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Institute of Economic Studies

Bachelor's Thesis

2021 **Tomáš Boukal**

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How Much in Taxes Do Multinational Enterprises Pay?

Bachelor's Thesis

Author of the Thesis: **Tomáš Boukal**

Supervisor: **doc. Petr Janský, M.Sc., Ph.D.**

Year of the defence: **2021**

Declaration

1. I hereby declare that I have compiled this thesis using the listed literature and resources only.
2. I hereby declare that my thesis has not been used to gain any other academic title.
3. I fully agree to my work being used for study and scientific purposes.

In Prague on January 5, 2021 Tomáš Boukal

Bibliographic note

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Abstract

Taxation of multinational enterprises accounts for a significant portion of government revenues. These revenues are however negatively affected by the tax behavior of many multinational groups which shift significant part of their profits to tax haven countries. The prevailing body of the literature on this topic has focused on the quantification of shifted profits and the resulting tax losses. Thus, the question of how much multinational enterprises do pay on taxes has remained unanswered. This has changed with the recent publications of Bolwijn et al. (2018) and Tørsløv et al. (2018). The aim of this thesis is to discuss their methodologies, apply them and present the amount of taxes paid by foreign affiliates of multinationals in individual countries. We express the results as a portion of GDP to enable cross-country comparison and put them in contrast to the estimates of tax losses from profit shifting.

Abstrakt

Zdanění nadnárodních společností tvoří důležitou část vládních příjmů. Tyto příjmy mohou být negativně ovlivněny daňovou optimalizací nadnárodních korporací, které mohou značnou část svých nezdaněných zisků přesunout do daňových rájů. Přesun zisků do daňových rájů a následné vyčíslení daňových ztrát pro jednotlivé země bylo doposud hlavním předmětem výzkumu prací v této oblasti. Výzkum na téma, jaký je skutečný daňový podíl mezinárodních společností tak zůstal neprobádaný. To se změnilo s nedávnou publikací Bolwijn et al. (2018) a Tørsløv et al. (2018), kteří se snaží odpovědět i na tuto důležitou otázku. Úlohou této práce tak bude prodiskutování metodologie obou prací a její následná aplikace. To nám umožní vypočítání daňových odvodů mezinárodních korporací pro jednotlivé země. Výsledky vyjádříme jako podíl k HDP pro lehčí porovnání napříč státy a uvedeme je do kontrastu se současným poznáním literatury na téma mezinárodního zdanění.

Keywords

multinational enterprise, corporate income tax, international taxation, government revenue, tax avoidance

Klíčová slova

nadnárodní společnosti, daň z příjmů právnických osob, mezinárodní zdanění, vládní příjmy, daňové úniky

Název práce

Kolik nadnárodní společnosti platí na daních?

Acknowledgement

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Bachelor's Thesis Proposal

Author	**Tomáš Boukal**
Supervisor	**Petr Janský**
Proposed Topic	**How Much in Taxes Do Multinational Enterprises Pay?**

Research question and motivation

Multinational Enterprises (MNEs) are responsible for a significant share of government revenues. According to UNCTAD (2015), the contribution of MNEs to government revenues is around 37 percent globally. Very intense debate is ongoing about a particular section of the MNEs contribution – taxes which account for 6 percent share of government revenues (UNCTAD, 2015). MNEs take into account several tax considerations to achieve the most tax-efficient decisions. This leads many companies to shift their profits into low-tax locations. To this strategy, we often refer to Base Erosion and Profit Shifting (BEPS). This phenomenon and its estimations are described very closely in literature (see for example: Johansson et al., 2015; Crivelli et al., 2016).

What literature does not cover to such an extent is the actual contribution of MNEs to national governments in taxes. This gap in literature will be the subject of the thesis when I will be asking the following question: how much in taxes do foreign affiliates of MNEs pay to national governments. This question is partly answered by Zucman et al. (2018). They point out that countries acting as tax havens as Luxemburg and Ireland collect a higher share of its national income in corporate tax revenues (7% and 5% respectively) than countries with the highest statutory tax rates as the United States or Germany (less than 3%). Another prominent work of Bolwijn et al. (2018) estimates the total contribution of foreign affiliates of MNEs to developing-countries. They find that foreign affiliates pay around $725 billion which corresponds roughly to 20% of government revenues in developing-countries. Additionally, they estimate the corporate tax component to be around $220 billion. However, these works have certain limitations which are addressed in the following section.

Contribution

As I have indicated in the previous section, my research question distinguishes itself from the prevailing literature on this topic. My thesis aims to put the estimation of BEPS into a wider context. The question of how much are governments losing from profit shifting remains partially open if we do not account for government tax revenues.

In my thesis, I would like to focus on a cross-country comparison of corporate tax revenues. This is something which is left unanswered by Bolwijn et al. (2018) as they focus only on tax revenue gains for developing-countries in total. On the other hand, Zucman et al. (2018) show cross-country comparison of corporate tax revenues but do not break down their results neither they provide any discussion over them. This may due to the secondary importance of this question in their research. Hence, I would like to use the methodology of Bolwijn et al. (2018) in which they decompose government revenue shares paid by foreign affiliates on various sources. Whereas Bolwijn et al. (2018) is focusing on developing countries in total, I would like to provide a calculation for each OECD country plus several countries which we may identify as tax havens. Subsequently, I would compare these numbers with the results of Zucman et al. (2018).

The second contribution of my thesis lies in regression analysis which I would like to employ in my thesis. I would like to set the calculated tax revenues of governments from MNEs (as a percentage of national income) as dependent variable allowing me to show the importance of various characteristics of countries depending on their tax corporate gains. Here, the approach differs from the literature that in most cases uses econometrics methods to examine the profit shifting of MNEs (Johansson et al., 2015; Crivelli et al., 2016; Janský & Palanský, 2018).

Methodology

Firstly, I focus on the estimation of the amount of taxes paid by MNEs in separate countries. I use the approach developed by Bolwijn et al. (2018). Particularly, I employ the method based on the foreign affiliates of MNEs. In order to get data, I exploit the ICTD Government Revenue Dataset that provides a very detailed coverage of government revenues and taxes at cross-country level. As an additional source of data may be used the database developed by Zucman et al. (2018).

In the second part, I employ the OLS model to analyze how the countries score on various independent variables based on their corporate tax revenue gains (as a percentage of national income). As a possible independent variable, I include the corporate tax rate

in a given country. In addition, I might include a dummy variable which would identify countries as being tax havens or not as I expect to find out the significance of this dummy variable

Outline

I start with the introduction, pointing out to my motivation and to the relevance of this topic. Second, I describe existing literature in this field looking on both BEPS and tax contribution of MNEs. I continue with research part of my thesis that would be divided into two sections. In the first section, I focus on the estimation of corporate tax revenues for individual countries. In the second section, I attempt to put the calculations into a broader context by running a linear regression analysis on corporate tax revenue gains of countries. Both parts are consisting of methodology, calculation part, and a quick summary of results. The research part is followed by the discussion over the results of both sections of my research and link to the existing literature will be provided. Finally, I state a conclusion of my thesis, point out to limitations and give suggestion for future research.

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Acronyms

AETR	Average Effective Tax Rate
BoP	Balance of Payments
BEPS	Base Erosion and Profit Shifting
CIT	Corporate Income Tax
CbCR	Country by Country Reporting
ETR	Effective Tax Rate
FATS	Foreign Affiliates' Statistics
FA	Foreign Affiliate
FDI	Foreign Direct Investment
IMF	International Monetary Fund
MNE	Multinational Enterprise
OECD	Organisation for Economic Co-operation and Development
OECD RS	OECD Revenue Statistics
OLS	Ordinary Least Squares
UNCTAD	United Nations Conference on Trade and Development

Introduction

"Taxes matter for the economy. They provide the sustainable funding needed for social programmes and public investments to promote economic growth and development and build a prosperous and orderly society (PwC and World Bank Group 2015, p. 9*)."* Multinational enterprises are responsible for a large portion of overall tax revenue. It has been estimated that corporate payments can constitute up to 10 percent of government revenues in developing countries (UNCTAD, 2015). Governments realize this fact and they attempt to create the most favourable environment for businesses. Introduction of smaller tax rates can therefore attract paper profits or investment from abroad (Keen and Konrad, 2013). This phenomenon, also known as "tax competition", has been largely accompanied by the decrease of statutory tax rates globally (Tørsløv et al., 2018). The best illustration can be shown on the 2017 US tax reform, which lowered the corporate tax rate from 35 percent to 21 percent (Drucker and Tankersley, 2019).

Nevertheless, many multinational enterprises still try to circumvent their tax payments by shifting profits to tax havens. Thus, this activity of MNEs, also labelled by the term base erosion and profit shifting, has attracted the attention of many scholars and policymakers. The recent study of Tørsløv et al. (2018) has shown that as much as 40% of multinational profits is being shifted to tax havens which, represents a governmental loss of around 10% of all corporate tax income. A different estimate is proposed by Janský and Palanský (2019), who calculated the tax revenue loss to be $125 billion on the sample of 79 countries.

This debate, however, has left one question largely unanswered. What is the actual tax contribution of multinational enterprises? To put it in other words, how much in taxes do MNEs pay after we account for profit shifting? Finding the answer to these questions will be the main aim of our research. The payments of multinational corporations are still being kept secret by MNEs, despite increasing pressure by scholars, journalists and civil society campaigners. This has been summarized by Cobham et al. (2017) article "What do they pay?" which calls for a new dataset on economic activities and tax contributions of MNEs to battle the current information asymmetry. Despite the data scarcity, two recent studies of Tørsløv et al. (2018) and Bolwijn et al. (2018) have estimated tax payments of MNEs.

Both of those studies differ in their results and the scope of their analysis. Tørsløv et al. (2018) exploit the recent improvements in Foreign Affiliates' Statistics (FATS) which have been made available by the OECD of Eurostat. With the FATS, they disaggregate the national income of countries into many components to arrive at the final estimation of profit shifting. The estimation of corporate taxation is thus created as a byproduct and Tørsløv et al. (2018) do not pay much attention to it. In contrast, the research of Bolwijn at al. (2018) directly aims only at the corporate tax contribution of multinationals. They develop two methods for estimation of tax revenues: the first, same as Tørsløv et al. (2018), utilizes FATS and breaks fiscal contributions made by multinationals into separate components. The second approach is based on foreign direct investment as it leverages BoP data on FDI income to arrive at meaningful measurement of tax contribution of multinationals.

The objective of our thesis is to elaborate on those studies. We see our main contribution in two areas. First, we aim to provide a comparison of the two methods. This is something left unanswered by Bolwijn et al. (2018) who focus only on tax revenue gains for developing-countries in total. Tørsløv et al. (2018), on the other hand, show cross-country comparison of corporate tax revenues. However, they do not delve any further into the topic. Second, we present the actual estimates of corporate tax contributions of MNEs for individual countries in the year 2017, both in gross numbers and as a percentage of GDP. Furthermore, we check for the robustness of presented methods by discussing the recently published Country by Country Reporting (CbCR) statistics by OECD (2020). The presented results can have great value for further research, which can empirically test what are the main factors behind the different levels of tax revenues across the countries.

The reminder of the thesis proceeds as follows. First, we summarize the key findings of the literature in the field of MNEs taxations and tax avoidance. Second, we focus only on the issue of tax contribution of MNEs alone. We review the available statistics on corporate taxations and trends that arise from the data. We also present the methodologies of the estimation of corporate taxation of multinationals and outline their differences. Third, we offer a re-estimation of the methods for 2017 and discuss the results within the literature on profit shifting. We follow with a brief discussion on usage of the results and present a few factors that could have be affecting the difference in tax raised. Lastly, the conclusion of our research is stated.

2 Literature review

In this chapter, we outline the most important literature on the tax behavior of multinationals and base erosion and profit shifting. However, before we discuss the main works within the field, the main definitions have to be established. Under the term multinational enterprise (MNE) or multinational enterprise group, we understand a set of enterprises united under a common ownership (OECD, 2015b, pp. 46–48). A MNE group then consists of one ultimate parent, which "ultimately owns" all the entities based either in local tax jurisdictions or in foreign ones (ibid.). This brings us to the term "foreign affiliate", which stands for a corporation in which the ownership is at least from 10% foreign. If the ownership of foreign parents is 50% or more foreign, we then speak about "majority-owned" foreign affiliate (European Commission and Eurostat, 2012, pp. 13–20).[1] A majority of works researching the activities of MNEs adopts the definition of foreign affiliates as enterprises with foreign investment above 10%, however, the latter prescription can be also applied.[2]

To clarify our terms, the following illustration of activity of a multinational is presented. Consider there is an MNE group whose parent is headquartered in country A. In order to optimize the costs from taxation, the MNE will create a subsidiary with direct ownership in country B, where the rate of taxation will be smaller. If the ownership is above 10%, then it can be classified as country B's foreign affiliate (headquartered in country A) and the affiliate is obliged to pay taxes on any recorded profits in country B. However, the original MNE group can create another subsidiary in country C with at least minority ownership and move its production there. If the level of taxation is higher in country C than in country B, the MNE has several options how to optimize the tax costs (Mirrlees *et al.*, 2011, pp. 443–45). Firstly, it can use the method of "*transfer pricing*", wherein it will charge a higher price for input produced in country C and subsequently charge a lower price in country B. This results in the shift of profits to country B, where the taxation is lower. This method can be exaggerated by charging for intangibles or intellectual property, where it is very challenging for the tax authorities to value the good

[1] The definition of a foreign affiliate is usually consistent across institutions: see for example the U.S. Bureau of Economic Analysis (BEA) (no date) *Activities of U.S. Multinational Enterprises (MNEs)*. Available at: https://www.bea.gov/data/intl-trade-investment/activities-us-multinational-enterprises-mnes (Accessed: 2 October 2020). However, the definition of "*ultimate parent*" can differ and we can find entries as "*ultimate beneficial owner*" or "*ultimate controlling unit*".

[2] For example, Tørsløv et al. (2018) use in their research "foreign-controlled firms", meaning at least 50% of ordinary shares or voting power comes from foreign investors.

at its actual price. Another often used method is the "*debt pricing*". With this method, the MNE will locate most of its debt in country C with high taxation, as interest payments are tax deductible against profits. This can become highly effective when the affiliate in low tax country B is lending to an affiliate in high tax country C, and thus producing deductible interest payments at country C and taxed revenue from interest payments at country B, with low taxation.[3]

As we have reviewed the key definitions and shown their meaning on the examples of tax optimization, we can move to the literature. Firstly, we will incorporate the examples of base erosion and show the research of their influence on real economies. Secondly, we will present the studies on the losses arising from profit shifting, which will serve as the template for estimating what tax amount is left to be seized by governments.

2.1 Tax competition and the response of multinational enterprises

The importance of MNEs' tax contribution can be shown on the continued decline of statutory tax rates. Governments decide to lower their corporate tax bases mainly for the following reasons: entrance of new firms to the market, attraction of FDI, and attraction of shifted profits from abroad (Leibrecht and Hochgatterer, 2012). The work of UNCTAD (2015) argues for tax-related reason that may play a role in attraction of FDI. According to their study, the manipulation of intangibles to low-tax jurisdictions and financial schemes can be among the main reasons for tax-related FDI flows. The strategical manipulation of intangibles with respect to country's corporate tax rate is more closely analyzed by (Dischinger and Riedel, 2011) on the sample of European countries. They claim, that conversely to manufactures, the return on profit on intangibles is significantly higher which incentivizes firms to transfer their subsidiaries into low-tax countries. As a result, a decrease in taxes of one percentage point in the affiliate's location increases the volume of intangibles on its balance sheet by 1.7% on average.

The summary of the effects of tax cut and pre-tax profits is presented by Heckemeyer and Overesch (2017). In their opinion, MNEs closely react to cross-country tax differentials which may incentivize tax-competition. They support this view by estimating the tax-semi elasticity of pre-tax profit to be 0.8. In other words, a positive

[3]More examples of profit shifting can be found in UNCTAD (2015, pp. 192 - 97).

change of 10 percent in the tax difference between affiliate and its parent would result in positive change of 8% in the pre-tax profit indicated by the affiliate. Another area of the firm's tax consideration is listed by Clausing (2003). They investigate the transfer pricing of US companies over the years 1997-1999. Their results point to a strong relationship between the prices of intrafirm imports and exports to a country and its tax rate. In particular, a decrease of tax rate by 1% of a trading partner results, for intrafirm transactions, in a 2,0% increase in US import prices and 1,8% in US export prices, relative to non-intrafirm transactions.

On the other hand, the argument for the lowering of tax rates has also been given by multinationals themselves. If we broaden the debate by introducing the term effective tax rate (ETR) we find out that many companies pay much less than they should based on the tax rate alone. The term ETR enables us to show what is the share of MNE's corporate taxes with respect to their profits. Lately, companies such as Google Inc. or Apple Inc. have reported effective taxes rates on their foreign profits to be 3% and 1% respectively, which is much lower than the actual corporate tax rate in the place of their origin (Fuest *et al.*, 2013). The significance of effective foreign tax rates on the profit of MNEs has been proved by Grubert (2012), who estimates that the foreign income of multinationals has increased by 14 percentage points between the years 1996 and 2004. Similar view on the ETR has been adopted by Janský (2019), who points out to the "race to the bottom" within Europe. This is given by the fact that in Europe we may find countries with very low ETRs (Luxemburg being the lowest with ETR of 2,8%) and countries with very high ETR (Norway being the highest with ETR of 48,7%). When we compare these numbers with the nominal rate of taxation, we observe that, for many countries, the tax burden of MNEs is smaller by an order. The debate was further broadened by Johansson et al. (2017), who show various practices employed by MNEs to arrive at the lowest tax contribution possible. They estimate that, on a sample of OECD countries, larger MNEs with 250 or more employees have been able to lower their ETR by rates ranging from 4,0 to 8,5 percentage points.

From the paragraphs above, it is clear that the tax policies of countries play a significant role in various MNEs' economic activities. The literature offers many reasons for the ongoing tax competition between countries and the so call "race to bottom". Thus, the effective taxation of multinationals is sometimes prevented by many hurdles that multinationals lay down in order to achieve the most optimal taxation of their profits. In

the next section, we will present the literature on base erosion and profit shifting which constitutes a critical part of MNEs' tax behaviour.

2.2 Base erosion and profit shifting

The issue of tax competition and aggressive tax planning of multinationals gains importance because of base erosion and profit shifting (BEPS). The OECD defines it as a set of strategies of multinationals to exploit gaps and mismatches in tax systems in order to avoid tax payments (*What is BEPS*, no date). In reaction, in 2013, the OECD in cooperation with G20 launched a BEPS project aimed at tackling the tax avoidance of MNEs (OECD, 2013). It introduced diverse policy recommendations in 15 areas in order to develop a joint action which would bring taxation of profits to the countries of origin. As of 2019, the action plan has united 129 countries, accounting for more than 95% of global output. Despite this fact, some scholars point to its ineffectiveness and shortcomings particularly with respect to developing countries and their low bargaining power (Burgers and Mosquera, 2017). The literature overview on this problematics, summarizing the key theoretical approaches followed by their subsequent results, has been done by (Dharmapala, 2014). Based on the study's conclusion, there is a wide perception that BEPS has grown over time, with significant consequences for governments' incomes. Among the studies taking into account the concrete effects of profit shifting, the research of U.S. firms done by Hines and Rice (1994) is considered as pioneering. Despite their evidence that U.S. multinationals locate a considerable fraction of their activities in tax havens, the authors remain optimistic about the presence of tax havens. They maintain, the factors of production are not affected and furthermore, tax havens can improve the ability of the U.S. Treasury to collect taxes. The argument pointing out to profit shifting as a common practice of firms is strengthen by (Dharmapala and Riedel, 2013). Based on their evidence, as much as 60% of foreign affiliates within Europe face lower taxation than their parent company.

Despite the efforts of national governments to curb the profit shifting, its magnitude remains very high. Tørsløv et al. (2018) estimate that globally, around 40% of multinational profit has been shifted to low-tax countries in 2015. According to their data, the United States has the highest share of shifted profits, and the European Union appears to be the main loser, with the reduction of its profits by 20%. Various studies have also

considered the impact on developing countries. Crivelli et al. (2015) suggest that, developing countries are more affected by BEPS than developed ones. Their results, on based on a panel of 173 countries between 1980-2013, shows that whereas developing countries lose around 1,3% of their GDP to profit shifting, for developed ones it is "only" 1,0%. The difference may be found very relevant in the context of other studies. For instance, the work of UNCTAD (2015) underlines the greater significance of corporate taxes for developing countries, where the corporate income tax account for 4 percent of their GDP conversely to the developed, where the share is at 2 percent.

The same study has also introduced a new method for the estimation of revenue losses. In simplification, it uses an FDI data driven approach by plugging the rate of return on FDI as the dependent variable and the indicator measuring the volume of corporate investment stock routed by a country as the independent variable. Based on this method, Bolwijn et al. (2018) estimate the loss developing countries incur to be $90 billion. Extending the calculation to the global environment, they arrive at a figure of around $200 billion. The method is replicated by Janský and Palanský (2019), who also find that, despite the fact that reported FDI stock is higher for developed countries, developing countries are globally more exposed to tax haven investment. Furthermore, they extend the model to account for a more detailed definition of developing countries, and secondly, they account for effects which could affect the share of FDI and the rate of return on it. As a result, they estimate a gross revenue loss for governments to be $125 billion in 2016 for the sample of 79 countries. The subsequent re-estimation of the model is offered by Nepivoda (2019) who includes lowest available CIT to the model. In 2016 and for the sample of 46 countries, he finds the tax revenue to be $188 billion.

These measurements can be compared with methodologies that were adopted. Crivelli et al. (2016) employ the CIT as a dependent variable to estimate the spillovers from tax policies to other countries (as cited in Cobham and Janský 2018, pp. 206-207). They estimate the revenue loss to be $650 billion globally. Despite the fact that the study draws its strength from a large sample (173 countries over 33 years), the approach relies on the levied CIT and not on the taxes actually paid by MNEs. This research is followed by Cobham and Janský (2018), who aim to improve the robustness of data by taking into account for the revenue side of MNEs. Their results found a more conservative estimation of global revenue loss of $500 billion. Lastly, the method of Crivelli et al. (2016) has been used by Cobham and Gibson (2016) for the estimation of revenue loss of developing countries. Based on their conclusion, the avoided revenue is around 2-3% in OECD

countries, but 6-13% in developing countries. This proves the argument established by the FDI method above.

The last approach that we would like to present is the estimation based on the Orbis database. The database compiles information from financial companies and is subsequently adapted by Bureau Van Dijk to ensure comparability across countries (Johansson *et al.*, 2017). Also, studies that employ Orbis database support the aggressive behavior of MNEs in reduction of their tax payments. The evidence shows that between $100 - $240 billion has been lost due to the BEPS globally in the year 2014, which corresponds to 4% to 10% of global CIT revenue (OECD, 2015a). On the other hand, there is a vide perception that the Orbis database does not include many of the multinationals' profits (Tørsløv et al. 2018). For example, the consolidated profits of Apple Inc. for the year 2016 were 55.3 billion euros: however, when we add up its profits, we arrive at a sum of 2 billion euros only. In fact, only about 17% of multinationals' profits are visible in Orbis, which makes the estimation very challenging (Tørsløv et al. 2018).

This also be the reason why different statistics such as FATS or FDI have been used for the estimation of MNE's tax contributions, to which we turn next. In this chapter, we have established that there are many challenges that governments have to overcome to achieve more effective tax collection. Furthermore, we have shown a wide number of estimates for the government revenue losses, both globally and for particular groups of countries. These estimates are methodologically opposite to what we will be presenting now. Instead of the question that has been presented up to now: "What should be MNEs paying, but they do not", we will focus on the question "What do MNEs actually pay".

3 Tax contributions of MNEs, the review of methodologies and datasets

Unlike the literature that has been assessed up to this point, we aim to measure the total tax contribution of MNEs and not the amount of taxes that has been shifted to tax havens. The literature on this topic has been very scarce due to the limited availability of data. This is why we, in this chapter, approach the topic more broadly. We will first review the works and data available on tax collection of countries, focusing on the corporate income tax in particular. Secondly, we scrutinize the methodologies of the two recently published works, Bolwijn et al. (2018) and Tørsløv et al. (2018), that attempt to circumvent the poor data coverage by introducing the estimation methods for the calculation of MNEs contributions.

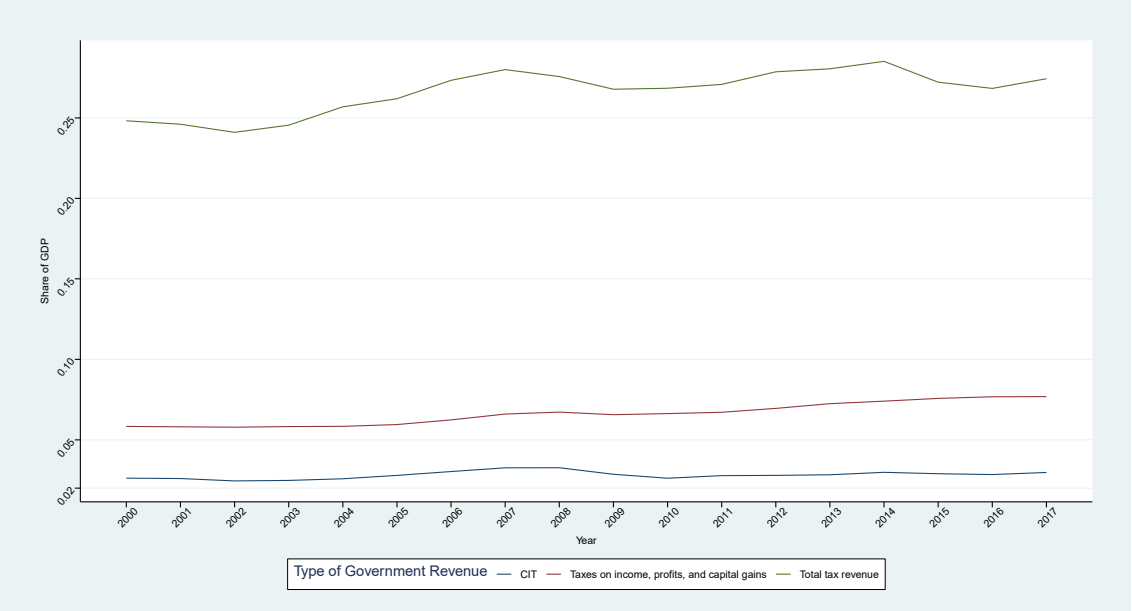
3.1 Data on taxation of corporates

The first possible option to examine the country specifics of taxation is to propose a composite measure of taxes paid which would aggregate the data based on individual tax components. This methods has been chosen by the PwC in the joint contribution with the World Bank in their proposal of the "Total Tax and Contribution Rate" in which they account for all taxes raised by governments as a percentage of commercial profits (PwC and World Bank Group, 2015). To this measure the authors then add an indicator on tax compliance and the number of filings a company has to make each year. Even though this approach can offer a good insight on the overall tax and business environment and we are able to look on the average profitability of MNEs in separate countries, it is not very useful when examining the tax components and their gross values.

To examine the data on gross values of tax components, we can turn to the International Centre for Tax and Development (ICTD) for the Government Revenue Dataset (GRD).[4] This dataset decomposes the income of countries as the share of GDP into many subsections such as: government revenue; direct taxes; taxes on income,

[4] The description of the dataset can be found in: McNabb, K. (2017) 'Toward closer cohesion of international tax statistics', 2017. doi: https://doi.org/10.35188/UNU-WIDER/2017/410-0.

Figure 3.1 Weight of different types of taxes in government revenues as share of GDP, world averages, 2000 - 2017



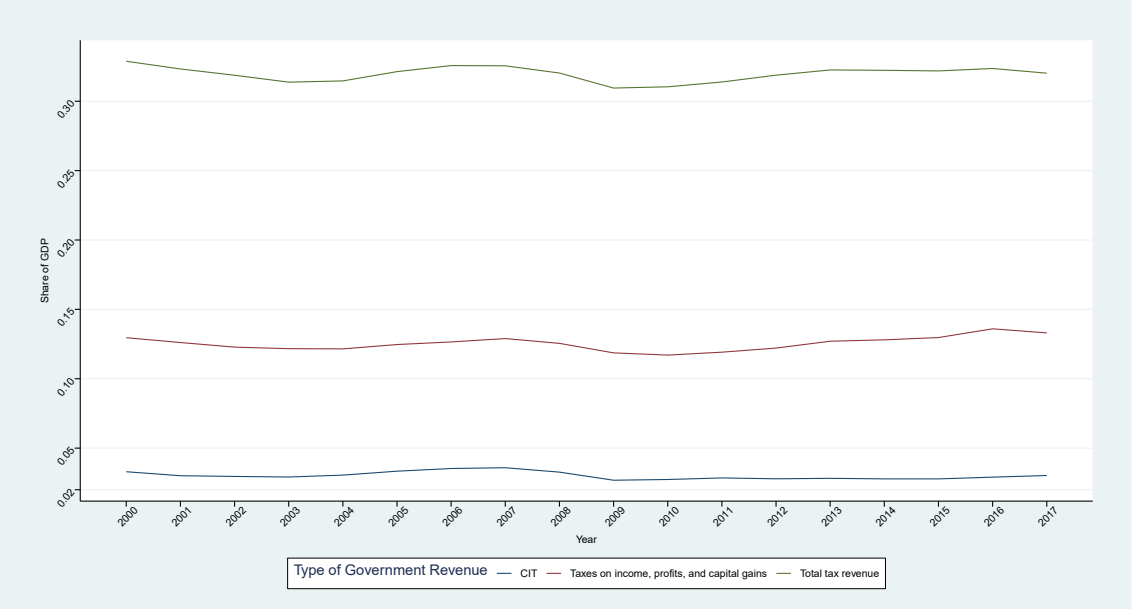
Source: Authors' compilation based on the ICTD GRD dataset.[5]

profits, and capital gains; and CIT. In *Figure 1*, the distribution of taxes is shown from top to bottom to arrive at the separate weight of CIT share of the GDP of countries. Another representation of the national account data can be found in the OECD Revenue Statistics (RS) (OECD, 2020c). Despite many similarities in the collection of data to the ICTD GRD dataset, there are some inconsistencies, mainly arising from the different accounting of social contribution (McNabb, 2017).

Furthermore, there is a benefit to using the ICTD GRD which has a wider country coverage. This is true despite the fact that there is a possible limitation of ICTD GRD in the form of timeliness, as there were data for 146 countries in 2000, but only 123 in 2017. It is still better than the OECD RS with 80 countries covered in 2000 and 98 countries in 2017. This can be due to the fact that ICTD GRD compiles the data from multiple sources including the OECD Revenue Statistics. Hence, as the ICTD GRD gives us the most satisfactory combination between the granularity and country coverage, we will utilize this dataset in the next stages when we will work with the CIT revenues.

[5] Note that for the easier comparison across figures displayed, the label of "*Total tax revenue*" in *Figure 3.1* corresponds to *"Total government revenue"* in the ICTD GDR dataset. Furthermore, all figures from the ICTD GRD are exclusive of the social contribution and grants as the accounting of those can differ across sources.

Figure 3.2 Weight of different types of taxes in government revenues as share of GDP, OECD averages, 2000 - 2017



Source: Authors' compilation based on the ICTD GRD dataset.[6]

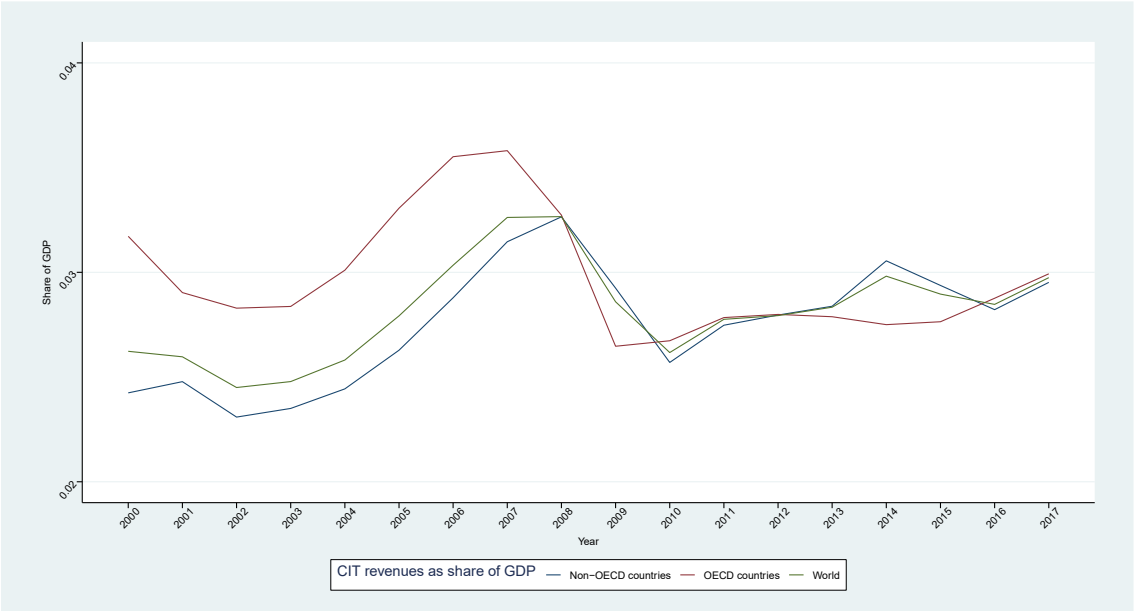
Still, there remains one issue to consider. In the literature review, we have outlined works which emphasize the differences in taxation practices and BEPS between developed and developing countries. On *Figure 3.2*, where we limit the sample only to OECD countries, it is shown that developed countries raise on average around 5% more in taxes on income, profits and capital gains which is then projected to the total tax revenue raised (*in comparison to Figure 3.1*).

The general pattern, which can be observed from the data on country revenues from CIT, is that the contribution of taxes to GDP has changed only slightly over the years. This is true for both developing countries and developed ones. Nevertheless, we see a different pattern in the amount of taxes raised. This means that there can be a meaningful difference between the ability of governments of developed countries – OECD sample – and other countries to raise taxes. Hence, for the next two figures, which will show solely the properties of CIT tax, we will also separate the illustrations to a non-OECD sample.

Firstly, on the *Figure 3.3*, we concentrate only on the shares of CIT revenue to the GDP of countries. It can be observed that despite an approximate 0,5% difference between the developed and developing countries at the year 2000, after 2009 the average

[6] To check, whether the trend is similar across different datasets, we provide the same figure based on OECD RB data in Appendix chapter as "Appendix Figure 1" and we find no significant differences.

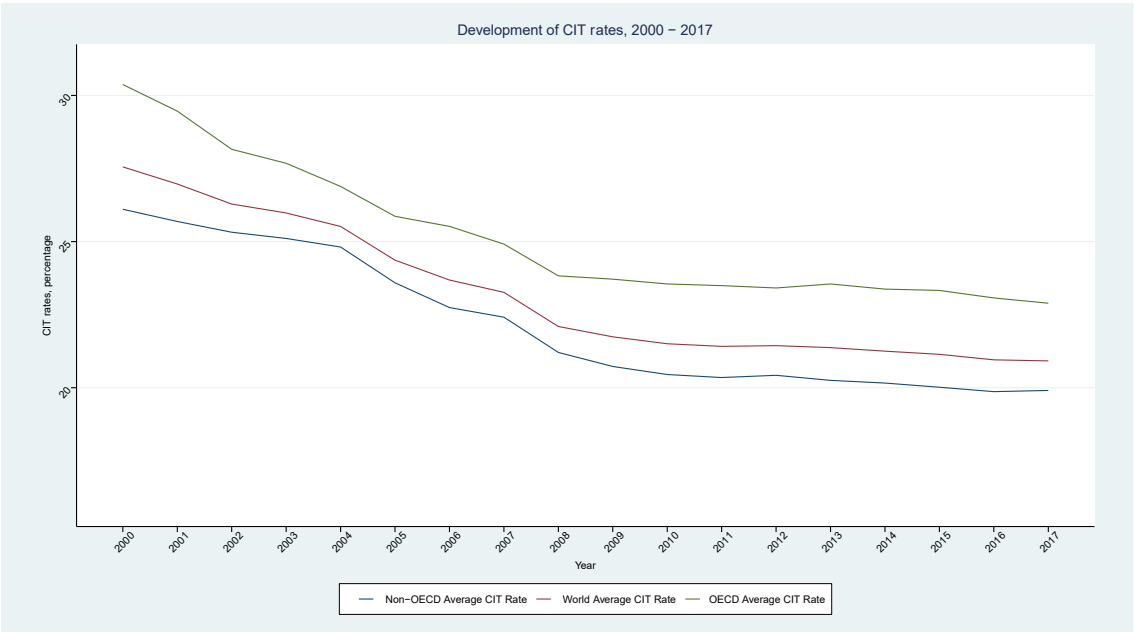
Figure 3.3 Development of CIT revenue as a share of GDP on average, 2000 - 2017



Source: Authors' compilation based on the ICTD GRD dataset

CIT revenues stabilized for both groups on the level close to 3% of GDP. This is in contrast to the statutory corporate income tax rates (CIT rates), where the 5% difference in taxation has remained across the observed year, even though the downward trend holds for both groups (*Figure 3.4)*.

Figure 3.4 Development of CIT rates, cross country averages, 2000 - 2017



Source: Authors' compilation based on the OECD (OECD, 2020a) Corporate Tax Statistics database

What is the main insight from the development of corporate taxation summarized above? Despite the fact that revenue from corporate taxation has played very similar roles across the countries, particularly after 2009, the CIT rates have continued to decrease. To illustrate this, some notable tax haven jurisdictions such as the British Virgin Islands, Guernsey, Jersey, and the Isle of Man have moved CIT rates to zero during this period (OECD, 2020a). Importantly, the OECD (2020) maintains that there are more significant reasons for this development than BEPS. However, it can be suggested that profit shifting can contribute to a "race to the bottom" of corporate taxation. Secondly, the CIT is not the only rate at the countries' disposal. Some tax jurisdictions operate preferential tax regimes to corporations, or there can be different tax rate for non-resident companies, or else there can specially designated economic zones (OECD, 2020).

This is important when we want to distinguish between the taxation of foreign and local firms, as in some countries the taxation and revenue raised can differ for local and foreign firms, as demonstrated by Tørsløv et al. (2018). This can be realized even by examining the standard statutory income tax rate (OECD, 2020c). The data sources which we have outlined up to this point have not worked with this crucial distinction. To address this issue, the OECD, under the "*Measuring and Monitoring BEPS"* initiative, proposed "*Anonymized and aggregated Country-by-Country Report (CbCR)*". The main idea behind the CbCR is to track the tax behavior of MNEs based on the obligatory filings for large firms. This enables tax administrators to acquire information about both local and foreign companies inside their jurisdiction on items such as revenue, profit before taxation or tax paid (OECD, 2015b). Furthermore, it provides details on key components of assets and capital such as intangibles or research and development financing which represent a common form of profit shifting, as has been examined in the literature. Lastly, to ensure the completeness of CbCR, it is necessary that the obligatory filings are reported at all the instances of an MNE group. In other words, it is required that the fillings be implemented at the level of ultimate parent entity and all its local entities in all tax jurisdictions concerned (OECD, 2015b).

Up to this date, the CbCR is one of the best sources of data available for comparison of the tax optimalization of MNEs across jurisdictions. Nevertheless, the data on CbCR data has so far been published only for the year 2016 and comes with many shortcomings arising mainly from the poor coverage of individual countries (OECD, 2020c). First, a MNE is included in the dataset only when its consolidated revenues are above EUR 750 million. Secondly, even though 137 tax jurisdictions have endorsed the

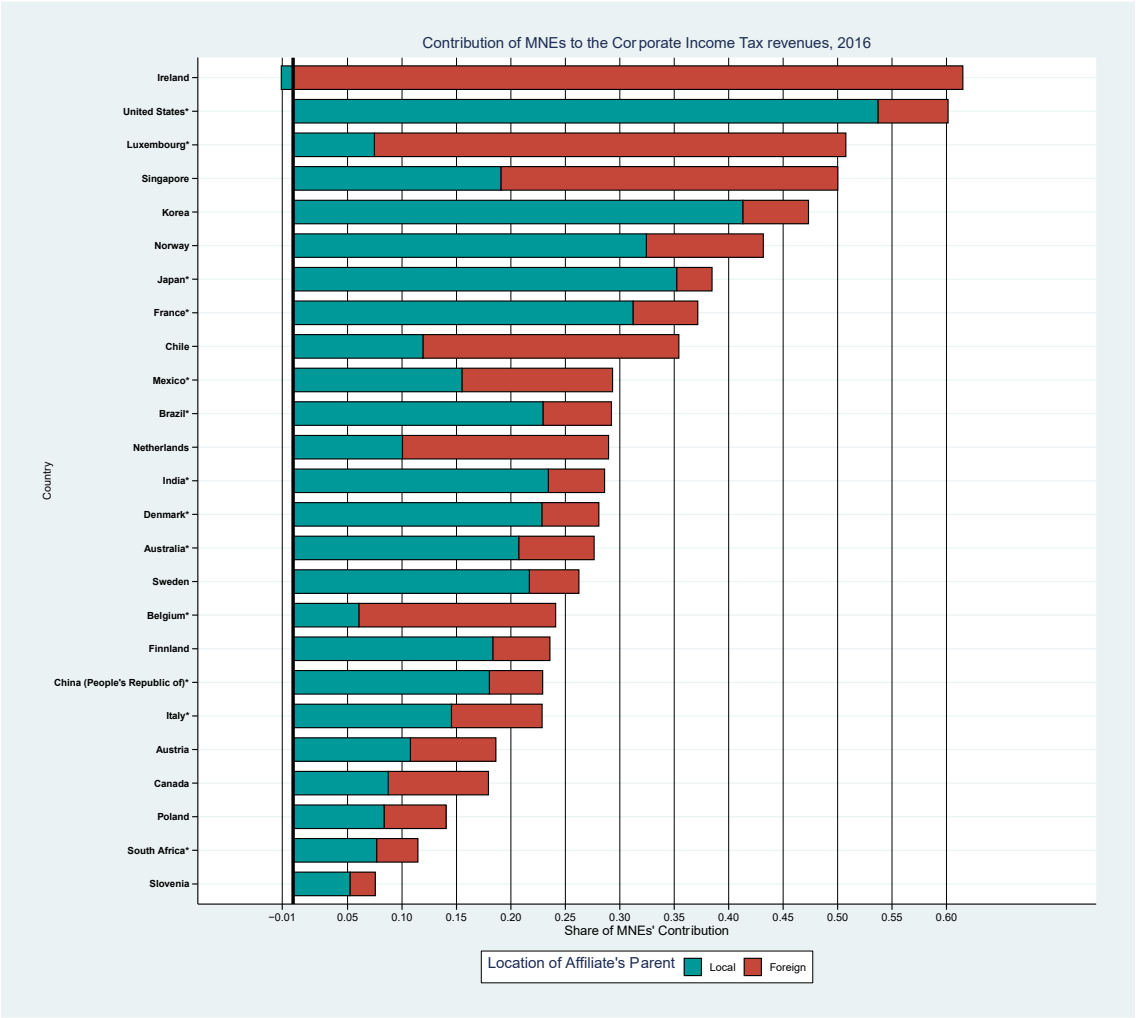
CbCR framework, only 58 of them reported for the year 2016 out of which only 12 provided data under voluntary filing. Together, there were only 35 jurisdictions which supplied sufficient information. Out of them, only 27 appears in the CbCR statistics for the year 2020 with data aggregated from more than 4000 MNEs (OECD 2020a). Despite the fact that some prominent tax havens such as Bermuda or OECD tax havens (Ireland, Netherlands, Luxembourg, Belgium) are included in the CbCR statistics, still, wide coverage is not yet possible. On *Figure 3.5,* we present the comparison of local and foreign affiliates of MNEs based on their tax contribution to total corporate tax revenues for selected countries.

From *Figure 3.5*, we see that large MNEs account for a significant part of CIT revenues. In a few countries, the CbCR statistics are able to cover around 50% of total CIT revenues. This is a reasonably high number given two facts. Firstly, we have data only for MNE groups with consolidated revenues above EUR 750 million. Secondly, only a small portion of reporting countries included the foreign affiliate headquartered in other jurisdictions than the location of the parent. The estimation for foreign affiliates' share should thus be regarded as a lower bound. Nonetheless, a clear pattern is still observable from the graph. All countries that are perceived to be tax havens,[7] get significantly higher portions of tax revenue from foreign affiliates. Most prominent are the results for Ireland and Luxembourg. In fact, the Irish MNEs with tax residence in Ireland had negative contribution of -1,09% on the total corporate tax revenues on Ireland, whereas foreign MNEs headquartered in Irish tax residence had contributed from 61,5% to CIT revenue in 2016. Similarly for Luxembourg, we get roughly 7,5% for local MNEs and 43,3% for foreign affiliates of MNEs headquartered in Luxembourg.

The results from CbCR statistics are therefore confirming the hypothesis presented in literature that tax haven countries rely on and are able to raise substantially high tax revenue from profit shifting of MNEs. Still, the CbCR is so far able to account only for a small proportion of countries. Furthermore, some of those give up on data disaggregation for foreign entities headquartered in other jurisdiction which results in underestimation of fiscal contribution for foreign affiliates. In order to account for that,

[7] The following countries can be identified in *Figure 3.5* as tax havens: Ireland, Luxembourg, Singapore, Netherlands, Belgium. We form this set on the works of Hines and Rice (1994) and Tørsløv, et al. (2018).

Figure 3.5 Contribution of MNEs to corporate tax revenues based on location of affiliate, 2016



Source: Authors' compilation based on the OECD (2020a) Corporate Tax Statistics database, (indicator: 2016 Anonymised and Aggregated CbCR statistics) [8]

[8] Shares are calculated by taking the *"Income Tax Accrued"* and divided by total CIT revenues from ICTD GRD dataset. For foreign affiliates we take numbers reported by ultimate parent entities located in all other tax jurisdictions. As we have no CIT revenue data for Indonesia and Bermuda, we are forced to omit them from the figure.

"*"next to a country then signifies that the given country has reported the FA of its ultimate parent entities for more than 30 countries (arbitrary chosen to distinguish between countries that reports only for a few countries or only for continents as tax jurisdictions).

The ICTD GRD dataset has been chosen for consistency and wider country coverage. Nevertheless, as the data on CIT revenues is represented as shares of GDP, we multiply the values by GDP from the World Bank (2020). Note that ICTD GRD's last reporting CIT revenue for Chile was in 2009. As the CIT revenues are represented as shares and multiplied by GDP, we use that value and multiply it by GDP's value for 2016. We assume that this approximation should not cause any significant deviation as the CIT revenues proportionally to GDP has been very stable since 2009 as we have shown on *Figure 3.3*.

it is necessary to come up with estimation method which would be able to size up the tax revenues for a much larger sample of countries, and also would not be dependent on the robust reporting of individual countries. Introduction of such methods has been the subject of the two recent papers: "Establishing the baseline: estimating the fiscal contribution of multinational enterprises" by Bolwijn et al. and "The Missing Profits of Nations" by Tørsløv et al.[9] The comparison of these two works will be the subject of this section, in which we will introduce their methodologies and point out to the differences. This will give ground for the subsequent reestimation of their results.

3.2 The estimation of foreign affiliates' tax contribution: the works of Tørsløv et al. (2018) and Bolwijn et al. (2018)

The first and most prominent distinction is the scope of the work. As we have pointed out, the results and tax optimalization of MNEs can be different across developing and developed nations. The focus of Bolwijn et al. is aimed at developing nations, concretely the regions of Africa, Asia, Latin America and the Caribbean. Instead, the research of Tørsløv et al. encompasses primarily the OECD countries with the inclusion of tax havens and a few major developing economies. Furthermore, the research of Tørsløv et al. presents country-specific results, whereas Bolwijn et al. present only the aggregated sum across all developing nations. Their results are therefore more precise and valuable to our research as they are country specific.

The second distinction lies in the components of government revenues that are taken into account. The starting point for Tørsløv et al. is the value added of governments which is then subdivided into more granular components to arrive at the tax contribution of foreign firms. On the other hand, the approach of Bolwijn's et al. looks at the government revenue data which is subsequently decomposed into separate components. In doing so, Bolwijn's et al. consider not only the taxes paid by foreign affiliates, but also social contributions and other revenues (e.g. property income) that are part of government revenue. This is left largely unanswered by Tørsløv et al. Taking these contributions into account draws a more comprehensive picture of the role of foreign affiliates for the home economies. Just to take an example, CIT paid by affiliates in 2015 was constituting only around one third of the total affiliate contributions (Bolwijn et al. 2018). The last and

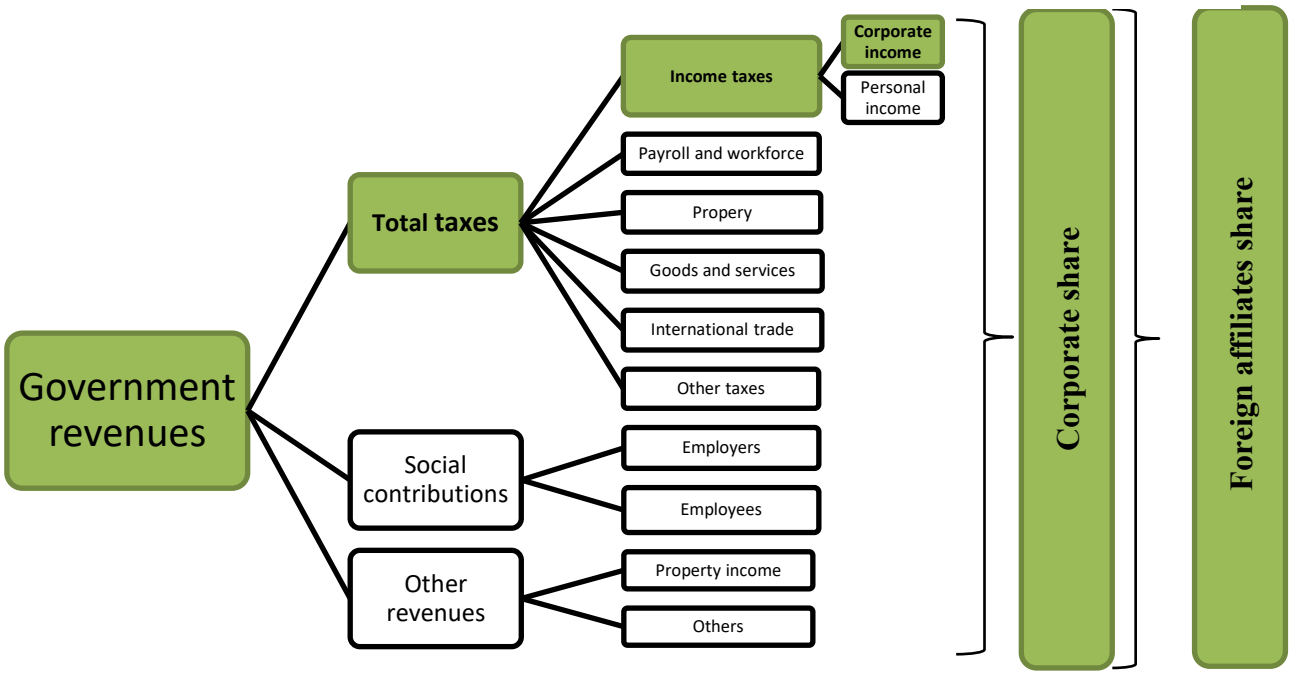
[9] From now on, we will make reference to these two works solely based on the name of the authors.

important is the method for calculation. Bolwijn's et al. is presenting two methods: "Contribution method" and "FDI-income method". Tørsløv et al. research shares many characteristics with the "contribution method". Thus, we will also refer to it as such in the comparison of the methods which is the focus of the next sections.

3.2.1 Contribution method, description

Bolwijn et al. presents this method as a decomposition of government revenue into separate components. Those are taxes, social contributions and other revenues. Furthermore, the taxes component is further subdivided into income taxes, taxes on payroll and workforce, property, goods and services, and international trade. In order to arrive at the corporate income share, which is the focal point for our analysis, the income taxes have to be split into the contribution of individuals and corporations. Subsequently, the proper corporate share is attributed to each of the components. This corresponds to the value that is allocated only by corporates and not, for example, by individuals. Lastly, the share generated by affiliates is estimated. In other words, how much of the revenue is borne by foreign affiliates of MNEs and not by local firms. The whole contribution method presented by Bolwijn et al. is shown in the *Table 3.1*. The most important component for our analysis, the CIT paid by affiliates, is then depicted in green.

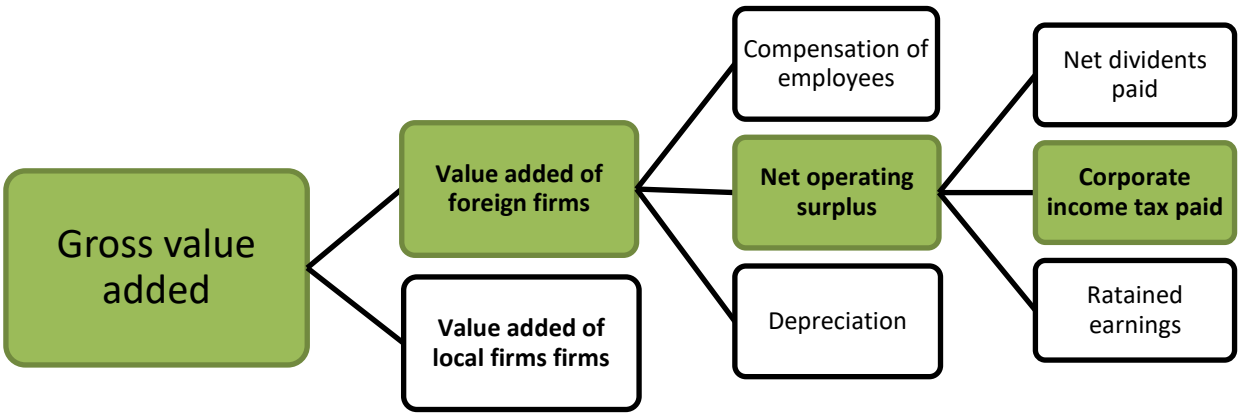
Table 3.1 Contribution method by Bolwijn et al.



Source: Author's compilation based on the methodology of Bolwijn et al.

As we have indicated above, Tørsløv et al. choose a different starting point of analysis as they look at the national accounts data and the corporate value added, net of indirect taxes. This is subdivided into compensation of employees, net operating surplus and depreciation. Net operating surplus free of capital depreciation and net interest payment is then denoted as corporate profits and separated into the sum of net dividends paid, corporate income tax paid, and retained earnings. With the estimates on CIT paid the process is complete. However, as we aim to estimate the CIT of foreign affiliates, the value added has to be split on the value added of local firms and foreign firms. The whole process is then shown in *Table 3.2.*

Table 3.2 Contribution method by Tørsløv et al.



Source: Author's compilation based on the methodology of Tørsløv et al.

As we are focusing only on the CIT tax paid, let us now compare how both methods arrive at the final estimate. Starting with Bolwijn et al., the corporate share is set here at 100%, because the component is fully paid by corporations. However, the foreign affiliates share is under heavier contention. Bolwijn et al. estimate it to be at 25%, and the number is based on the following discussion. They assume that the FA's share of labor component (social contribution, taxes on payroll and workforce components) has to be 10%, based on the weighted average of employment for individual countries. Because the corporate income is unknown, he turns to value added. Same as Tørsløv et al., they split

value added into a labour component (compensation of employees in *Table 3.2)* and a corporate income component (net operating surplus in *Table 3.2*). Here, Bolwijn et al. argue that, for developing countries, the labour component is approximately at 1/3 and corporate income component is at 2/3 of value added. Thus, considering the labour component is equal to 10%, the corporate income component has to be at 25% after scaling it up. This share is then applied to the whole sample of developing countries. We find this value to be highly inconsistent as the share of labor and capital income component in the value added differs significantly across countries. This is visible from cross country data of Tørsløv et al. who find the average of OECD countries at the directly opposite values, while the method of Bolwijn et al. is consistent only with a few countries such as Mexico or Luxembourg. The argument can be that Bolwijn et al. use the value as a proxy for all developing countries, and thus leave the developed countries with a high labor component out of the equation. Nevertheless, the labor share of value added for developing countries can still be underestimated by Bolwijn et al. due to the ill treatment of some of its components such as self-employment income (Guerriero, 2012).

The method of Tørsløv et al. seems to be much more fitting for the cross-country comparison. Not just because of the appropriate handling of value added, but also because of the level of granularity when depreciation, net dividends paid and retained earnings are accounted for. However, it bears one important limitation. Tørsløv et al. recognize that the subdivision of net operating surplus into net dividends, retained earnings, and corporate income tax is sometimes not declared by foreign firms, particularly for non-OECD countries. Therefore, many of the values have to be interpolated based on the data observable from other countries.

In this, the previously mentioned CbCR statistics compiled by OECD can offer a great advantage. The CbCR is very similar to the contribution method, as it disseminates the activity of multinationals into various components. Most importantly, these components are very similar to those which Tørsløv et al. identify as crucial. That is the information on employment, revenues, and earnings are recognized by the CbCR statistics and can serve as proxies in the contribution method.

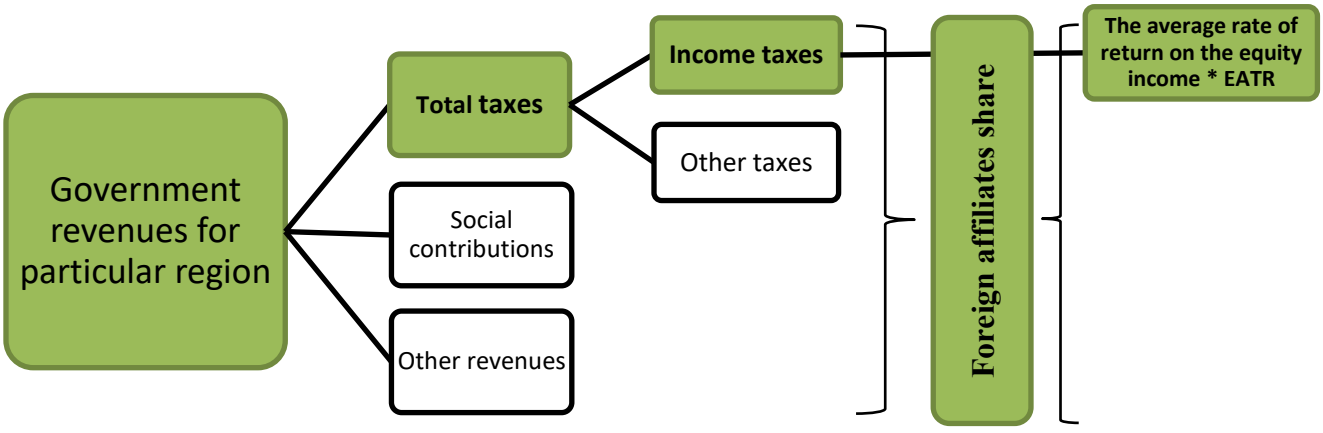
For some countries where disaggregation on components is not feasible, Tørsløv et al. compute the CIT revenue by exploiting the Balance of Payments (BoP) data together with the EATRs. This method is also presented by Bolwijn et al. as FDI income method and it will be examined in the next section.

3.2.2 FDI income method, description

The FDI income method shares many characteristics with the contribution method developed by Bolwijn et al. It differs only in the most important part for us, which is the computation of CIT. Here, the effective tax rate is leveraged on the pre-tax FDI income to arrive at the average rate of return of the equity income. This approach therefore replaces the most disputed estimation of the contribution method, which is the 25% FA's share for CIT. Furthermore, this method builds on data with improved country coverage and thus, Bolwijn et al. make the estimation with respect to the regions of Africa, Asia, Latin America and the Caribbean, which are subsequently summed to come to the final value for the whole developing world. A potential problem arises with the determination of ETRs. Because of the data constraints, Bolwijn et al. set AETRs of foreign firms equal to local firms. However, as Bolwijn et al. acknowledge, AETRs of foreign firms can be smaller as countries may look for ways to attract FDI. We advise to solve for this by the introduction of effective rates of American affiliates from BEA, as proposed by Tørsløv et al., although the data for some countries is still missing.

We provide the illustration of this method for any of the regions in *Table 3.3,* when we show only how to arrive at CIT paid. If the aim were to arrive at the whole contribution of FAs for government revenues it would be necessary to take the value of CIT and its weight of corporate contribution and apply it to other components, i.e. social contributions.

Table 3.3 FDI income method by Bolwijn et al.



Source: Author's compilation based on the methodology of Bolwijn et al.

3.3 Implications for the reestimation of the CIT revenues resulting from the methods described above

The proposition that we have outlined above will serve us now as a basis for the replication of the estimates. Those propositions give us a number of implications that should be considered in order to encompass the widest sample of countries possible and yet, the results should come with the ease of estimation. This can be a problem for the contribution method, which in the presentation of Bolwijn et al. derives many cross regional proxies. Furthermore, the contribution method as developed by Tørsløv et al. makes the process of searching for country-specific national account data very demanding, particularly for tax-havens where the data is usually not retrievable from international databases. In fact, the dataset which is created by Tørsløv et al. (n.d.) to support their research is also presenting the FDI-income method for the years after the publication of the initial article.[10] The FDI-income by Tørsløv et al. (n.d.) is actually yielding different results than the initial formula used by Bolwijn et al. and thus comparison of both works is still fruitful. This means that we left out the estimation for the contribution method in our thesis. However, the usefulness of contribution method can change in near future with the CbCR statistics as many features of the contribution methods such as the retained earnings or information on employees are part of CbCR (OECD, 2015a).

The next consideration we need to take into account are the properties of the sample. We use the sample derived by Tørsløv et al. with minor adjustments. The sample itself includes first, the OECD countries with very good data coverage, second, the most prominent tax haven countries as proposed by Hines and Rice (1994) which are often covered in works on profit shifting, and third, it includes the pool of developing countries as well.[11] The last consideration is the year we choose for the estimation. Despite the fact that both Bolwijn et al. and Tørsløv et al. use the year 2015 for their estimation and CbCR

[10] The original research of Tørsløv et al. (2018) covers only the year 2015. For this year the authors use the contribution method as discussed by us in section 3.2.1 "Contribution method". Nevertheless, the authors of the article commit themselves to republish the results annually on (Tørsløv et al., n.d.). Up to this time, the results were republished for the years 2016 and 2017. For both years the CIT contribution of foreign affiliates is estimated on similar basics as the FDI-income method.

[11] The list of those countries can be seen for example in the "Appendix Table 1", where we include ETRs for our sample of countries. These countries are chosen because of their economic relevancy (BRICS countries). Indonesia is added because of its inclusion in the OECD CbCR statistics. Also, because of the timing of our thesis, we list Columbia as one of the developing nations despite its admission into OECD in 2020. Lastly, we list Costa Rica into developing countries as it was invited to join the OECD group.

statistics is available for the year 2016, we opt for the year 2017 which is the most recent year for which all the necessary data is available.

Having discussed the methodologies of the most significant works, we turn to the actual estimation of CIT tax contributions of MNEs based on the FDI income method as presented by both Bolwijn et al. and Tørsløv et al.

4 Estimation of CIT revenues of MNEs' foreign affiliates

In this chapter we will present the results from the FDI income method as presented by both Bolwijn et al. and Tørsløv et al. We will start with the estimation of the tax paid as described by Bolwijn et al. and follow up with the approach of Tørsløv et al. which is the extension of the former. We will firstly describe the formulas and subsequently discuss the properties of the used data.

4.1 Estimation of FDI income method as presented by Bolwijn et al.

At the *Table 3.3* we have outlined the FDI-income method, where the corporate share of foreign affiliates is associated with the average rate of return on the equity income. As the rate of return on equity income is equity income over the total FDI stock and we apply the rate of return to the total stock, we receive the equity income component only. Next, to derive the tax share of the FDI equity income, the authors suggest to multiply the income on equity by the average effective tax rate. This gives us the following formula:

$$CITrevenue\_Country_i = FDI\_equity\_income_i * AETR_i \qquad (1)$$

where $CITrevenue\_Country_i$ stands for the revenue raised by taxing multinationals, for a given country i. Derivation of $FDI\_equity\_income_{i,t}$ (FDI equity income for a given country and a given time) number is also very straightforward. The FDI is counted if an investor has at least a 10% share in the enterprise within which the investment is made (OECD *al.*, 2008, p. 17). In that, the definition corresponds to the identification of foreign affiliates established in *Chapter 2*. The income then expresses the productivity of the investment. And lastly, the equity component, which is similar to the profits of the enterprise and can be further redistributed on dividends or reinvestments of earnings (ibid, p. 25). It can be more helpful to mark what the equity component does not encompass, which are the debt instruments. There can be a discussion as to whether to encompass the whole FDI income, or just the income on equity as the income on debts in the form of interest payments can play a significant role in profit shifting as we have reviewed in literature part of the thesis.

However, at this point, we stick to the presentation of Bolwijn et al. and we apply the income on equity part. For the data part, we utilize the BoP data from IMF (2020), concretely the "*Current Account, Primary Income, Investment Income, Direct Investment, Income on Equity and Investment Fund Shares, Debit, US Dollars*" entry (see *Appendix Table 2*, column 1).[12] The numbers on debit are used in order to account for the investment generated from outside (OECD *et al.*, 2008, p. 57).[13] It is possible that negative values appear for income on FDI (case of Iceland and Saint Vincent and the Grenadines). The explanations for negative income are first, dividends paid could be greater than earning of a firm, resulting in negative reinvested earnings of a firm and second, there can be a loss of the company (OECD et al., 2008, p. 37). We take the assumption when there would be negative profits, the tax would not be applied and thus we automatically 0 tax contribution for the countries where this might be the case. Speaking about the tax rate, lastly, the values on equity income have to be multiplied by the effective tax rates to arrive at the corporate tax contribution of multinationals. We show how to derive the effective tax rates in the next section.

4.1.1 Effective tax rates

In the literature review, we have introduced the term as the amount companies pay on taxes in respect to their profits, and we have showed that companies are often able to achieve much lower rate from taxation than is the CIT. Such definition apply to the *"backward-looking"* approach, according to which the ETRs are calculated as a taxes paid divided by the profits of the company before taxation over a period of time (OECD, 2020, p. 16). However, a more traditional method is the so called *"forward-looking"* approach. It is founded on the idea that a firm will continue to invest as long as the

[12] This approach is able to secure data for the most relevant world economies except for China and the UK. It is possible to incorporate data on the UK from the OECD database, however, this is not possible for China. Thus, to observe data on China we utilize Chinese national statistics (The data can be found at: "The time-series data of Balance of Payments of China" (no date). State Administration of Foreign Exchange. Available at: https://www.safe.gov.cn/en/2019/0329/1496.html (Accessed: 20 December 2020)). For data on FDI income, we use the entry: "Current account, primary income, investment income, debit". Furthermore, as Tørsløv et al. (2018, Appendix p. 21) observe, it may be the case that foreign portfolio investment on Chinese companies is listed within the direct investment and thus, in order not to overestimate Chinese tax contribution, the numbers are divided by half.

[13] For the FDI definitions we largely refer to OECD et al.'s (2008) "*Benchmark definition of foreign direct investment*" published in collaboration with IMF. Despite the fact that OECD and IMF use different methodologies and labeling, the reference points to "*debit*" position in IMF datasets and "*inward*" positions in OECD datasets should correspond. See for example Organisation for Economic Co-operation and Development *et al.* (2008, p. 35).

marginal product of capital is smaller or equal to the cost of capital. The effect the tax has on the cost of capital is then calculated by the Effective Marginal Tax Rate (EMTR) (Devereux, 2007). To get to the Effective Average Tax Rate (EATR), it is necessary to move from the intensive margin to extensive and thus, take into account the decisions MNEs face when deciding about alternative locations for its production (Hanappi, 2018).[14] For example, when a firm considers two locations for investment, then the EATR would denote the amount of tax paid on average from any profits above zero.

Thus, the *"forward-looking"* approach incorporates the current tax incentives for investment such as the depreciation rules on intangibles, patents, or trademarks. However, it does not take into consideration the actual tax payment of firms, as with the *"backward looking approach"*. For the estimation of tax contribution, we will exploit data reached by both of these methods. This is because otherwise we would run into the problem of data scarcity for some countries. Firstly, we use the *"forward looking"* EATR from OECD (2020a),[15] where the figures for our sample can be seen in *Appendix Table 1 – column 2*. Secondly, we use the "*backward looking"* EATR from the information on the activities of US multinationals (*Appendix Table 1 – column 1)*.[16] Even though there are certain disadvantages linked to both methods, we do not prioritize any of them. Instead, the minimum figure resulting from these three methods is used for the final calculation of tax revenue paid.[17] We assume that when the foreign affiliates are able to achieve a certain level of taxation, they will choose the smallest one in order to optimize their costs.

However, it can happen that for some non-OECD tax havens, the figures for AETR are not available. If this is the case, we estimate EATR based on the Tørsløv et al.'s (2018) derivation of profit before taxation and we divide it by tax revenues from ICTD GRD dataset (*Appendix Table 1 – column 4).* This method is very relaxed in its assumptions, in particular we are unable to distinguish between the EATRs for local and

[14] One possible simplified way of calculation of forward-looking EATR as presented by Hanappi (2018) is: $EATR = \frac{R^* - (1-z)R}{p/(1+r)}$, where R* is pre-tax net present value of investment, R is the post-tax net present value of investment, z stands for the capital gain tax. This is divided by the income stream the investment generates, where p is the rate of return before tax and r is the real interest rate.

[15] Detailed description on the estimation of "forward looking" AETR as used by the OECD can be found in Hanappi (2018).

[16] The data can be accessed at: IRS (2019) 'IRS, Statistics of Income Division (Internal Revenue Service)'. Available at: https://www.irs.gov/statistics/soi-tax-stats-country-by-country-report (Accessed: 1 October 2020). Within the dataset, we divide the *"Income tax accrued"* by the *"Profit (loss) before income tax".*

[17] It is possible that some results of AETR will be negative, for example when, instead of corporate profit there would be a corporate loss. Also, the data from the OECD is suggesting AETR $= 0$ for some countries. Therefore, we apply the constrain that the resulting minimum AETR has to be a positive number.

foreign affiliates of MNEs.[18] This is why we give priority to the first two methods. Lastly, if even this estimation does not yield any number for a given country, we calculate the average from the final AETRs, arising from the three methods above, for all the countries in non-OECD tax havens sample. This average, free of outliers, is then set for all countries where no AETR figure. The final AETRs are presented in *Appendix Table 1 – column 5,* where "*" next to a country name signals that AETR has been derived as the average among all the non-OECD tax havens. As we have presented both components used for derivation of the CIT revenues, we will move toward the results which this method yields.

4.1.2 Results from the Bolwijn et al.'s FDI income method

We present the resulting estimates in *Appendix Table 2,* column 5. In *Appendix Table 3*, the estimates are then expressed as a percentage of CIT revenues (column 2)[19] and as a percentage of GDP (column 3)[20]. For the whole sample, we have estimated the tax contribution to be roughly $308 billion. This is approximately 50% higher than the value offered by Bolwijn et al., who arrive at a corporate contribution of $200 billion, presented by the FDI income method ($220 billion for the contribution method). When we take into consideration that our sample consists mainly of developed nations, whereas the research of Bolwijn et al. focuses on developing nations, there should be some difference between the final values.

When we turn towards results for individual countries, for which Bolwijn et al. 's work does not allow, we see a few inconsistencies that arise on the first site. Even though we get higher contribution for all the tax haven countries in OECD (as a portion of total CIT revenues or GDP) than the average, with Ireland and Netherlands having the highest

[18] Another problem of this method is that the Tørsløv et al.'s (2018) derivation of profit before taxation comes from the year 2015 and thus, we multiply it by the GDP growth to get the values for 2017. These values are then divided by the tax revenues from ICTD GRD dataset. As we have already debated, the ICTD GRD suffers from timeliness of the data and some values can be missing for recent years. To get as many observations as possible, we utilize the fact the tax revenues have been very stable since 2009 (i.e.: see the *Figure 3.3*) and if there is a value in the dataset post-2009 we use it. This approach is also enabled as the data are expressed by shares of GDP, so the derived values are then multiplied by the GDP figures for the year 2017. For the all GDP figures we use the data from the World Bank (2020) series.

[19] For the CIT revenues we use the data from ICTD GRD dataset. For more information on the values check "*Footnote 8* " (p. 18), where we debate the possible problems of the dataset. We applied the same approach as mentioned, i.e. if values for the year 2017 are missing, but values after most the most recent year after 2009 are present, we apply those. This approach applies also to *Appendix Table 3*, column 5.

[20] For GDP values we use data from the World Bank (2020) series. When the data are not available, we turn to UNSD (2020), and as the data are at national currencies we use the current exchange rates to get them in form of USD. For Jersey and Gibraltar, no values are available and thus we retrieve the numbers from their official statistics. This applies also to *Appendix Table 3*, column 6.

shares, we still receive large shares for some countries, where we would not expect them. In particular, for the Czech Republic, we estimate the share of corporate tax revenues of foreign affiliates to total CIT revenues to be above 50% (above 2% for GDP). We find this number very unlikely. Firstly, given the fact that there is a literature indicating a possible profit shifting from the Czech Republic (Janský and Kokeš, 2016). Secondly, the research on the FDI stocks in the Czech Republic has not identified any abnormalities (Szabo, 2018). Similarly, we observe quite high numbers for Baltic countries as the shares of the total CIT revenues, however: when, compared to the shares of GDP, the results are slightly bellow average. This can indicate some irregularities within ICTD GRD dataset or within our treatment of it. Thus, referring to the share of GDP instead may be more appropriate.

Moving from the OECD countries to the tax havens, we can detect a formidably overstated value for Malta. This variation can stem from our use of AETR, which is found a at much lower level (Janský, 2019).[21] The result for Malta is also inflating the average for GDP share. If Malta is omitted, the tax contribution as share of GDP for non-OECD tax havens would decline from 3.1% to 1.3%. Nevertheless, the 1.3% share is still well above the average for the remaining pool of countries. To summarize, two notable points arises. Firstly, some values can be misspecified due to the inaccurate derivation of AETR and secondly, the presentation of results as a share of GDP may produce more intuitive results. On the other hand, for a few tax havens we get results higher than what is the total CIT revenue raised. This should not be the case even if we assume some inconsistencies within the ICTD GRD dataset. We now turn our attention to the Tørsløv et al.'s method, which will enhance the estimation for tax on unrecorded profits.

4.2 Estimation of FDI method as presented by Tørsløv et al.

When we account for the tax share on unrecorded profits, the equation (1) from the previous section will be enhanced to following form:

$$CITrevenue\_Country_i = FDI\_equity\_income_i * AETR_i + tax\_unrecord\_\pi_i \quad (2)$$

[21] Also, if we would check the AETR for Malta based on Tørsløv et al.'s (2018) derivation of profit before taxation, we would get much smaller value.

where the $tax\_unrecord\_\pi_i$ corresponds to the tax raised on unrecorded profits for a given country i. But foremost, we outline how we treat the other components in equation (2). The selection of AETR stays the same as in the previous selection as we opt for consistency across this component. Next, regarding the FDI_equity_income part, we follow the methodology of Tørsløv et al. and employ slightly different data when compared to the previous section. Firstly, for OECD countries, we utilize the OECD (2020b) FDI statistics database. There are two possible indicators of *"FDI income – Income on Equity"* within the database that can be selected. Firstly, it is within the *"FDI main aggregates"* and secondly within the *"FDI financial flows, income and positions by partner country and by industry"*. We apply the latter indicator, which should more carefully account for the investment that originated abroad, and only when the data is missing do we apply the former indicator (obtained values can be seen in *Appendix Table 2,* column 3).[22]

Despite the continuous effort from both the IMF and OECD, there are some discrepancies between the data from both sources, but we are unable to recognize any significant pattern. A possible difference can appear for large economies such as the US, France or Germany, where the OECD figure on equity income is considerably lower. On the other hand, the values obtained for tax-havens within OECD deviate by 1% at maximum with the exclusion of Belgium. What is the explanation for the discrepancies? For particular countries the methodologies and data coverage can be different or the time of reporting and revision of data may vary within the datasets.[23] Also, crucially for our estimation, the OECD statistics check for FDI which has been channelled through Special Purpose Entities (SPEs) and excludes it from final figures which should make the results more precise (Janský and Palanský, 2019).

As the OECD FDI statistics stockpiles data only for the member countries (with the exception of Brazil), we have to turn to other source. Conversely to Bolwijn et al., "*Current Account, Primary Income, Investment Income, Direct Investment, Debit, US*

[22] The description of the differences can be found in the following explanatory note: OECD (no date). *OECD database on FDI statistics according to BMD4 Structure and content*. Available at: http://www.oecd.org/daf/inv/OECD-BMD4-FDI-statistics-database-content-and-structure.pdf. The indicators within *"FDI main aggregates"* can be computed based on *"asset/liability presentation"* which does not take into account the source of FDI generation, in other words, the parent country. In most cases, this creates differences only in few percentages, however, for some tax havens as Luxembourg or Netherlands, the discrepancies can be tremendous. Despite this, we opt for consistency and the approach selected above, in which the later results may differ to Tørsløv et al.

[23] For wider discussion of why there exist the discrepancies between both datasets see for example: Patterson and International Monetary Fund (2004) "*Foreign direct investment: trends, data availability, concepts, and recording practices"*.

Dollars" entry from IMF (2020) is used.[24] As we have debated, using the complete investment income and not just its equity component can incorporate some additional channels of profit shifting. This can be essential when accounting for the tax on unrecorded profits to which we turn next.

4.2.1 Estimating the tax on unrecorded profits

Up until now we have operated with the data on inward position of FDI income. When we would also employ the data on outward FDI income and ass them up across the figures should correspond, which is not the case. This suggest there can be some unrecorded income on investment – profits. This can be especially important when we want to account for tax contributions of MNEs in tax havens, which often do not report the FDI figures. We measure the gap on investment income in following way:

$$world\_gap = \sum_{i=1}^{w} FDI\_outward\_income_i + \sum_{i=1}^{h} FDI\_outward\_income\_gap_i - \sum_{i=1}^{w} FDI\_inward\_income_i - \sum_{i=1}^{h} FDI\_inward\_income\_gap_i$$

where for $\sum_{i=1}^{w}$ we are summing across all countries in world (with the inclusion of countries outside our sample) and for $\sum_{i=1}^{h}$ we are summing only across tax haven countries (outside of OECD). The $FDI\_outward\_income$ corresponds to outward investment income from IMF (2020) "*Current Account, Primary Income, Investment Income, Direct Investment, Credit, US Dollars*" entry (*Appendix Table 4, col. 5*). To receive $FDI\_outward\_income\_gap$, we check whether there is a gap between what the country reports and what the all the partner countries (host countries to the investment) report. To receive the numbers for host countries, we utilize the OECD (2020b) statistics, *"FDI statistics by partner country and by industry - BMD4*, *measurement principle inward*" and we sum across all OECD members which report received investment from a given country (*Appendix Table 4,* col. 6). If the numbers reported by partners are bigger than what the country reports, we count is a gap (*Appendix Table 4*, col. 7). Next, for FDI_inward_income we only flip the measurement principle. For a reporting country,

[24] Again, we are unable to observe data for China, thus we apply the approach described in "Footnote 12" (p. 28) of the thesis.

we will extract the corresponding data from the IMF, using debit values. Similarly, for the summation across OECD partner countries we will now look for "*measurement principle outward"*. The $FDI\_inward\_income\_gap$ is then observed if the inward income is greater than what is reported by partners. However, there is one important addition that Tørsløv et al. take into account. The outward profits can be also measured by CbCR data, particularly by the IRS (2019) database on the activities of US multinationals, "*Profit (loss) before income tax*" entry. If the profit of US multinationals is higher than what the number recorded by OECD partners, it is assumed to be unrecorded profits and is imputed to the gap (see *Appendix Table 4*, column 4).

That concludes the estimation of the "$world\_gap$" of investment income which need to be to align to the countries where the missing investment income originated. The missing income for country *i* is then:

$$missing\_inc_i = world\_gap * \frac{FDI\_inward\_income_i + FDI\_inward\_income\_gap_i}{\sum_{i=1}^{h} FDI\_inward\_income_i + \sum_{i=1}^{h} FDI\_inward\_income\_gap_i}$$

where $\sum_{i=1}^{h}$ corresponds only to summation across tax haven countries. This approach ensures that the country share of missing investment income will be appropriately distributed back based on the identified share of the country (results are presented in *Appendix Table 4*). We can check for this by the following equality

$$\sum_{i=1}^{h} missing\_inc_i = world\_gap$$

Further, the unrecorded profit has to be calculated. This is done as follows:

$$unrecorded\_\pi_i = FDI\_inward\_income\_gap_i - FDI\_outward\_income\_gap_i + missing\_inc_i$$

the unrecorded profits are here expressed as the unrecorded income coming to a country, minus the unrecorded income leaving a country, plus the missing income (see *Appendix Table 4,* column 9).

Lastly, the tax on unrecorded profits is estimated. First, the tax share is applied only to the positive values of profits. Next, we simply assume that the profits were taxed by the lowest rates the MNEs are able to achieve in the given country and thus apply the AETR. In this, we differ to Tørsløv et al.'s approach. Their proposition is to position the tax share on 1% of the total unrecorded profits. This stems from the results of Tørsløv et al.'s (2018) who estimate that if profit shifting is taken into account, the capital share

income would increase by 1 percent on average for OECD countries. Thus, it can be assumed that currently, the 1% capital income share lies in the hands of tax haven countries (Tørsløv et al., 2018 Appendix, p. 34). However, we check both methods and attempt to realign the results with the OECD (2020a) CbCR statistics, and the application of AETR produces much consistent results.

The final results on the taxes generated by tax havens from unrecorded profits are summarized in the *Appendix Table 4* (column 11).[25] We arrive at a figure slightly above $4 billions paid in tax, which is approximately a 0,4% share of GDP of all non-OECD tax haven countries. From looking at the results, a possible dependency on the CbCR of US multinationals might arise, as we see higher tax revenues for countries where the values from US CbCR were applied. We check for this occurrence by making use of the OECD (2020a) CbCR data. However, as was debated before, this data come only for the year 2016. On the other hand, the dataset consists of 17 countries that report at least for one foreign jurisdiction of its multinational with the inclusion with the United States, which should make this dataset preferable. To overcome the problem with different year of publication of CbCR and the year for which we present the results, we make very weak assumption. We treat unrecorded profits in such a way that they would yield very similar values for both years 2016 and 2017. Such an assumption can be easily refuted as we do not include any discussion on how the FDI income figures evolved in past years and yet, we assume that the data will be very close. From the database we retrieve the "*Profit (Loss) before Income Tax*" and assume the same approach as above, and when the values from OECD CbCR would be higher than from CbCR of US multinationals we take them instead. The summary of the whole derivation can be found in *Appendix Table 5*. We obtain a figure which is by $3,4 billions higher. Furthermore, the highest weights of tax contributions are distributed to different countries. As the application of OECD CbCR statistics rests on a very weak assumption, we will not discuss the results further. Nevertheless, the future research encompassing the unrecorded profits should take the CbCR data into account as the true the allocation of missing FDI income may be dependent on sources used.

[25] It is important to acknowledge that the method of Tørsløv et al. also estimates the 1% tax revenue share for European tax havens and checks for robustness by adding the capital stock component for tax havens where the FDI investment income might be underestimated. We omit this part from estimation as we aim to propose a method which would be uniform across a chosen set of countries.

Having reviewed the method for estimation of tax contribution on unrecorded profits with relevant data sources, let us now present the results arising from this method.

4.2.2 Results from the Tørsløv et al.'s FDI income method

In *Appendix Table 2* we present the results from FDI income method as introduced by Tørsløv et al. The column 6 summarizes the results without the estimation of tax on unrecorded profits, for which we then account in column 7. Considering the estimation without unrecorded profits we receive the value of $308,5 billion. The figure is only $44 million higher than the estimate derived from the Bolwijn et al. method. The final results thus appear very consistent. However, there are some attributes that should be discussed. Firstly, despite the final results being close to each other, using the IMF figures in Bolwijn et al. attributes larger tax shares to larger OECD economies. Nevertheless, as we are unable to obtain results for the UK, which are estimated at $15,5 billion, the final results are then offset in such a way that they appear very close to each other. Secondly, the tax revenues for our pool of developing countries are aligned to very similar values as the reporting values from both the IMF and OECD were also very close. Lastly, using the FDI investment income instead of income on equity inflates the tax revenues for non-OECD tax havens by $580 million (which $8 million is attributed to Cayman Islands for which income on equity is not retrievable). The tax contributions for tax havens should be made even more precise by introducing the tax share component on unrecorded profits.

We show the estimated tax contributions from unrecorded profits incorporated to the complete estimates of taxes revenue seized by governments in *Appendix Table 2,* column 7 (in *Appendix Table 3,* column 5 and 6 we show the results as shares of total CIT revenues and GDP respectively). To recognize the weight of taxes estimated from unrecorded profits and from income of FDI, we compare both shares to the total tax contribution paid by MNEs in tax havens. The outcome is depicted in *Appendix Figure 2* (when we include the tax from unrecorded profits in parentheses, if there are any). We observe that, for the majority of tax havens, the estimated share is either fully borne by FDI income or by the tax on unrecorded profits (which, in the case of missing FDI income numbers, should be taken as lower bounded). For a few countries, the estimated tax on unrecorded profits is above 1% of their GDP. This is Bermuda (6,67% of GDP), the Cayman Islands (5,89%), Barbados (3,77%), the British Virgin Islands (1,66%), the Seychelles (1,65%), and Mauritius (1,24%).

By incorporating the tax on unrecorded profits of $4,05 billion to the final results, we assess the total CIT paid by foreign affiliates to be $312,53 billion. If we compare this to the research of Tørsløv et al. (no date), who arrive to $271,38 billion for the year 2017, we find our figure to be significantly higher. This can stem from our method of setting the average effective tax rates. For many tax havens, notably Ireland and Malta, our derivation of AETR is higher (see the *Appendix Table 1*). When we look on country specific details, there are no wide differences to the Bolwijn et al. method in terms of GDP shares except for the countries with large unrecorded profits that have been mentioned above. That being said, we now move to the next part where we debate the results in wider context and set them within the literature on profit shifting.

4.3 Discussion over the results from both methods

The results that we have presented appear consistent across both methods. We have debated the implications arising from the applied components in the estimations. The method of Bolwijn et al. is applied such that the process of receiving the results is the same across all the countries, in terms of components used. The method of Tørsløv et al. then allows for greater variance and the results estimated for particular countries should therefore be more precise. Subsequently, we present the estimates as the shares of total CIT revenues and of the GDP (*Appendix Table 3)*, so that the countries' specifics could be displayed. The shares of total CIT revenues should be nonetheless taken very conservatively as for some countries we obtain a share above 100% despite the share of GDP is placed low. For example, for Bahrain we find that multinationals account for a 173% share of CIT which reflects a 0,2% GDP share, and a similar pattern although on a smaller scale can, be observed for more countries. This is not the only inconsistency that we experience.

Foremost, as discussed in previous chapter, for some countries, the income on FDI can be negative, which would result in negative tax contribution. We have set tax contribution equal to zero where this is a case (Iceland and Saint Vincent and the Grenadines), however, a possible wider interpretation of negative investment incomes in individual countries should be considered. Further proof that both of the developed methods are not robust to all countries can be shown on the case of Malta, where we receive a very upwardly biased outcome, attributed to effective tax rates. This indicates

that the proper selection and discussion over the effective tax rates should be made when the results are be used for further estimation. On the other hand, tax contribution for some non-OECD tax havens have been underestimated, despite the inclusion of unrecorded profits as for some prominent tax havens very small contributions of MNEs are calculated.

Conversely, the tax contribution for OECD countries is in line with the intuition. Within the OECD, we have obtained the largest CIT tax shares to GDP out of all other countries, with the exception of the Czech Republic. As in the case of non-tax havens, some tax contributions of MNEs appears very low: however, this can be due to many factors. Clausing (2007) suggests that, among the main factors, the size of the corporate sector or the internalization of the economy may explain why tax revenues can be smaller in some countries which can hold for our results as well. The only check that we have at our disposal which could indicate that our results are underestimated are the OECD CbCR statistics.

Comparing our results with those (see *Appendix Table 3*, column 7), we get higher estimations of tax paid for all countries with the exception of two tax havens: Bermuda and Singapore. This indicates that our estimated tax contribution may not be underestimated despite receiving small GDP shares for some countries. Again, it is important to stress that the CbCR statistics is available for the year 2016, and furthermore, that we include only countries which actively participate in CbCR. On the other hand, our estimation confirms what has been discussed in Chapter 3: it is likely that CbCR data for foreign affiliates should be evaluated as lower-bounded. There are two main reasons. First, many countries do not disseminate for their MNEs. Second, the tax contribution that we present is especially different in contrast to CbCR for small economies (Slovenia, Austria, Sweden), where the MNEs may not be required to complete the fillings due to small overall profits. On the other hand, the CbCR statistics is showing that, for the only two non-OECD tax havens that take active part in the reporting (Bermuda and Singapore), there is higher taxation of multinationals as compared to our results. Even more importantly, both Bermuda and Singapore do not report FDI income to the IMF and thus, we suggest that our estimation of unrecorded profits is underestimated.

Speaking about unrecorded profits, it is also critical how our results score against the research on profit shifting that has been examined in the literature part. In comparing the portion of profits has been taxed and the portion that has been shifted away we will only refer to the results of Tørsløv et al.'s method that should produce a more accurate

picture. For the year 2013, Cobham and Janský (2018) estimate the government tax revenue loss of $500 billion. Interestingly, among the countries that are losing from profits shifting are the Seychelles and Belize (both at 0,78% loss of GDP), for which we estimate one of the highest tax contributions, both above 3% of GDP. Conversely, Cyprus is identified as the main benefiter (gain of 1,19% GDP), for which the second highest tax contribution (exclusion of Malta) of 10,02% is estimated.[26] A similar indicator to ours – FDI income is then used by Janský and Palanský (2019) to estimate the corporate tax loss on shifted profits of $125 billion for 2015 in comparison to our estimate of $312,5 billion raised on taxation of MNEs. Considering the GDP shares, the research of Crivelli et al. (2015) has shown that developed countries lose around 1% of GDP due to profit shifting. Our research estimates the contribution of the MNEs to be at 0,77% of GDP on average for OECD countries. To put it differently, in terms of GDP, more is forfeited than what is incurred. The state of effective tax collection is even worse for developing countries for which Crivelli et al. (2015) measures the loss on corporate profits of 1.3% of GDP, whereas our average gain for developing countries sits at 0,82% GDP.

Importantly, the MNEs do not contribute to government revenues just through the corporate income tax, but also by paying taxes on payroll and workforce, on property, or by paying for the social security and other social benefits. The work of Bolwijn et al. (2018) which takes all of these fiscal contributions into consideration, estimates that the corporate income tax accounts only for roughly 30% of the total revenues paid by corporations in developing countries. This is one of many areas that shows the complexities of the research on the role of MNEs and which our work has not covered. We attempt to address some of these areas in the next section where we outline how the results can be used for further estimation.

[26] The biggest loss estimated by Cobham and Janský (2018) is actually Malta, for which we have clearly overestimated the tax contributions.

5 Broadening the picture

In this part, we will consider which factors could explain the differences between the amount of corporate tax revenue seized in individual countries and suggest how the results and methods of estimation could be used for future research. In the whole chapter, we will consider only the following sample. We will omit Malta (where we have received a very large share), secondly, we will not consider countries with zero tax contribution (negative FDI income), and lastly, to make use only of the most precise results, we only use country results with the FDI income component, as the results based solely on unrecorded profits could be underestimated as has been discussed before.

When it comes to the main tool at the government disposal for changing the size of corporate tax contributions, we have to think about statutory income tax rates. If we would not consider only the foreign affiliates of multinationals, but the whole corporate taxation, we usually assume a quadratic negative relationship between the corporate tax revenues and corporate income tax. At low levels, a higher tax rate should increase the revenues, however, too high corporate tax rates can disincentive investment and lead to tax avoidance practices (Clausing, 2007). In contrast, Tørsløv et al. (2018) argue for a more strict relationship applicable to the taxation of foreign affiliates. In their opinion, tax havens characterized by smaller statutory tax rates should be more dependent on tax revenues than other countries, pointing to a more linear negative relationship.

In the *Appendix Figure 3*, in the top row, we show the relationship between the tax contributions of MNE's affiliates and CIT rates for all countries.[27] In the second row, we then show the relationship between the tax contributions and GDP per capita, to account for different states of development in individual countries. This has been suggested as another driver of differences in tax revenues across states throughout our study.[28] It can be observed, that truly, a negative link between the taxation of foreign affiliates and CIT rates exists, with some indication of a positive quadratic relationship for tax rates. Therefore, it seems that the dependency between CIT rates and tax contribution of MNE's foreign affiliates is completely opposite to the dependency for

[27] We retrieve the CIT rates from the OECD (2020a) database. If the data are missing, we utilize the KPMG (2020) database. For Marshall Islands, we use a tax rate of 3% which is applied to the gross revenues of companies (Retrieved from: Republic of the Marshall Islands, Ministry of Finance. Retrieved December 20, 2020, from https://rmi-mof.com/division-of-customs-treasury-revenue-and-taxation/tax-forms-and-instruction/).

[28] Data on GDP per capita are retrieved from UNSD (2020b).

total corporate revenues as identified by Clausing (2007) or Devereux (2007). The relationship for the GDP per capita then appears as positive. To relate it back to the literature background, despite the work of UNCTAD (2015) which assumes higher corporate revenues proportionally to GDP for developing nations, our results side more with Crivelli et al. (2016) who assume that developing nations are more affected by profit shifting and thus loose more on taxes.

To show what is the exact change of CIT rate on the size of foreign affiliates' tax contribution, we run a simple OLS regression model. We follow the works of Clausing (2007) or Devereux (2007) and Kawano and Slemrod (2016), who propose the following specification for the relationship between the corporate tax revenues and corporate income tax rates:

$$R_i = \alpha + \beta\tau_i + \gamma\tau_i^2 + \Gamma \mathrm{X_i} + \epsilon_\mathrm{i}$$

where *i* stands for countries, R_i is in our case the ratio of MNE's tax contribution to GDP, τ_i is the statutory tax rate, $\mathrm{X_i}$ are the control variables and ϵ_i is the error term. These studies usually identify the control variables being the logarithm of GDP per capita (showing the development, but also it is used by Clausing (2007) as a proxy for the size of corporate sector), dummy measuring the internalization of a country,[29] dummy measuring the country size,[30] and variables explaining the structure of a tax system.[31]

In accordance with Clausing (2007), we include the dummies as interaction effects to see in what way they influence not just the dependent variable, but also the CIT rates. Thus, the final specification looks as follows:

$$R_i = \alpha + \beta\tau_i + \gamma\tau_i^2 + \Gamma_1 \ln(\text{GDP per capita})_\mathrm{i} + \Gamma_2\tau_i * international_i + \Gamma_3\tau_i^2 * international_i + \Gamma_4\tau_i * Large_i + \Gamma_5\tau_i^2 * Large_i + \epsilon_\mathrm{i}$$

[29] The studies that we mentioned used for internalization a ratio of total FDI stock to GDP, where the ratio of above-average is coded as 1. As we have used FDI income to measure the tax revenues there could be a possible dependency between the FDI stock and FDI income, we measure the internalization by the sum of exports and imports of goods and services (using the trade instead of FDI as a measure by internalization is for example considered by Bellak (1998)). We retrieve data on trade from WTO (2020) searching for "*Total Services*" and "*Total Merchandise*" entries. The internalization = 1 then signifies a country which sum of trade in goods and services divided by GDP is above average.

[30] We follow the method of Clausing (2007) and identify a country as Large = 1 if its population is above average. Data are retrieved from UNSD (2020c). This is different to the study of Devereux (2007) which looks at the share of the urban population instead.

[31] We omit these variables from the estimation. This is mainly for time reasons. The authors work only with OECD countries where these data are easily retrievable, however, getting the information about all tax jurisdictions would require a careful examination of government websites in the case of many tax haven countries.

The results of the regression are presented in *Appendix Table 6,* with robust standard errors in parentheses.[32] Firstly, let us note that the model suffers from a very low number of observations which is given by the scope of our analysis. Considering the model with the control variables, we would receive that the reduction of the CIT rate by 1% would increase the corporate tax to GDP share by 0.33. However, we see that the CIT rate itself explains only a very small portion of the data and is insignificant. The greater share of the variance in the data is explained by adding the dummy variables with interaction terms. Given the *Large* countries, we receive a negative effect on the dependent variable. The interaction term then suggests that for *larger* countries an increase in CIT rate can actually result in higher tax revenues. This will then offset due to the negative quadratic relationship. The *international* dummy suggests that more closed economies can gain less by increasing the CIT tax rates and open economies more. This result is very inconclusive. We would expect that open economies will be able to attract more paper profits from abroad, however, at very small CIT rates.

Nevertheless, we should take the explanation of all variables very conservatively, as none of the variables is significant. Also, the adjusted R^2 suggests that the model is not able to explain a large portion of the data Thus, the presented model experiences many weaknesses that should be considered. Clearly, there is a wide range of possibilities to develop a model which would go beyond our specification. The presented model should be therefore regarded as the illustration of how the methods for estimation of tax contributions of MNEs could be used in future research with more data observations. The specification of the model that has been used to explain the variation within the tax revenues can be simply extended to panel structure:

$$R_{it} = \alpha + \beta\tau_{it} + \gamma\tau_{it}^2 + \Gamma \mathrm{X_{it}} + \epsilon_{\mathrm{it}}$$

where the tax revenue paid by foreign affiliates of MNEs - R_{it} can be expressed as follows:

$$R_{it} = FDI\_equity\_income_{it} * AETR_{it} + tax\_unrecord\_\pi_{it}$$

Furthermore, the calculation of $tax\_unrecord\_\pi_{it}$ – tax on unrecorded profits can be in future made more robust due to the use of OECD CbCR statistics. So far, only data for

[32] The assumptions of OLS should not be violated with the exception of homoscedasticity. The result of the Breusch–Pagan test rejects the null hypothesis of homoskedasticity for the model without control variables. The result of Breusch–Pagan test for models with control variable is very close to rejection (p=0.06), thus we include robust standard errors for all specifications. Furthermore, it is possible that the model suffers from endogeneity (omitted variable bias) as we include only one variable for the explanation of a tax system.

2016 are published making it unavailable for the panel structure. The very same applies to AETRs, which are being published by the OECD from 2017 and can facilitate easier derivation of results. To summarize, the upcoming years should see improved data coverage, which could make the estimation of tax contributions by foreign affiliates easier and more robust and thus, creating a wider space for future research.

6 Conclusion

In this thesis, we have discussed the methods introduced by Bolwijn et al. (2018) and Tørsløv et al. (2018), which enable the estimation of tax contributions of MNEs' foreign affiliates. Using the data on FDI investment income and average effective tax rates, we have estimated the tax revenues paid by foreign affiliates to be $308,04 billion for the method of Bolwijn et al. (2018), accounting for the sample of 65 countries, in the year 2017. The replication of the method of Tørsløv et al. (2018) then estimates the foreign affiliates' tax payments of $312,54 billion, accounting for 76 countries in the same year. We employ the method of Bolwijn et al. (2018) to show the differences in results, while the data sources stay the same across all countries. The Tørsløv et al.'s (2018) method then allows for more adjustments across the sample. Thus, it should produce more country-specific results, and even more importantly, the method accounts for unrecorded profits. The tax on unrecorded profits for non-OECD tax havens is valued at $4,05 billion. However, this number is probably underestimated. By using the OECD CbCR data on profits, assuming the data reported for 2016 and 2017 would be similar, we calculate almost twice higher tax contribution from unrecorded profits.

We have checked for the consistency of results by their comparison with the tax contributions of foreign affiliates recorded by the OECD CbCR statistics for the year 2016, where possible. With the exception of non-OECD tax havens, we receive higher values of tax paid than what is recorded by CbCR statistics. As the CbCR should present values at their lower bound, we have verified, that the presented tax contributions should not be underestimated. This does not hold for the non-OECD tax havens, where the opposite may be true. On the other hand, we cannot check for a possible overestimation of tax contributions, which can arise, mainly, due to an improper selection of AETRs. Subsequently, we have expressed the results both, as a percentage share of GDP, and as a percentage share of the total corporate tax revenue, to enable the cross-country comparison. However, we advise interpreting the percentage share of total corporate tax revenues with cautions, as we observe some irregularities.

Lastly, we have suggested how the results can be applied for the further use. In that, we have proposed a very simplified model. The outcomes of the regression analysis are very inconclusive and suffer from probable underspecification and a low number of observations. Thus, the model should be regarded as mainly illustrative. Despite this fact, we see wide use of our study for future research. The single year results can be extended

to a panel structure. The researchers can refer to our work, to see what methods can be chosen for calculation of the tax contribution of foreign affiliates and which limitations should be considered. Also, a clear commitment of governments to allow for a detailed coverage of the activities of multinationals in the form of CbCR and FATS would improve the current state of research. This would not only benefit the researchers, but also the policy makers as more effective and revenue maximizing taxation of foreign affiliates could be presented.

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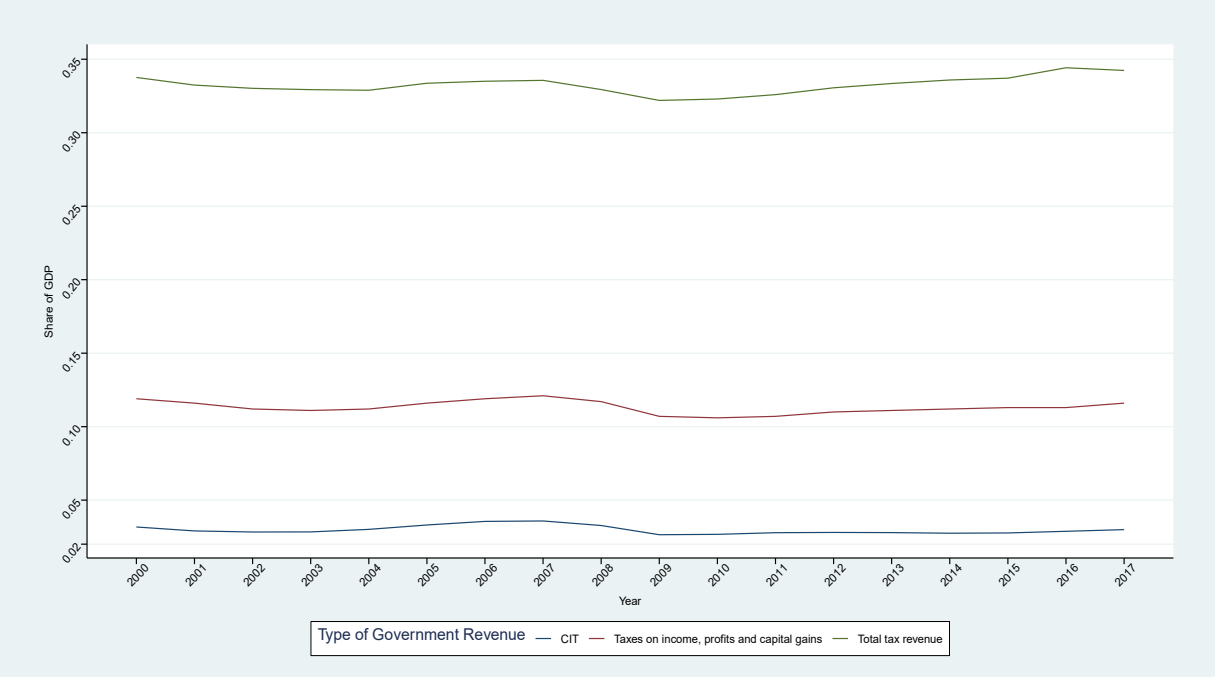
8 List of Appendices

Appendix Figure 1, Weight of different types of taxes in government revenues as share of GDP, OECD averages, 2000 - 2017



Source: Authors' compilation based on the OECD dataset

Appendix Table 1, Summary of Effective Tax Rates

Summary: Average Effective Tax Rates (1/2)					
	1	2	3	4	5
Country	CbCR based on US MNEs abroad	OECD: Effective Average Tax Rate	OECD: Effective Marginal Tax Rate	Estimated AETR on Tørsløv et al. data	AETR Applied
OECD averages	32,13%	22,43%	5,68%	20,80%	18,60%
Australia	19,07%	29,89%	20,16%	39,76%	19,07%
Austria	71,60%	23,83%	14,92%	21,30%	23,83%
Belgium	19,44%	26,14%	-42,80%	26,20%	19,44%
Canada	19,74%	25,25%	14,44%	46,99%	19,74%
Chile	18,36%	31,06%	24,97%	15,08%	18,36%
Czech Republic	20,63%	21,23%	24,80%	25,16%	20,63%
Denmark	44,32%	19,61%	3,30%	21,66%	19,61%
Estonia	7,67%	17,00%	0,00%	8,80%	7,67%
Finland	32,09%	19,09%	12,27%	27,15%	19,09%
France	65,96%	32,62%	17,28%	34,56%	32,62%
Germany	78,39%	27,47%	11,49%	13,75%	27,47%
Greece	30,86%	27,86%	17,98%	21,09%	27,86%
Hungary	3,06%	9,96%	3,05%	14,58%	3,06%
Iceland	82,45%	18,26%	6,89%	22,61%	18,26%
Ireland	15,76%	12,00%	8,57%	4,93%	12,00%
Israel	16,98%	22,93%	14,40%	17,08%	16,98%
Italy	50,45%	20,23%	-130,31%	20,44%	20,23%
Japan	21,15%	27,37%	8,16%	35,20%	21,15%
Korea	27,45%	22,51%	11,48%	19,41%	22,51%
Latvia	-5,38%	13,56%	4,61%	10,82%	13,56%
Lithuania	16,06%	13,39%	3,23%		13,39%
Luxembourg	2,85%	24,63%	8,04%	3,45%	2,85%
Mexico	31,30%	26,77%	1,53%	13,25%	26,77%
Netherlands	13,26%	22,55%	6,39%	14,80%	13,26%
New Zealand	19,96%	27,04%	18,28%	18,52%	19,96%
Norway	147,89%	23,30%	17,25%	29,94%	23,30%
Poland	18,78%	17,77%	10,06%	12,29%	17,77%
Portugal	26,11%	24,00%	-17,61%	27,54%	24,00%
Slovak Republic	20,92%	22,52%	20,03%	28,52%	20,92%
Slovenia	12,64%	18,14%	11,74%	25,70%	12,64%
Spain	27,41%	24,96%	18,50%	20,71%	24,96%
Sweden	63,92%	20,36%	9,49%	24,30%	20,36%
Switzerland	6,94%	19,57%	9,46%	20,42%	6,94%
Turkey	29,42%	18,23%	8,17%	8,79%	18,23%
United Kingdom	56,86%	18,94%	16,84%	17,96%	18,94%
United States	22,27%	37,50%	17,38%	15,32%	22,27%
Main developing countries averages	39,51%	28,02%	9,07%	20,13%	27,77%
Brazil	53,47%	30,06%	-2,76%	23,94%	30,06%
China	25,83%	15,16%	6,75%	17,26%	15,16%
Colombia	59,50%				59,50%
Costa Rica	10,50%	37,32%	28,17%	9,74%	10,50%
Indonesia	43,26%	22,35%	3,65%		22,35%
India	38,73%	45,35%	8,44%	19,98%	38,73%
Russia	23,31%	18,75%	9,46%	20,58%	18,75%
South Africa	61,43%	27,13%	9,79%	29,27%	27,13%

Cont'd - Summary: Average Effective Tax Rates (2/2)					
	1	2	3	4	5
Country	CbCR based on US MNEs abroad	OECD: Effective Average Tax Rate	OECD: Effective Marginal Tax Rate	Estimated AETR on Tørsløv et al. data	AETR Applied
Non-OECD tax havens averages	2,43%	10,51%	4,37%	5,73%	7,63%
Andorra		8,88%	2,20%		8,88%
Anguilla*					5,04%
Antigua and Barbuda				2,73%	2,73%
Aruba	26,36%			5,18%	26,36%
Bahamas, The*	-0,80%				5,04%
Bahrain	2,22%			0,31%	2,22%
Barbados	3,29%			2,61%	3,29%
Belize				1,77%	1,77%
Bermuda	1,81%				1,81%
Bonaire*					5,04%
British Virgin Islands	0,80%	0,00%	0,00%		0,80%
Cayman Islands	0,58%	0,00%	0,00%		0,58%
Curacao	2,71%	20,46%	10,31%		2,71%
Cyprus	-42,91%	10,39%	-2,18%	19,33%	10,39%
Jersey	0,28%	0,00%	0,00%		0,28%
Grenada				3,60%	3,60%
Guernsey*	-0,19%	0,00%	0,00%		5,04%
Gibraltar	0,34%				0,34%
Hong Kong	12,86%	15,16%	6,75%	14,65%	12,86%
Isle of man	0,02%	0,00%	0,00%		0,02%
Lebanon	25,62%				25,62%
Liechtenstein		10,12%	-4,08%		10,12%
Macau	0,32%	11,46%	7,79%	3,23%	0,32%
Malta	-26,12%	33,07%	15,85%	5,52%	33,07%
Marshall Islands*				0,00%	5,04%
Monaco	23,14%				23,14%
Sint Maarten*					5,04%
Mauritius	5,41%	13,98%	7,54%	4,20%	5,41%
Seychelles		28,40%	15,11%	10,72%	28,40%
Singapore	4,74%	16,27%	10,70%	11,31%	4,74%
St. Kitts and Nevis	5,87%			4,95%	5,87%
St. Lucia	1,81%			2,75%	1,81%
St. Vincent and the Grenadines*				4,50%	5,04%
Turks and Caicos*		0,00%	0,00%		5,04%
Panama	8,69%				8,69%
Puerto Rico	1,54%				1,54%
Averages all	22,52%	19,86%	5,73%	16,31%	14,58%

Source: Authors' compilation based on the OECD, IRS, and Tørsløv et al. data[33]

[33] Values from Column 3 ("*OECD: Effective Marginal Tax Rate*") are included only for the use of comparison and are not applied in any estimation within the paper. Values are taken from (OECD 2020a).

Appendix Table 2, Estimates of CIT tax contribution of multinationals

Estimates of tax contributions based on presented methods in billions of $USD (1/2)							
	1	2	3	4	5	6	7
Country	IMF, DI income on Equity and Investment Fund Shares, Debit	IMF Direct investment income, Debit,	OECD inward FDI, income on equity (if NA, col. 2 values are used)	AETR used	**Estimated tax based on Bolwijn et al.**	**Estimated tax based on Tørsløv et al. (without unrecorded profits)**	**Estimated tax based on Tørsløv et al. (with unrecorded profits)**
OECD	1003,520	1196,597	1009,340	0,190	**217,687**	**215,471**	**215,471**
Australia	33,566	37,888	33,745	0,191	**7,909**	**7,952**	**7,952**
Austria	11,774	13,693	15,375	0,238	**3,683**	**4,810**	**4,810**
Belgium	29,563	36,013	27,293	0,194	**7,134**	**6,586**	**6,586**
Canada	34,385	37,883	34,888	0,197	**8,457**	**8,581**	**8,581**
Chile	12,382	14,897	12,213	0,184	**2,785**	**2,747**	**2,747**
Czech Republic	18,879	19,527	18,602	0,206	**4,907**	**4,835**	**4,835**
Denmark	6,394	6,862	5,930	0,196	**1,560**	**1,447**	**1,447**
Estonia	1,716	1,781	1,683	0,077	**0,143**	**0,140**	**0,140**
Finland	7,970	8,691	7,949	0,191	**1,880**	**1,876**	**1,876**
France	33,597	40,057	30,175	0,326	**16,265**	**14,608**	**14,608**
Germany	47,095	63,875	31,279	0,275	**17,837**	**11,847**	**11,847**
Greece	1,367	1,470	1,349	0,279	**0,528**	**0,521**	**0,521**
Hungary	16,321	17,489	10,342	0,031	**0,515**	**0,326**	**0,326**
Iceland	-0,105	0,184	-0,104	0,183	**0**	**0**	**0**
Ireland	75,559	82,097	75,102	0,120	**10,304**	**10,241**	**10,241**
Israel	5,337	5,585	5,838	0,170	**1,092**	**1,194**	**1,194**
Italy	18,651	22,781	18,604	0,202	**4,730**	**4,718**	**4,718**
Japan	32,597	33,315	33,315	0,212	**8,744**	**8,936**	**8,936**
Korea	12,173	12,515	3,526	0,225	**3,536**	**1,024**	**1,024**
Latvia	1,334	1,400	1,343	0,136	**0,209**	**0,211**	**0,211**
Lithuania	1,899	1,966	1,933	0,134	**0,294**	**0,299**	**0,299**
Luxembourg	53,541	83,244	52,997	0,029	**1,571**	**1,555**	**1,555**
Mexico	18,887	19,039	18,473	0,268	**6,904**	**6,753**	**6,753**
Netherlands	170,847	201,093	170,445	0,133	**26,117**	**26,056**	**26,056**
New Zealand	6,693	7,375	6,574	0,200	**1,669**	**1,639**	**1,639**
Norway	11,034	14,993	8,977	0,233	**3,352**	**2,727**	**2,727**
Poland	19,066	22,007	19,028	0,178	**4,120**	**4,112**	**4,112**
Portugal	5,681	6,938	5,222	0,240	**1,794**	**1,649**	**1,649**
Slovak Republic	4,141	4,479	4,132	0,209	**1,096**	**1,093**	**1,093**
Slovenia	1,188	1,270	1,186	0,126	**0,172**	**0,172**	**0,172**
Spain	26,230	32,513	24,667	0,250	**8,725**	**8,205**	**8,205**
Sweden	21,264	22,551	21,233	0,204	**5,436**	**5,428**	**5,428**
Switzerland	98,152	107,076	98,175	0,069	**7,320**	**7,321**	**7,321**
Turkey	2,895	3,308	2,891	0,182	**0,645**	**0,645**	**0,645**
UK			66,298	0,189		**15,491**	**15,491**
United States	161,446	210,743	138,662	0,223	**46,255**	**39,727**	**39,727**
Developing countries	167,820	188,906	176,101	0,280	**61,367**	**63,440**	**63,440**
Brazil	29,086	41,474	29,086	0,301	**12,501**	**12,501**	**12,501**
China	32,516	32,516	32,516	0,152	**5,810**	**5,810**	**5,810**
Colombia	7,193	7,610	7,193	0,595	**10,568**	**10,568**	**10,568**
Costa Rica	2,287	2,312	2,312	0,105	**0,268**	**0,271**	**0,271**
Indonesia	20,815	21,786	21,786	0,224	**5,991**	**6,271**	**6,271**
India	19,491	19,711	19,711	0,387	**12,321**	**12,460**	**12,460**
Russia	50,184	57,097	57,097	0,188	**11,581**	**13,176**	**13,176**
South Africa	6,248	6,400	6,400	0,271	**2,326**	**2,383**	**2,383**

Cont'd: Estimates of tax contributions based on presented methods in billions of $USD (2/2)							
	1	2	3	4	5	6	7
Country	IMF, DI income on Equity and Investment Fund Shares, Debit	IMF Direct investment income, Debit,	OECD inward FDI, income on equity (if NA, col. 2 values are used)	AETR used	**Estimated tax based on Bolwijn et al.**	**Estimated tax based on Tørsløv et al. (without unrecorded profits)**	**Estimated tax based on Tørsløv et al. (with unrecorded profits)**
Non-OECD tax havens	192,2573	198,3652	198,3652	0,0800	**28,9902**	**29,5703**	**33,6252**
Andorra				0,0890			
Anguilla	0,0166	0,0175	0,0175	0,0500	**0,0009**	**0,0009**	**0,0010**
Antigua and Barbuda	0,0788	0,0813	0,0813	0,0270	**0,0022**	**0,0023**	**0,0023**
Aruba				0,2640			**0,0072**
Bahamas				0,0500			**0,0251**
Bahrain	3,2676	3,2652	3,2652	0,0220	**0,0742**	**0,0741**	**0,0741**
Barbados				0,0330			**0,1754**
Belize	0,1260	0,1260	0,1260	0,0180	**0,0023**	**0,0023**	**0,0023**
Bermuda	0,0638	0,0669	0,0669	0,0180			**0,4021**
Bonaire				0,0500			**0,0000**
British Virgin Islands				0,0080			**0,0227**
Cayman Islands		1,3970	1,3970	0,0060		**0,0081**	**0,2933**
Curacao	0,0612	0,0661	0,0661	0,0270	**0,0017**	**0,0018**	**0,0067**
Cyprus	19,0167	22,8455	22,8455	0,1040	**2,2049**	**2,6489**	**2,6489**
Jersey				0,0030			**0,0244**
Grenada	0,0508	0,0534	0,0534	0,0360	**0,0019**	**0,0020**	**0,0020**
Guernsey				0,0500			**0,0047**
Gibraltar				0,0030			**0,0147**
China, P.R.: Hong Kong	139,3098	140,0075	140,0075	0,1290	**20,5591**	**20,6621**	**20,6621**
Isle of man				0,0000			**0,0014**
Lebanon	0,3980	0,4063	0,4063	0,2560	**0,1371**	**0,1400**	**0,1400**
Liechtenstein				0,1010			
Macau	7,4682	7,5869	7,5869	0,0030	**0,0240**	**0,0244**	**0,0335**
Malta	10,3965	10,4391	10,4391	0,3310	**5,1369**	**5,1579**	**5,1579**
Marshall Islands	0,0168	0,0168	0,0168	0,0500	**0,0009**	**0,0009**	**0,0009**
Monaco				0,2310			**0,0019**
Sint Maarten	0,0004	0,0009	0,0009	0,0500	**0,0000**	**0,0000**	**0,0000**
Mauritius	8,3480	8,3480	8,3480	0,0540	**0,4775**	**0,4775**	**0,6379**
Seychelles	0,1011	0,1017	0,1017	0,2840	**0,0401**	**0,0403**	**0,0625**
Singapore				0,0470			**2,3023**
Saint Kitts and Nevis	0,0624	0,0626	0,0626	0,0590	**0,0039**	**0,0039**	**0,0050**
Saint Lucia	0,1052	0,1064	0,1064	0,0180	**0,0019**	**0,0020**	**0,0034**
Saint Vincent and the Grenadines	-0,0006	0,0001	0,0001	0,0500	**0**	**0,0000**	**0,0000**
Turks and Caicos	0,0270	0,0270	0,0270	0,0500	**0,0014**	**0,0014**	**0,0014**
Panama	3,3429	3,3429	3,3429	0,0870	**0,3181**	**0,3181**	**0,3875**
Puerto Rico				0,0150			**0,5174**
World (sampled)	1476,3752	1696,6463	1496,5841		**308,0442**	**308,4813**	**312,5362**

Source: *Author's compilation, based on the methodologies of Tørsløv et al. (2018) and Bolwijn et al. (2018). Detailed description of data in Chapter 4.*

Appendix Table 3, Estimates of CIT tax contributions of multinationals as share of GDP

Estimates of tax contributions of MNEs as shares of GDP (1/2)							
	1	2	3	4	5	6	7
	Bolwijn et al. method			**Tørsløv et al. method**			**OECD CbCR**
Country	Estimates of tax paid (billions $USD)	As % of total CIT tax revenues (if appl.)	**As % of GDP**	Estimates of tax paid (billions $USD)	As % of total CIT tax revenues (if appl.)	**As % of GDP**	Recorderded tax for foreign affiliates
OECD (avg.)		27,027%	**0,794%**		26,158%	**0,767%**	
Australia	7,909	10,605%	**0,573%**	7,952	10,662%	**0,577%**	4,409
Austria	3,683	34,591%	**0,854%**	4,810	45,172%	**1,115%**	0,780
Belgium	7,134	33,009%	**1,351%**	6,586	30,475%	**1,248%**	3,221
Canada	8,457	12,102%	**0,452%**	8,581	12,279%	**0,459%**	6,243
Chile	2,785	26,594%	**1,023%**	2,747	26,231%	**1,009%**	2,432
Czech Republic	4,907	53,635%	**2,001%**	4,835	52,849%	**1,972%**	
Denmark	1,560	13,154%	**0,428%**	1,447	12,200%	**0,397%**	0,525
Estonia	0,143	36,718%	**0,565%**	0,140	36,021%	**0,554%**	
Finland	1,880	26,076%	**0,708%**	1,876	26,009%	**0,706%**	0,297
France	16,265	24,281%	**0,566%**	14,608	21,807%	**0,508%**	3,401
Germany	17,837	22,458%	**0,460%**	11,847	14,916%	**0,306%**	
Greece	0,528	10,929%	**0,213%**	0,521	10,792%	**0,210%**	
Hungary	0,515	15,994%	**0,331%**	0,326	10,134%	**0,210%**	
Iceland	0	0%	**0%**	0	0%	**0%**	
Ireland	10,304	108,181%	**2,987%**	10,241	107,526%	**2,969%**	5,315
Israel	1,092	11,087%	**0,366%**	1,194	12,126%	**0,400%**	
Italy	4,730	10,616%	**0,223%**	4,718	10,589%	**0,222%**	3,726
Japan	8,744	3,816%	**0,142%**	8,936	3,901%	**0,145%**	7,224
Korea	3,536	6,934%	**0,250%**	1,024	2,008%	**0,073%**	2,789
Latvia	0,209	43,637%	**0,695%**	0,211	43,912%	**0,699%**	
Lithuania	0,294	41,141%	**0,614%**	0,299	41,878%	**0,625%**	
Luxembourg	1,571	47,125%	**2,406%**	1,555	46,646%	**2,382%**	1,249
Mexico	6,904	15,326%	**0,538%**	6,753	14,991%	**0,527%**	6,070
Netherlands	26,117	86,242%	**2,826%**	26,056	86,039%	**2,820%**	5,689
New Zealand	1,669	19,397%	**0,923%**	1,639	19,050%	**0,906%**	
Norway	3,352	14,235%	**0,694%**	2,727	11,581%	**0,564%**	2,052
Poland	4,120	35,606%	**0,687%**	4,112	35,536%	**0,685%**	
Portugal	1,794	23,240%	**0,745%**	1,649	21,360%	**0,685%**	
Slovak Republic	1,096	31,532%	**1,016%**	1,093	31,463%	**1,013%**	
Slovenia	0,172	18,201%	**0,323%**	0,172	18,167%	**0,323%**	0,019
Spain	8,725	25,064%	**0,580%**	8,205	23,570%	**0,545%**	
Sweden	5,436	33,792%	**0,941%**	5,428	33,742%	**0,939%**	0,700
Switzerland	7,320	36,520%	**1,115%**	7,321	36,529%	**1,115%**	
Turkey	0,645	3,125%	**0,053%**	0,645	3,121%	**0,053%**	
UK				15,491	19,572%	**0,545%**	
United States	46,255	15,368%	**0,266%**	39,727	13,199%	**0,228%**	22,280
Developing countries (avg.)		14,825%	**0,804%**		15,366%	**0,822%**	
Brazil	12,501	19,429%	**0,546%**	12,501	19,429%	**0,546%**	4,490
China	25,962	6,463%	**0,255%**	25,962	6,463%	**0,255%**	18,112
Colombia	10,568		**2,835%**	10,568		**2,835%**	
Costa Rica	0,268	19,378%	**0,555%**	0,271	19,590%	**0,561%**	
Indonesia	5,991		**0,549%**	6,271		**0,575%**	6,014
India	12,321	14,421%	**0,463%**	12,460	14,584%	**0,469%**	4,127
Russia	11,581	19,051%	**0,683%**	13,176	21,675%	**0,777%**	
South Africa	2,326	10,210%	**0,546%**	2,383	10,458%	**0,559%**	0,874

Estimates of tax contributions of MNEs as shares of GDP (2/2)							
	1	2	3	4	5	6	7
	Bolwijn et al. method			**Tørsløv et al. method**			**OECD CbCR**
Country	Estimates of tax paid (billions $USD)	As % of total CIT tax revenues (if appl.)	**As % of GDP**	Estimates of tax paid (billions $USD)	As % of total CIT tax revenues (if appl.)	As % of GDP	Recorderded tax for foreign affiliates
Non-OECD tax havens (avg.)		108,271%	**3,079%**		99,918%	**2,749%**	
Andorra							
Anguilla	0,001		**0,314%**	0,0010		**0,328%**	
Antigua and Barbuda	0,002	8,957%	**0,163%**	0,0023	9,234%	**0,169%**	
Aruba				0,0072		**0,010%**	
Bahamas				0,0251		**0,046%**	
Bahrain	0,074	173,238%	**0,224%**	0,0741	173,112%	**0,224%**	
Barbados				0,1754	42,488%	**1,146%**	
Belize	0,002		**0,144%**	0,0023		**0,145%**	
Bermuda				0,4021		**3,688%**	0,503
Bonaire							
British Virgin Islands				0,0227		**2,081%**	
Cayman Islands				0,2933		**10,318%**	
Curacao	0,002		**0,055%**	0,0067		**0,115%**	
Cyprus	2,205	149,824%	**8,340%**	2,6489	179,989%	**10,020%**	
Jersey			**0,000%**	0,0244		**1,492%**	
Grenada	0,002	12,172%	**0,195%**	0,0020	12,807%	**0,206%**	
Guernsey				0,0047			
Gibraltar				0,0147		**1,588%**	
China, P.R.: Hong Kong	20,559	139,389%	**7,333%**	20,6621	140,087%	**7,370%**	
Isle of man				0,0014		**0,917%**	
Lebanon	0,137		**0,316%**	0,1400		**0,323%**	
Liechtenstein				1,6807			
Macau	0,024	4,951%	**0,068%**	0,0335	10,899%	**0,150%**	
Malta	5,137	603,357%	**38,921%**	5,1579	605,827%	**39,080%**	
Marshall Islands	0,001		**0,515%**	0,0009		**0,521%**	
Monaco				0,0019		**0,001%**	
Sint Maarten	0,000		**0,002%**	0,0000		**0,000%**	
Mauritius	0,477	142,446%	**3,702%**	0,6379	152,017%	**3,932%**	
Seychelles	0,040	41,886%	**2,982%**	0,0625	42,159%	**3,055%**	
Singapore				2,3023	3,418%	**0,151%**	3,431
Saint Kitts and Nevis	0,004	16,496%	**0,451%**	0,0050	17,277%	**0,474%**	
Saint Lucia	0,002	6,700%	**0,119%**	0,0034	9,495%	**0,168%**	
Saint Vincent and the Grenadines	0	0%	**0%**	0,0000	0,039%	**0,000%**	
Turks and Caicos	0,001		**0,149%**	0,0014		**0,145%**	
Panama	0,318		**0,672%**	0,3875		**0,689%**	
Puerto Rico				0,5174		**0,367%**	
World (sampled) avg.		44,041%	**1,545%**		43,442%	**1,592%**	

Source: Author's compilation, based on the methodologies of Tørsløv et al. (2018) and Bolwijn et al. (2018). Detailed description of data in Chapter 4.

Appendix Table 4, Estimation of tax gains from unrecorded profits

Estimating the corporate tax paid from unreported profits (numbers in millions of $USD)											
	1	2	3	4	5	6	7	8	9	10	11
	Reported income from inward FDI				Reported income from outward FDI						
Country	IMF, Direct investment income, debit	Sum of outward FDI income, by all OECD partners	Sum of outward FDI income, US multinationals	Gap on inward FDI income	IMF, Direct investment income, debit	Sum of inward FDI income, by all OECD partners	Gap on outward FDI income	Allocation of missing FDI income to individual countries	Unrecorded profits for individual countries	Positive unrecorded profits (othewise 0)	Tax paid on unrecorded profits (π*AETR)
Andorra		0,00		0,00		0,81	0,81	0,00	-0,81	0,00	0,00
Anguilla	17,49	20,82		3,33	0,17	1,00	0,83	-0,45	2,06	2,06	0,10
Antigua and Barbuda	81,28	0,59		0,00	0,15	0,00	0,00	-1,74	-1,74	0,00	0,00
Aruba		9,32	27,89	27,89	17,42	0,00	0,00	-0,60	27,29	27,29	7,19
Bahamas	0,00	602,11	-988,06	602,11		90,21	90,21	-12,91	498,99	498,99	25,15
Bahrain	3265,19	258,99	218,42	0,00	1965,96	38,68	0,00	-70,01	-70,01	0,00	0,00
Barbados		84,95	6170,22	6170,22		705,40	705,40	-132,30	5332,52	5332,52	175,44
Belize	126,04	8,16		0,00	1,48	25,07	23,59	-2,70	-26,29	0,00	0,00
Bermuda	66,88	34470,07	32476,48	34403,19		11449,92	11449,92	-739,08	22214,20	22214,20	402,08
Bonaire		0,00		0,00		16,45	16,45	0,00	-16,45	0,00	0,00
British Virgin Islands		475,47	2900,54	2900,54		0,00	0,00	-62,19	2838,35	2838,35	22,71
Cayman Islands	1396,97	37600,42	58540,24	58540,24	100,83	8176,07	8075,24	-1285,12	49179,89	49179,89	285,24
Curacao	66,13	250,92	167,76	184,79		-117,88	0,00	-5,38	179,41	179,41	4,86
Cyprus	22845,54	1844,76	-70,18	0,00	23474,47	3418,40	0,00	-489,83	-489,83	0,00	0,00
Jersey		3174,19	11687,60	11687,60	21,05	2726,12	2705,07	-250,59	8731,93	8731,93	24,45
Grenada	53,44	4,00		0,00	0,54	0,00	0,00	-1,15	-1,15	0,00	0,00
Guernsey		271,93	-1645,85	271,93		173,22	173,22	-5,83	92,89	92,89	4,68
Gibraltar		-2449,99	5058,64	5058,64		631,29	631,29	-108,46	4318,88	4318,88	14,68
China, P.R.: Hong Kong	140007,52	22827,49	12315,18	0,00	124934,73	2395,44	0,00	-3001,91	-3001,91	0,00	0,00
Isle of man		455,57	7395,35	7395,35		105,09	105,09	-158,56	7131,70	7131,70	1,43
Lebanon	406,33	66,84	48,44	0,00	1019,45	14,04	0,00	-8,71	-8,71	0,00	0,00
Liechtenstein		120,72		120,72		101,53	101,53	-2,59	16,61	16,61	1,68
Macau	7586,91	686,40	3065,57	3065,57	195,91	-0,04	0,00	-228,40	2837,17	2837,17	9,08
Malta	10439,07	981,06	-251,88	0,00	60,80	503,18	442,38	-223,82	-666,21	0,00	0,00
Marshall Islands	16,77	-0,08		0,00	0,11	16,84	16,72	-0,36	-17,08	0,00	0,00
Monaco			8,60	8,60				-0,18	8,41	8,41	1,95
Sint Maarten	0,91	-13,71		0,00	2,01	0,00	0,00	-0,02	-0,02	0,00	0,00
Mauritius	8347,97	482,44	3212,11	3212,11	8994,26	411,22	0,00	-247,86	2964,25	2964,25	160,37
Seychelles	101,73	194,00		92,28	-0,41	9,65	10,07	-4,16	78,05	78,05	22,17
Singapore		40750,96	54642,38	54642,38		4898,49	4898,49	-1171,59	48572,30	48572,30	2302,33
Saint Kitts and Nevis	62,63	88,00	72,71	25,37	0,04	4,25	4,21	-1,89	19,28	19,28	1,13
Saint Lucia	106,35	73,29	78,89	78,89	14,93	1,29	0,00	-3,97	74,92	74,92	1,36
Saint Vincent and the	0,14	-1,00		0,00	0,17	-4,39	0,00	0,00	0,00	0,00	0,00
Turks and Caicos	27,01	0,00		0,00		3,37	3,37	-0,58	-3,95	0,00	0,00
Panama	3342,90	745,69	888,97	888,97	535,64	-10,18	0,00	-90,74	798,23	798,23	69,37
Puerto Rico			34335,33	34335,33				-736,19	33599,14	33599,14	517,43
World total	1866318,90	1063815,49	1772189,64	223716,04	2051531,19	696535,07	29453,87	-9049,88	185212,29	189516,47	4054,86

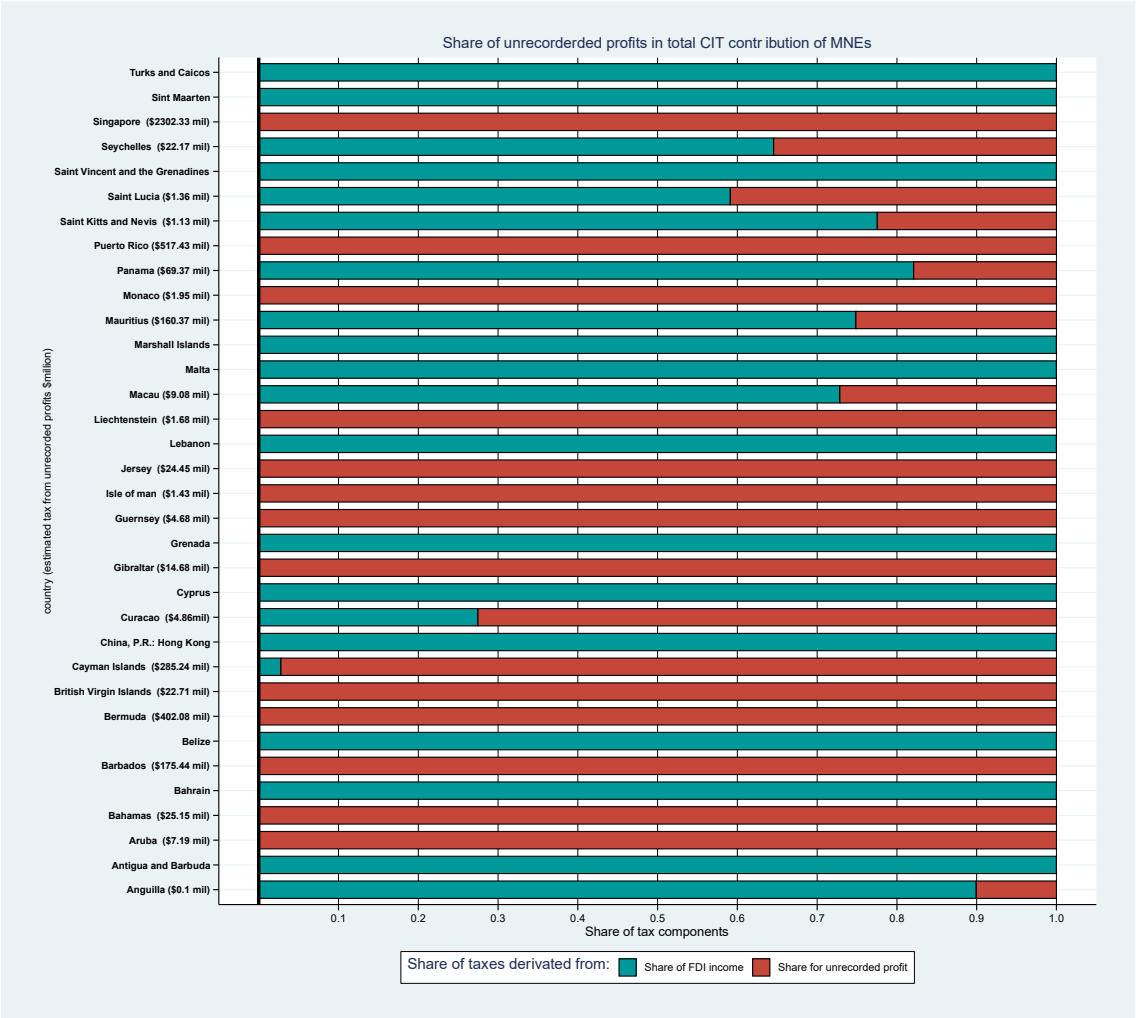
Source: Author's compilation, based on the methodology of Tørsløv et al. (2018). Source of data is described in the Chapter 4.

Appendix Table 5, Estimation of tax gains from unrecorded profits (incorporation of data from OECD CbCR 2016)

Estimating the corporate tax paid from unreported profits CBCR 2016 (numbers in millions of $USD)											
	1	2	3	4	5	6	7	8	9	10	11
	Reported income from inward FDI				Reported income from outward FDI			Allocation of missing FDI income to individual countries	Unrecorded profits for individual countries	Positive unrecorded profits (othewise 0)	Tax paid on unrecorded profits (π*AETR)
Country	IMF, Direct investment income, debit (2017)	Sum of outward FDI income, by all OECD partners (2017)	Sum of outward profit before tax (OECD CbCR) 2016	Gap on inward FDI income	IMF, Direct investment income, debit (2017)	Sum of inward FDI income, by all OECD partners (2017)	Gap on outward FDI income				
Andorra		0,00		0,00		0,81	0,81	0,00	-0,81	0,00	0,0000
Anguilla	17,49	20,82		3,33	0,17	1,00	0,83	-3,17	-0,67	0,00	0,0000
Antigua and Barbuda	81,28	0,59		0,00	0,15	0,00	0,00	-12,39	-12,39	0,00	0,0000
Aruba		9,32	179,44	179,44	17,42	0,00	0,00	-27,36	152,08	152,08	40,0880
Bahamas	0,00	602,11	21837,95	21837,95		90,21	90,21	-3329,46	18418,28	18418,28	928,2813
Bahrain	3265,19	258,99	218,42	0,00	1965,96	38,68	0,00	-497,82	-497,82	0,00	0,0000
Barbados		84,95	6170,22	6170,22		705,40	705,40	-940,72	4524,09	4524,09	148,8427
Belize	126,04	8,16		0,00	1,48	25,07	23,59	-19,22	-42,80	0,00	0,0000
Bermuda	66,88	34470,07	32476,48	34403,19		11449,92	11449,92	-5255,38	17697,90	17697,90	320,3319
Bonaire		0,00		0,00		16,45	16,45	0,00	-16,45	0,00	0,0000
British Virgin Islands		475,47	26898,29	26898,29		0,00	0,00	-4100,97	22797,32	22797,32	182,3785
Cayman Islands	1396,97	37600,42	21037,75	36203,45	100,83	8176,07	8075,24	-5732,64	22395,58	22395,58	129,8944
Curacao	66,13	250,92	178,93	184,79		-117,88	0,00	-38,26	146,53	146,53	3,9710
Cyprus	22845,54	1844,76	2261,72	2261,72	23474,47	3418,40	0,00	-3827,91	-1566,19	0,00	0,0000
Jersey		3174,19	11687,60	11687,60	21,05	2726,12	2705,07	-1781,92	7200,61	7200,61	20,1617
Grenada	53,44	4,00		0,00	0,54	0,00	0,00	-8,15	-8,15	0,00	0,0000
Guernsey		271,93	377,51	377,51		173,22	173,22	-57,56	146,74	146,74	7,3955
Gibraltar		-2449,99	39,79	39,79		631,29	631,29	-6,07	-597,57	0,00	0,0000
China, P.R.: Hong Kong	140007,52	22827,49	58849,91	58849,91	124934,73	2395,44	0,00	-30318,23	28531,69	28531,69	3669,1747
Isle of man		455,57	7395,35	7395,35		105,09	105,09	-1127,51	6162,75	6162,75	1,2325
Lebanon	406,33	66,84	139,80	139,80	1019,45	14,04	0,00	-83,26	56,54	56,54	14,4844
Liechtenstein		120,72		120,72		101,53	101,53	-18,41	0,79	0,79	0,0800
Macau	7586,91	686,40	3661,21	3661,21	195,91	-0,04	0,00	-1714,91	1946,30	1946,30	6,2282
Malta	10439,07	981,06	372,73	0,00	60,80	503,18	442,38	-1591,56	-2033,95	0,00	0,0000
Marshall Islands	16,77	-0,08	3,66	3,66	0,11	16,84	16,72	-3,11	-16,18	0,00	0,0000
Monaco			8,60	8,60				-1,31	7,29	7,29	1,6862
Sint Maarten	0,91	-13,71		0,00	2,01	0,00	0,00	-0,14	-0,14	0,00	0,0000
Mauritius	8347,97	482,44	1991,17	1991,17	8994,26	411,22	0,00	-1576,33	414,84	414,84	22,4430
Seychelles	101,73	194,00	6,74	92,28	-0,41	9,65	10,07	-29,58	52,63	52,63	14,9478
Singapore		40750,96	28177,07	40750,96		4898,49	4898,49	-6212,98	29639,49	29639,49	1404,9119
Saint Kitts and Nevis	62,63	88,00	65,71	25,37	0,04	4,25	4,21	-13,42	7,75	7,75	0,4547
Saint Lucia	106,35	73,29	55,39	0,00	14,93	1,29	0,00	-16,22	-16,22	0,00	0,0000
Saint Vincent and the	0,14	-1,00		0,00	0,17	-4,39	0,00	-0,02	-0,02	0,00	0,0000
Turks and Caicos	27,01	0,00		0,00		3,37	3,37	-4,12	-7,49	0,00	0,0000
Panama	3342,90	745,69	1344,05	1344,05	535,64	-10,18	0,00	-714,58	629,47	629,47	54,7011
Puerto Rico			34335,33	34335,33				-5234,84	29100,49	29100,49	448,1476
World total	1866318,90	1063815,49	1801605,10	288965,66	2051531,19	696535,07	29453,87	-74299,50	185212,29	190029,14	7419,84

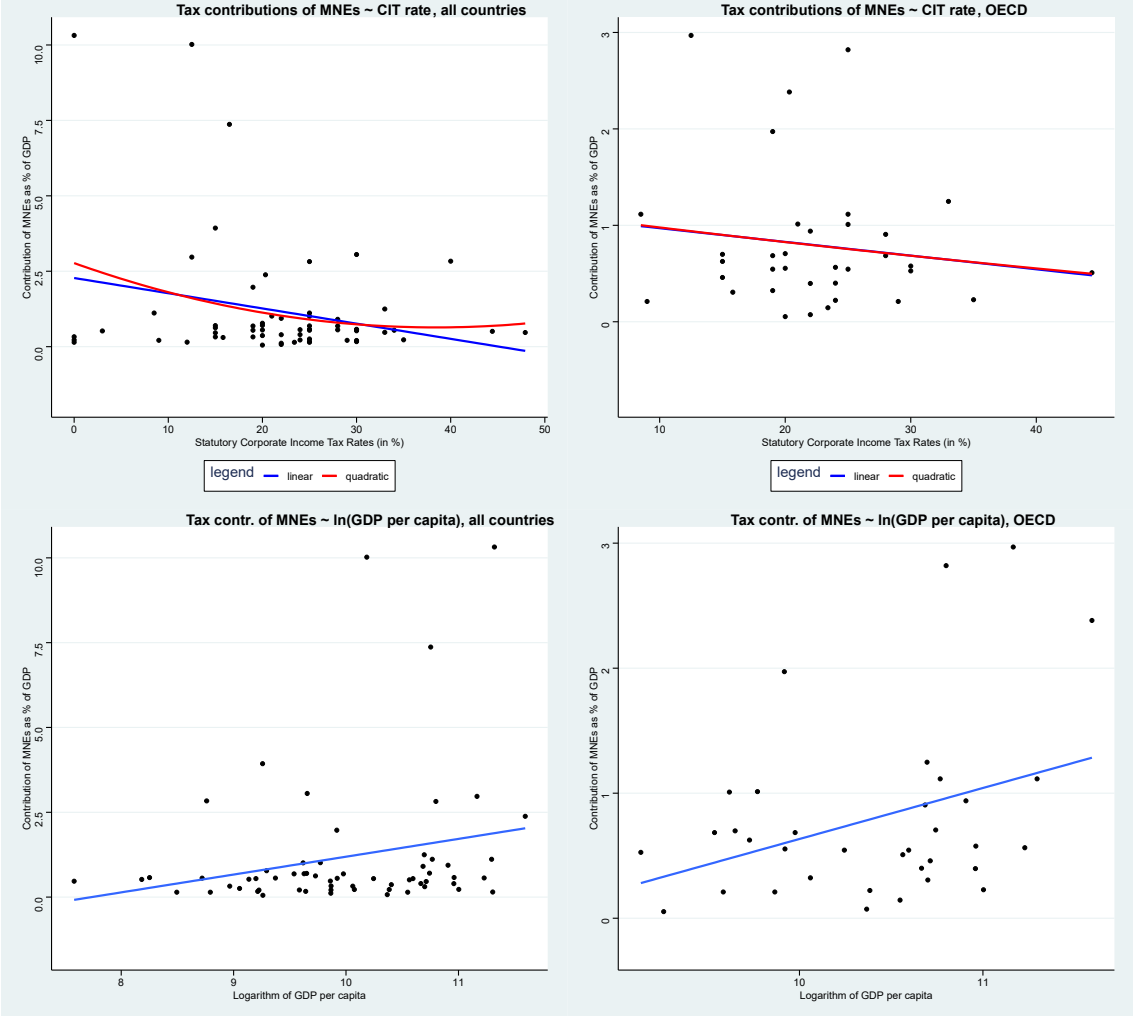
Source: Author's compilation, based on the methodology of Tørsløv et al. (2018). Source of data is described in the Chapter 4.

Appendix Figure 2, Share of estimated tax on unrecorded profits to the total estimate of tax contribution



Source: Authors' compilation (*Andorra and Bonaire are excluded from the computation as we have been unable to estimate numbers for those two countries).

Appendix Figure 3, Possible factors affecting the size of MNEs tax contributions



Source: Authors' compilation

Appendix Table 6, OLS model, drivers of MNEs tax contributions

Table 5.1: OLS model, Possible drivers of MNEs tax contributions

	Tax contribution	**Tax contribution**	**Tax contribution**	**Tax contribution**	**Tax contribution**
Predictors	*Estimates*	*Estimates*	*Estimates*	*Estimates*	*Estimates*
(Intercept)	2.28 * (1.09)	2.77 (1.92)	-2.55 (2.61)	-0.40 (6.40)	0.16 (7.99)
cit	-0.05 (0.04)	-0.11 (0.14)	-0.13 (0.15)	-0.31 (0.37)	-0.33 (0.43)
I(cit^2)		0.00 (0.00)	0.00 (0.00)	0.01 (0.01)	0.01 (0.01)
ln, GDP per capita			0.54 (0.36)	0.53 (0.44)	0.50 (0.52)
international				-4.39 (5.39)	-4.62 (6.00)
cit:international				0.47 (0.38)	0.49 (0.44)
I(cit^2):international				-0.01 (0.01)	-0.01 (0.01)
Large					-4.73 (9.03)
cit:Large					0.32 (0.70)
I(cit^2):Large					-0.01 (0.01)
Observations	62	62	62	61	61
R^2 / R^2 adjusted	0.061 / 0.045	0.073 / 0.041	0.123 / 0.077	0.247 / 0.163	0.257 / 0.126

** p<0.05 ** p<0.01 *** p<0.001*

Source: Authors' compilation