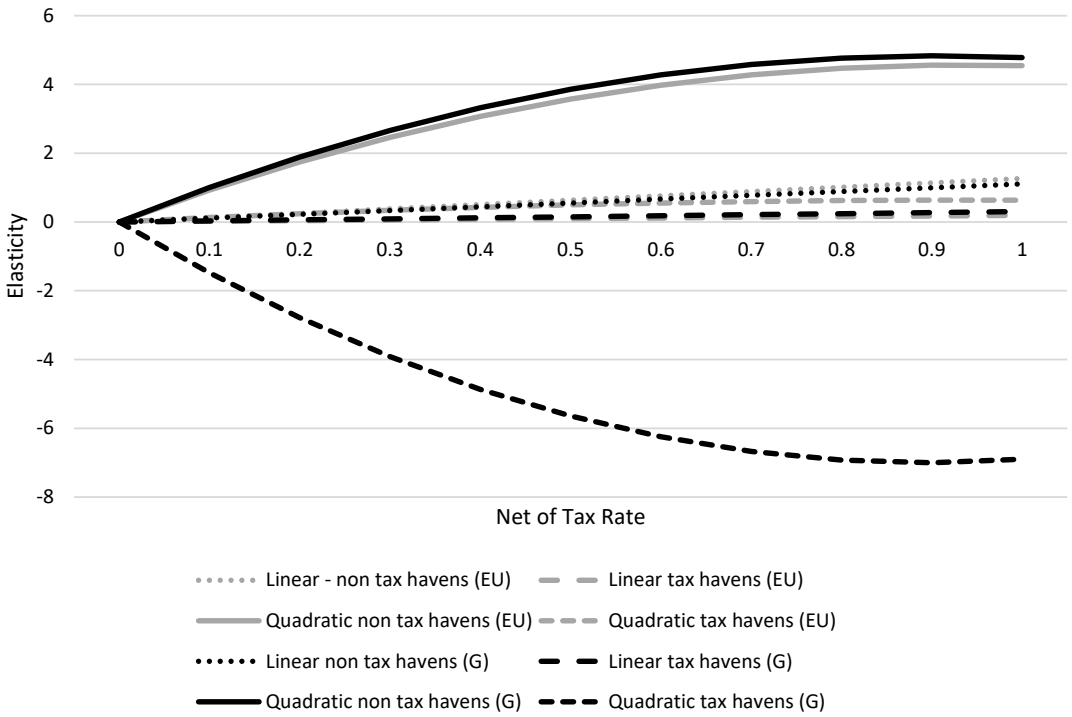
Table 5.4 provides the overview of the results. Regressions 1 and 3 summarize results of equation 4.4 and regressions 2 and 4 summarize results of equation 4.5. Again, we can notice that R^2s are comparable. Log(Assets), log(employees), and population do not differe as well and we get similar results as in table 5.3. Also, the net of the tax rate in regression 2 and 4, where we assume the quadratic relationships between *Profit before tax* and the *Net of the tax rate*, is comparable with results of regressions 1, 2, and 3 in table 5.3. If we compare these results with results of the model, which assumes the linear relationship between *Profit before tax* and *Net of tax rate* we can see that the resulting relationship is completly different. This can be seen from the following graph 5.7.

The interaction coefficients between net of tax rate and tax havens bring us diverse results. In case, where we assume linear semi-elasticity – regressions 1 and 3 – the coefficient is approximately -1. The overall semi-elasticity of non-tax havens countries in linear case is equal to 1.26 and 1.1 where tax havens countries are determined using Council of the European Union (2018)

list and Gravelle (2015) list respectively. The overall semi-elasticity of tax havens countries is 0.19 and 0.3 depending on measurement method of tax havens.

However, resulting coefficients in regression 2 and 4, where we allow semi-elasticity to by quadratic, differe a lot. In the regression 2, we used the list of 64 countries which EU determines as tax havens. The list consists of 47 countries which are on the gray list which means they promised to reform their tax system to meet EU criteria. Another 17 countries are on the blacklist. Those are the countries which even did not promise any cooperations. The resulting coefficients of the net of the *Tax rate*Tax haven* are much moderate using this tax havens source comparing with the results in regression 4. In regression 4, we use the list of 50 countries which are recognized as tax havens by Gravelle (2015). These two tax havens lists have 28 countries in common and other countries differe. We can see the complet list in the appendix in table A.1. This causes the main differenence between regression 2 and regression 4 coefficients of interaction coefficients.

Following graph 5.7 depicts the resulting relationship between the net of the tax rate and elasticity of the profit for the different type of measurements.



EU - countries which are on EU tax haven list; G - countries which are on Gravelle (2015) list. Source: Author.

Figure 5.7: Graph of the elasticity of tax haven and non tax haven countries.

Ftom the graph 5.7 we can see that almost all elasticities are close to zero no matter whether the relationship is quadratic or linear. The exceptions are quadratic relationships of non tax havens countries according to both definitions and quadratic relationship of tax havens defined by Gravelle (2015). The increasing and concave relationship of non-tax havens countries is not surprising since we obtain the similar result in graph 5.6. We have already commented that this relationship means that the reaction of profit on the percentage change in tax rate is stronger when the tax rate is high – the net of the tax rate is low.

The quadratic relationship of tax havens listed by Gravelle (2015) is more interesting. The convex and decreasing elasticity again suggests that the reaction of profit on the percentage change in tax rate is stronger when the tax rate is high, however, compared to the previous case, the lower tax rate causes decrease in declared profit. This seems to be counterintuitive, however, we can try to explain it. As we have discussed in chapter 3 specifically in table 3.3 the most of the profit is generated in richer countries and richer countries tend to have the higher tax rate. Therefore, the negative relationship can be reasonable and simply means that banks does not tend to allocate their profits to tax

havens. The reason for not using the tax havens might be because banks and other financial institutions are subject to stricter regulation than MNEs from other industries. Therefore, the profit shifting might be troublesome.

Now, we are going to focus on the second incentive to shift the profit which is the secrecy regulation of a target country. As a measurement of secrecy, we are going to use the secrecy score which is the part of FSI published by Tax Justice Network (2018). The secrecy score capture the information about secrecy regulation or bank secrecy of target country. Table 5.5 provides the results. We again use the linear model of semi-elasticity of profit with respect to the net of the tax rate as well as quadratic term as desribed in equation 4.6.

Log(Profit before tax)

	FSI - adjusted				FSI - Original			
	Regression 1		Regression 2		Regression 3		Regression 4	
Log(Assets)	0.4146	***	0.4079	***	0.3325	***	0.3281	***
	(0.0660)		(0.0641)		(0.0611)		(0.0591)	
Log(Employees)	0.2249	***	0.2265	***	0.2452	***	0.2463	***
	(0.0347)		(0.0345)		(0.0337)		(0.0332)	
(1-Tax rate)	1.0428	***	9.9457	.	1.9223	***	8.7623	
	(0.3022)		(5.5758)		(0.5538)		(6.1553)	
(1-Tax rate))^2			-5.4282	.			-4.3873	
			(3.2366)				(3.6237)	
GDP per Capita	1.1031		2.6964		-0.5159		0.7069	
	(4.0253)		(3.7696)		(3.9121)		(3.3745)	
GDP per Capita)^2	38.9842		34.2929		80.4658	*	76.6089	*
	(30.4106)		(29.3596)		(31.4602)		(30.2042)	
Population	-0.0119	***	-0.0110	***	-0.0125	***	-0.0119	***
	(0.0013)		(0.0014)		(0.0013)		(0.0012)	
FSI Secrecy score	-0.0021		-0.0021		0.0018		0.0019	
	(0.0025)		(0.0024)		(0.0022)		(0.0022)	
R-Squared	0.077425		0.078018		0.068649		0.068897	
Number of groups	2026		2026		1689		1689	
Number of observations	7417		7417		5869		5869	

Fixed effect estimation using time and individual fixed effects. Driscoll & Kraay (1998) robust standard errors are in the brackets. Adjusted FSI – missing Secrecy scores are substituted by average Secrecy score.

Significance levels: *** – < 1%, ** – 1%, * – 5%, . – 10%

Source: Author.

Table 5.5: Estimated effect of secrecy incentive.

We estimated 4 models where regression 1 and 3 in table 5.5 assume the

linear relationship between profit and net of the tax rate while regression 2 and 4 assume the quadratic relationship. We can see that all coefficients which we have previously investigated have similar magnitude. The FSI secrecy score is the variable of our interest now. We can see that neither one is significant, however, we can notice a difference in signs.

In regression 1 and 2, where we use adjusted FSI secrecy score we obtain the positive relationship with profit before tax. The adjusted FSI secrecy score includes information about secrecy scores which are published by Tax Justice Network (2018) and for countries which are not included in the official ranking, we substitute the information by overall average secrecy score so we have as large dataset as possible.

The original FSI dataset includes only countries which are listed in FSI ranking and thus, we have fewer observations in regressions 3 and 4. The coefficients of secrecy scores resulting from these regressions are positive which means that resulting relationship between profit before tax and official secrecy score is positive. The positive relationship makes better economic sense than the negative one.

Considering the results of regressions 3 and 4, if the secrecy score increases by 10 points the profit before tax increases by 0.02%. On the contrary, considering the results of regression 1 and 2, the 10 point increase in secrecy score would result in 0.02% decrease in profit before tax. In other words, the more benevolent secrecy regulation the country has the less attractive would be for profit allocation. However, since any result is not statistically significant and all are close to zero, we cannot make any conclusion about the role of secrecy in profit allocation.

5.3 The effect of CRD IV

In the last part, we focus on the effect of CRD IV which came into effect in 2014. The directive should improve the transparency of financial institutions and large MNEs. As a result, we assume that banks start to be more careful and reduce their activities in tax havens. The following analysis should show us whether our assumption is correct.

Model is detaily described in equation 4.7 and the results are shown in table 5.6. We again use the same two sources of tax havens as we already used in previous analysis. Regressions 1 and 2 use Council of the European

Union (2018) tax havens while regressions 3 and 4 use Gravelle (2015) list of tax havens.

Log(Profit before tax)

	List of 64 countries by EU				List of 50 countries by Gravelle (2015)			
	EU		non EU		EU		nonEU	
	Regression 1		Regression 2		Regression 3		Regression 4	
Log(Assets)	0.3544	***	0.4262	***	0.3493	***	0.4271	***
	(0.0624)		(0.0700)		(0.0617)		(0.0617)	
Log(Employees)	0.1558	***	0.2830	***	0.1574	***	0.2840	***
	(0.0180)		(0.0608)		(0.0176)		(0.0176)	
(1-Tax rate)	18.2613	*	10.7814		18.0771	*	10.5449	
	(7.5810)		(6.8769)		(7.7137)		(7.7137)	
(1-Tax rate))^2	-10.1901	*	-6.0158		-10.0058	*	-5.8853	
	(4.5232)		(3.9532)		(4.5973)		(4.5973)	
GDP per Capita	-27.0028	*	11.0871	*	-24.9816	*	10.6555	*
	(12.8686)		(4.7746)		(11.9783)		(11.9783)	
GDP per Capita)^2	224.3353	*	-31.0222		205.1920	*	-27.0240	
	(106.1586)		(30.1301)		(96.0621)		(96.0621)	
Population	-0.0096	*	-0.0100	***	-0.0113	*	-0.0092	***
	(0.0048)		(0.0018)		(0.0056)		(0.0056)	
Tax Haven*After 2014	-0.1674	***	0.0245		0.1781		-0.1312	***
	(0.0465)		(0.0278)		(0.1152)		(0.1152)	
R-Squared	0.038987		0.10996		0.039166		0.11121	
Number of groups	781		1245		781		1245	
Number of observations	2811		4606		2811		4606	

Fixed effect estimation using time and individual fixed effects. Driscoll & Kraay (1998) robust standard errors are in the brackets.

Significance levels: *** – < 1%, ** – 1%, * – 5%, . – 10%

Source: Author.

Table 5.6: Estimated effect of introducing the CRD IV.

To analyse the impact of introducing CRD IV on EU banks we decided to divide the set into two subsets. The first subset –labeled as EU – includes only banks which have their GUO in EU country. The second subset – non-EU – includes the rest of the dataset. Regressions 1 and 3 summarize results of first subset (EU) and regressions 2 and 4 summarize results of second subset (non-EU).

The most important coefficient is the interaction of tax haven and the dummy variable which is equal to 1 for the years 2014-2017. If the interaction term is negative it means that EU banks reduce the reallocation of the profit to tax havens. As a control group, we have banks from the rest of the world to see whether the effect is caused by other reasons.

From regression 1, which summarizes the results of banks with GUO in EU and uses the Council of the European Union (2018) tax haven list, we can

see that the effect of the interaction term is negative. On the contrary, the coefficients of the interaction term in control group (in regression 2) is positive. This suggests that the CRD IV regulation positively effected EU banks and their behavior associated with profit shifting while the rest of the world still take an advantage of using tax havens. Moreover, the result is highly significant in regression 1 which does not apply to the result of regression 2.

However, we get completely opposite result in the regression 3 and 4 respectively. As we already mention above, the EU tax haven list and Gravelle (2015) tax haven list have common 28 countries and the rest is different. This might cause the difference in the results between regression 1 and 3 and 2 and 4 respectively.

We can assume that EU, which published the CRD IV, would probably monitor the profit shifting to the countries which they considered as tax havens. Therefore, we can assume that banks would reduce the profit shifting to those countries which are on EU tax havens list. Countries, which are on the list by Gravelle (2015) and which are not in the EU tax havens list, are not tax havens according to EU and therefore, locating profit to these countries is not considered by EU as tax avoidance.

Following this logic, we can assume that results of regression 1 and 2 better reflect the true change in behavior as a reaction to introducing the CRD IV. Therefore, we can say that after the year 2014, banks which were established in EU reduce their profit declared in tax havens by 0.17%. However, we still cannot make a strong conclusion from these results since using of different tax havens list yields opposite effect.

5.4 Discussion

In the following part, we are going to discuss out findings with available literature. We analyZe the quadratic relationship between profit before tax and the net of the tax rate. We start our analysis using both tax measurement – the statutory tax rate and the effective tax rate, where effective tax rate was averaged on a country level so we reduced possible endogeneity. However, effective tax rate seemed to have no significant effect on profit before tax. Therefore, we continued with our analysis using only the statutory tax rate.

We decided to analyze two incentive to shift the profit to tax havens. The first is the tax incentive which is widely analyzed by many researchers and the

second is the secrecy incentive where we used the part of the FSI measurement – secrecy score.

We examined the semi-elasticity of profit with respect to the net of the tax rate and we assumed that the relationship would be negative which was firstly estimated by Hines Jr & Rice (1994) and then many years late by Dowd *et al.* (2017). Our results differ from their quite a lot. We obtained the increasing and concave function of elasticity whereas Dowd *et al.* (2017) came to an increasing and convex function. The difference can be explained by several reasons. First, we considered only financial industry which might behave differently from other industries Langenmayr *et al.* (2017). Secondly, our dataset includes the different time period (2010-2017) whereas Dowd *et al.* (2017) considered period 2002-2012. Their results might be influance by the crisis in 2009 while we considered period after the crisis. The last difference is that we used the dataset which consists of countries all over the world while Dowd *et al.* (2017) considered US MNEs only.

Hines Jr & Rice (1994) estimated the effect of tax on the profit. They used log(Population) as an instrumental variable for the tax as well as local tax rates and their estimate suggested significant curvature in the effect of tax rate on profit before tax. Their results are decreasing concave function which is actually the same relationship which we obtained. Slide differences can be explained by different time period used and again by differences in the industry used where we used financial industry only, which can have its specifications while Hines Jr & Rice (1994) used US MNEs.

Clausing (2016) found the evidence that US government is losing approximately $100 billion of taxable income. The estimated profit shifting is increasing every year and the most of it is driven by the tax incentive. Similarly, as in case of Dowd *et al.* (2017), he analyzed US MNEs while we used worldwide data on banks.

As we discussed in chapter 2 financial sector is not explored as much as other sectors. There are only a few studies which consider specificaly financial institutions or banks. Langenmayr *et al.* (2017) analyzed banks using German regulatory data. They suggested that banks use different channels to shift the profit and they find the evidence that proprietary fixed-income trading assets and trading derivatives are used as a channel to shift the profit to low tax jurisdictions.

Bouvatier *et al.* (2017) used country-by-country data – the same source as we do. However, they used data only for the year 2015 for 36 largest European

banks so they analyze cross-sectional dataset whereas we used the data for 2014-2017 for almost 60 largest banks which means we had panel dataset. They based their analysis on turnover while we investigated the profit before tax, therefore, the comparison of the results is not straightforward. However, one of their conclusion is that low tax rate is not sufficient to attract banks' profits. This is in accordance with our result, specificaly with table 5.4 and with graph 5.7. There we concluded that tax havens have very small or even negative effect on profit.

They also considered several other characteristics which could attract banks' profits such as quality of the governments. In a similar manner, we considered secrecy regulations as a factor which can influence the banks' behaviors related to profits' allocations – secrecy incentive to shift the profit. Grilli (1989) analyzed the effect of secrecy on banks' deposits. He found the evidence that to some extent the bank deposits are driven by secrecy regulation but also by tax treatment and size of the economy of the target country.

Chapter 6

Conclusion

The thesis is focused on banks and their tendency to misalign profit to tax havens. It provides the overview of existing literature related to the topic and provides quantitative analyses related to banks behavior.

The first part of the analysis was focused on the comparison of two data sets: The first one was dataset from Orbis Bank Focus database by Bureau van Dijk and the second is the CBCR dataset which includes data collected from country-by-country reports. The main contribution was the first analysis of datasets quality and identification of several inaccuracies. Information in Orbis dataset was inaccurate and some data were missing. The thesis was focused on bank groups hence the number of countries where it operates was considered as a basic indicator of the data completeness. This indicator suggests that in most of the cases 30% of the data are missing in Orbis dataset. The missing countries have of course impact on other categories such as the number of employees or declared profit before tax. Surprisingly, the tax declared was not the case. Even though the tax should be proportional to profit before tax we find out that the aggregate tax is higher in Orbis dataset than in CBCR dataset which indicates some inaccuracies of both datasets.

The thesis discussed several reasons for these inconsistencies. Firstly, we do not know which exchange rate was used in Orbis Bank Focus database to convert the amounts to EUR. However, this difference should be still consistent among categories, therefore, the same issue should occur in profit before tax or turnover. Secondly, banks create their Country-by-country reports inconsistently. Some banks declare tax on the profit generated in the same year. However, other banks declare tax paid which includes deferred tax from previous years and exclude deferred tax from the year when the profit was generated.

Still, the difference is very high – in Orbis dataset, the declared tax is four times higher than in CBCR dataset and oppositely in case of profit before tax. Moreover, aggregate taxes are in some cases negative in Orbis dataset which does not apply to CBCR dataset. On the contrary, the profits before tax are in some cases negative in CBCR dataset which again does not apply to Orbis dataset. Considering all these results, the conclusion is that that there are some crucial differences between these two datasets. These differences might be caused by the different method of measurement; however, more information is needed to make a deeper analysis.

The second part of the analysis focused on the role of tax havens for banks. Although the profit shifting of MNEs is broadly analyzed, studies focused on financial industry are rare with room for improvement. The semi-elasticity of profit with respect to the net of the tax rate was estimated according to relevant literature to be a quadratic function. Results suggest, that banks are sensitive to the tax rate, however, if the tax rate is very low the corresponding respond of the profit is moderate while if the tax rate is high the respond is rather strong which can be seen in the graph 5.6.

This finding is partly confirmed by the subsequent analysis with the model extended by interaction term of tax havens and net of the tax rate. Two sources of tax havens were used for comparison. Elasticities of non-tax haven countries have a similar shape to the first analysis, on the contrary, elasticities of tax havens are negative or have a very little effect which can be seen in the graph 5.1. This phenomenon is explained by two causes. First, the stricter regulations which apply to the financial institutions can prevent banks from profit shifting. The second cause is the fact that the most of the profit is generated in richer countries which can be seen in correlation matrix in table 3.3. Simultaneously, richer countries tend to have higher tax rate which can be seen also in table 3.3. Therefore, it does not seem that banks tend to misalign their profits to tax havens.

The second incentive to shift the profit is the secrecy incentive. The first analysis of secrecy incentive using the FSI ranking is provided. The secrecy score of FSIis used to capture the information about secrecy regulation of the country. Results suggest that the secrecy may have the positive impact on profit before tax, however, the results were insignificant, therefore, we cannot make a stronger conclusion.

The last part of the analysis focus on CRD IV which came into effect in 2014. According to the CRD IV banks have to disclose their detailed accounting

information on the country basis. The first analysis examining the impact of introducing the directive is provided.

The thesis examines whether banks reduce the profit shifting since the detailed data are now publicly available. Again, two sources of tax havens are used for comparison however, the analysis yields contradictory results. Since the regulation is European the greater emphasis can be put on the results which are obtained using EU tax havens list. These results suggest that banks with headquarters in the EU reduce reallocation of the profit to tax havens while the trend is the same in the rest of the world. However, since opposite results are obtained from the other list of tax havens a stronger conclusion cannot be made.

The main findings of the thesis are firstly several inaccuracies of Orbis Bank Focus database, as well as Country-by-country reports were found. Secondly, the evidence that banks' profits are sensitive to high taxes were found; however, tax havens do not play the significant role for banks. Moreover, results suggest that the secrecy is not important for banks' profits allocation. Lastly, the analysis of whether the introduction of CRD IV has any effect on banks behavior was provided and results were inconclusive.

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Appendix A

Graphs and tables

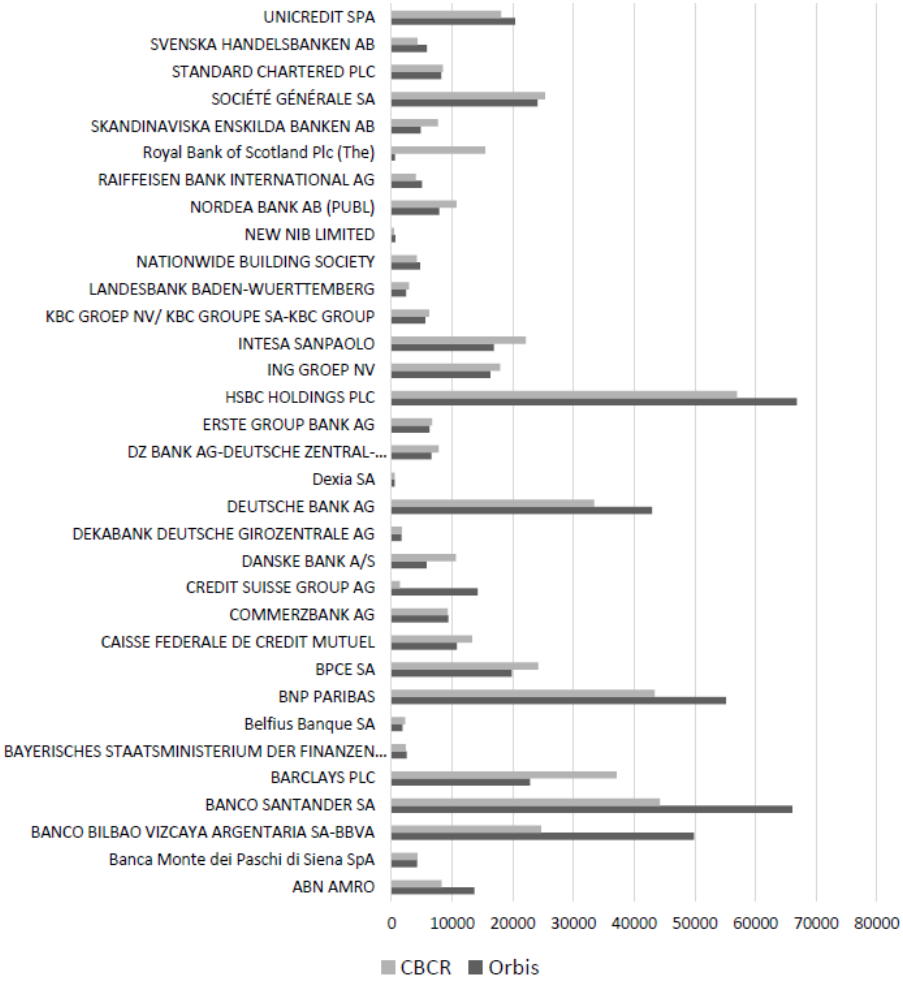

Figure A.1: Graph of aggregate turnovers for CBCR and Orbis datase

Source: Author.

Gravelle (2015) list		EU list		
Andorra	**Liechtenstein**	Albania	**Liechtenstein**	Swaziland
Anguilla	Luxembourg	American Samoa	**Macao**	**Switzerland**
Antigua and Barbuda	**Macao**	**Andorra**	Macedonia	Taiwan
Aruba	**Maldives**	Armenia	Malaysia	Thailand
Bahamas	Malta	**Aruba**	**Maldives**	Trinidad and Tobago
Bahrain	**Marshall Islands**	**Bahrain**	**Marshall Islands**	Tunisia
Barbados	**Mauritius**	**Barbados**	**Mauritius**	Turkey
Belize	Monaco	**Belize**	Mongolia	United Arab Emirates
Bermuda	Montserrat	**Bermuda**	Montenegro	Uruguay
British Virgin Islands	**Nauru**	Bosnia and Herzegovina	Morocco	**Vanuatu**
Cayman Islands	Netherlands Antilles	Botswana	Namibia	Vietnam
Cook Islands	**Niue**	**Cayman Islands**	**Nauru**	
Costa Rica	**Panama**	**Cook Islands**	New Caledonia	
Cyprus	**Samoa**	Curacao	**Niue**	
Dominica	**San Marino**	Faroe Islands	Oman	
Gibraltar	**Seychelles**	Fiji	Palau	
Grenada	Singapore	Greenland	**Panama**	
Guernsey	St. Kitts and Nevis	**Grenada**	Peru	
Hong Kong	**St. Lucia**	Guam	Qatar	
Ireland	St. Vincent and the Grenadines	**Guernsey**	**Samoa**	
Isle of Man	**Switzerland**	**Hong Kong**	**San Marino**	
Jersey	Tonga	**Isle of Man**	Serbia	
Jordan	Turks and Caicos Islands	Jamaica	Seychelles	
Lebanon	US Virgin Islands	**Jersey**	South Korea	
Liberia	**Vanuatu**	**Jordan**	**St. Lucia**	

Tax havens according to EU and Gravelle (2015).

Mutual tax havens are in bold.

Table A.1: Lists of tax havens

Appendix B

Common Consolidated Corporate Tax Base

There were published many proposals which designed unitary taxation. These proposals allow multinational companies to declare their consolidated profit to single authority. One of them was CCCTB which have been proposed by European commission in 2011.

This proposal allows multinational companies to declare their profits consolidated. The profit is than redistributed to each country according to real economic activity. We are using apportionment factor to recognize where the economic activity take place. Particularly CCCTB uses apportionment factors as number of employees, wages, assets or turnover. Equation 1 summarizes the whole idea. Since it combines large scale of apportionment factors it leaves little space for inaccuracies. For example, the wage factor can be arguable since some countries have lower average income that other. Thus, it might seem like there is smaller economic activity in these countries. That is why the employment factor is average of employees and wages so it reduces the differences among countries.

As the profit is distributed to each country, it is than tax on the country level using the local tax rate. This should make tax avoidance more difficult since the profit is distributed according to economic activity which should correspond to location where the profit was actually generated and it does not matter where it was declared.

For the multinational companies or in our case banks it means that the profit from one country can be reduced by loss from another country. This way multinationals can reduce their consolidated tax base in other words, they can

have lower tax burden. Unitary taxation could be also step forward to closer cooperation within EU, which can be stimulating for business environment. It would be easier for companies to declare their consolidated profits since they could do it only in one country.