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HABILITATION THESIS

Tax Havens and Financial Secrecy

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Chapter 1

Introduction

This habilitation thesis consists of an introduction and nine chapters which comprehensively present my contribution to the research of tax havens and financial secrecy. Eight chapters have been previously published or are forthcoming as articles in the following academic journals: *Economic Geography*, *Social Indicators Research*, *Development Policy Review* (two chapters), *Post-Communist Economies* (two chapters), *Applied Economics Letters*, *Journal of International Development* (all indexed in the Web of Science). The final chapter is currently under consideration for publication in *International Tax and Public Finance*. The introduction briefly describes the common threads and conclusions of my habilitation thesis and provides a summary of the findings of each of the following chapters.

As tax havens, financial secrecy and profit shifting constitute essential concepts used throughout my habilitation thesis, I shall briefly introduce them first. At the most general level, a country might be considered a tax haven if it provides benefits to foreign companies or individuals in the form of low tax burden, high financial secrecy or as a combination of the two factors or other conditions. Financial secrecy is the lack of financial transparency, ranging from a lack of corporate transparency to a lagging implementation of international standards and cooperation. Profit shifting constitutes the artificial reporting of profits in tax havens instead of in countries where economic activity in fact takes place. Profits are shifted to tax havens mainly by multinational enterprises (MNEs) without changing the locations of underlying economic activities and often in order to avoid taxes (tax avoidance generally being lawful, in contrast with illegal tax evasion). MNEs shift profit using three distinct channels: debt shifting, locating intangible assets and strategic transfer pricing. First, profits can be shifted through loans at high interest rates from one MNE unit located in a tax haven to another unit located elsewhere. Second, the subsidiaries of one MNE can pay another subsidiary in a tax haven for benefiting from intangible assets such as intellectual property located there. The third main profit shifting channel constitutes the artificial increase or decrease of the prices of goods or services being transferred between the individual parts of an MNE. Furthermore, all of the profit shifting mechanisms employed by MNEs to avoid tax also naturally influence government tax revenues.

These are simplified explanations, since, as I specifically point out in selected chapters, defining these terms is not without complications. This is especially true of the term tax haven. Since a great deal of academic research and public policy debate regarding tax

havens suffers from a lack of consistent definitions, agreement on which countries ought to be considered tax havens is far from universal. This issue is not new, e.g. a 1981 report by the United States Department of the Treasury found that no single objective test is capable of identifying a country as a tax haven (Gordon, 1981). Over time different classification alternatives to tax havens have been proposed, including the term offshore financial centre, widely used in economic geography for some time (Maurer 2008), and the more recently proposed secrecy jurisdiction (likewise explained in chapter 2). No alternative has proven good enough thus far and definition-related challenges continue to persist. It is therefore essential to clarify the preferred classification of tax havens in any research which chooses to utilize this term, as I have done in each of the following chapters.

All chapters thus focus on tax havens, a topic which has been the focal point of my research since early 2009 when I began working on the first edition of the Financial Secrecy Index. The chapters also share a number of common characteristics, both in terms of methodology and with respect to research questions. For example, most include an important empirical component: while some use straightforward statistical tools, others rely on econometric methods. Several chapters (4–6) use detailed firm-level data, whereas others (8–10) use country-level data. Most of my habilitation thesis focuses either on developing countries (3, 7–10) or on the Czech Republic (4–6). Most chapters (4–10) discuss profit shifting by MNEs while also approximating its scale. Estimating the effects of tax havens on the government tax revenues of other countries forms the primary focus of the second half of the habilitation thesis (chapters 6–10). Most chapters provide policy recommendations and some of them also introduce indicators which may be used to track the impact of policy changes over time. While individual chapters share a number of characteristics, each of them is distinct, with specific research questions, methods, data, and results relevant to a specific chapter and topic described in great detail.

In this introduction I propose an overarching research question for my entire habilitation thesis, namely: what effects do tax havens have on other countries? And, more specifically, what are the negative effects of tax havens? In particular I focus on financial secrecy and corporate tax revenues. I therefore provide examples of how research described in individual chapters provides an answer to this general research question. In chapter 2 I quantify financial secrecy. In chapter 3 I argue that tax haven-related illicit financial flows, loosely defined as funds which are illegally earned, transferred or utilized, exert a negative influence on developing countries. The remaining chapters focus on the tax revenue effects of tax havens. In chapters 4 to 7 I provide estimates of profit shifting by MNEs into tax havens out of India and the Czech Republic. In chapters 8 to 10, I approximate the scale of various tax haven-associated effects related to profit shifting. All of the chapters thus contribute to answering the main research question, albeit from different angles, and support the general conclusions of my habilitation thesis.

Findings described in the nine chapters which comprise my habilitation thesis and in other existing research may be summed up in the form of three general conclusions. First, low taxation is not the only temptation of tax havens. Low tax rates are far from the only characteristic of tax havens which are attractive to foreign individuals and companies. Financial secrecy, i.e. the lack of financial transparency, is important and facilitates illicit financial outflows from other countries. Tax havens thus prevent other countries from receiving the appropriate benefits of their economic production and also lower tax revenues are available to their governments. While these financial effects are important, tax havens may also harm the institutions of other countries. By enabling tax avoidance or illegal activities, they can weaken the role of government and citizens' willingness to pay taxes, undermine the morale of tax systems and the accountability of governments towards their citizens, lower investor confidence and harm the institutional environment in general. When tax havens are used to launder money used for corruption and bribery, they can help keep corrupt politicians and other elites in power, sustain criminal activities and hide criminal profits. I discuss these aspects of tax havens in chapter 3, while chapter 2 highlights financial secrecy as an important attraction of tax havens.

My second conclusion is that tax havens are not limited to small Caribbean islands. Some European countries and relatively big economies also constitute tax havens, or at least exhibit some important characteristics of tax havens. Lists of tax havens prepared by international organisations such as OECD (2013) and the European Commission (2015) have long been dominated by relatively small countries, while other countries – including several member countries of these international organisations – have rarely been listed. I have thus helped design and apply verifiable criteria for identifying tax havens. In chapter 2 I identify Switzerland, Luxembourg and the United States as some of the biggest suppliers of financial secrecy and in chapter 8 I conclude that the Netherlands, Ireland, Bermuda and Luxembourg systematically attract a disproportionate amount of profit with respect to their economic activity.

Finally, tax havens are associated with substantial tax revenue losses incurred by other countries' governments. A discussion on the extent of tax revenue losses stemming from profit shifting is ongoing, with some researchers including e.g. Hines (2014) suggesting that these losses may not be exceedingly high. However, recent evidence seems to confirm that global annual tax revenue losses are indeed high, reaching hundreds of billions USD, as shown by economists such as Zucman (2014) or Clausing (2016) and international organisations such as OECD's Johansson, et al. (2017) or IMF's Crivelli et al. (2016). These estimates are also comparable to the current global expenditure on development assistance and thus can be seen as the order of magnitude of what FitzGerald (2013) calls the global public goods levy. Furthermore, according to some estimates the losses tend to be higher for developing countries relative to their GDP. I contribute to these tax revenue loss estimates in chapters 8 to 10 and include a brief comparison of some of the above cited papers in the final chapter.

Along with these three general conclusions, a number of more specific findings are included in the nine chapters, some of which are highlighted in the remaining part of the introduction.

Chapter 2 of my habilitation thesis focuses on financial secrecy; the original paper is co-authored with Alex Cobham and Markus Meinzer (Cobham et al. 2015) and I assess my contribution to be roughly 50 %. In this chapter I explore and implement a concept of secrecy jurisdiction and present the findings of the resulting Financial Secrecy Index. The index ranks countries according to their contribution to global financial flow opacity. It reflects both the specific choices made by countries and the potential importance of such choices for other countries. It captures both the intensity of the countries' commitment to financial secrecy and their external scale. The empirical results reveal a geography of financial secrecy quite different from the popular image of small island tax havens still dominating popular perceptions and even some research literature. A number of secrecy-supplying major economies are identified. Instead of providing a simplified binary division differentiating between tax havens and other countries, the results introduce a comprehensive secrecy spectrum which all countries may be assigned to.

Though I have worked on research described in chapter 2 since 2009, the project remains ongoing, with the fifth version of the Financial Secrecy Index scheduled for publication in early 2018. In addition to improving the index itself, I am leading several follow-up research projects including the development of the Bilateral Financial Secrecy Index, designed to assess which secrecy jurisdictions are important for which countries, income groups and regions. This research focuses on European countries as both potential secrecy jurisdictions and as countries affected by them. We identify to what extent European countries are exposed to financial secrecy and which countries comprise the most significant secrecy jurisdictions in Europe. We encounter a high degree of heterogeneity across secrecy jurisdictions both in Europe and around the world. This new geography of financial secrecy has significant implications for policy recommendations and further research, especially as it also includes country-specific risk profiles. The research should thus point policy makers' limited resources and attention to the most relevant secrecy jurisdictions in individual countries.

Research described in chapter 2 is relevant for all other chapters especially as it argues that the term tax haven is an ill-defined misnomer. The lack of clear and agreed definitions of tax havens in academic literature has contributed to important and systematic weaknesses in existing analyses carried out in fields including international economics, international political economy and economic geography. The most obvious problem stemming from this lack of clear-cut definitions is when the category of tax haven is taken for granted without an explicit definition or classification. Without clearly defined criteria stipulating how lists of tax havens have been derived, papers such as Hines and Rice (1994) or Johannesen and Zucman (2014) expose themselves to the risk of providing insufficiently

robust results. In spite of this criticism included in chapter 2, I acknowledge that some of my own chapters are to some extent vulnerable in this respect. Throughout all chapters I use the term tax haven as there is hardly a better general term which would sufficiently cover the entire breadth of my research from low tax rates to financial secrecy. Furthermore, methodologies utilized in chapters 4 and 10 are dependent on lists of countries classified as tax havens. Where possible, I have attempted to improve on this approach and thus to contribute to research conducted in this respect as well: In chapter 6 I study the effects of specific tax havens one by one, rather than as a group. In chapter 7 I empirically derive which countries seem to be behaving as tax havens. In chapter 8 I use alternative lists of tax havens as a robustness check. I believe that the approaches used in these three chapters should become more common in research, as should the usage of indicators similar to the one presented in chapter 2.

Chapter 3 of my habilitation thesis, a sole-authored paper (Janský 2015), focuses on illicit financial flows from developing countries, what developed countries can do to diminish them and how to track their progress in doing so. Recent years have seen a growing degree of recognition of the harm caused by illicit financial flows and of the role of developed countries in providing an environment which tolerates these flows. In this chapter I explain why illicit financial flows should be reflected in the Center for Global Development's Commitment to Development Index which ranks developed countries according to their contribution to developing countries in seven policy areas: aid, trade, migration, environment, security, technology and investment. I identify the most relevant illicit financial flow indicators and discuss their advantages and limitations and ultimately propose the inclusion of a qualitative component of the Financial Secrecy Index into the investment component of the Commitment to Development Index. This recommendation has been reflected in the index since 2013, following the chapter's first publication as a working paper (Janský 2013). This chapter builds on my long-term interest in policy indices, reflected in my contribution to the estimation of the first results of the Commitment to Development Index for the Czech Republic (Janský and Řehořová 2013) as well as in my ongoing policy work associated with the United Nations' Sustainable Development Goals.

As the reduction of illicit financial flows is one of the targets of Sustainable Development Goals, the arguments of chapter 3 remain relevant. An ongoing discussion focuses on which indicators should be selected to track illicit financial flows included in target 16.4 ("By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime"). I recently joined this discussion with a co-authored paper for the United Nations Conference on Trade and Development (Cobham & Janský, 2017b) which argues that such an indicator should reflect both illegal flows based on the theft of state assets and the proceeds of crime and legal illicit flows based on tax evasion and avoidance and regulatory abuse. We focuse on the latter and propose three groups of potential indicators reflecting the scale, the underlying

financial secrecy which makes illicit financial flows possible and the illicit financial flows risk exposure that individual countries face. My research presented in this habilitation thesis supports some of these arguments and might thus, depending on what the United Nations and its member governments ultimately agree on, support the design of the Sustainable Development Goals target indicators.

Chapter 4 of the habilitation thesis focuses on profit shifting out of developing countries and, in particular, India. The paper is co-authored with Alex Prats (Janský and Prats 2015) and I assess my contribution to be roughly 75 %. This chapter is one of my first contributions to the discussion on how international corporate tax avoidance may be capable of reducing tax revenue in developing countries. It is also my first empirical analysis using the detailed firm-level Burea van Dijk's Orbis financial and ownership data. The methodology, largely based on Fuest and Riedel (2012), builds on the notion that MNEs differ in their ability to shift income out of their host countries. In the case of MNEs operating in India in 2010 the paper shows that the MNEs with links to tax havens reported lower profits and paid less taxes per unit of assets than MNEs with no such links. These observations are consistent with profit shifting.

Chapter 4 was, at the time of its first publication as a working paper in 2013 (Janský and Prats 2013), one of the first firm-level analyses of profit shifting for a developing country. While some more recent studies of developing countries have exploited the detailed information included in the Orbis database (Johannesen et al. 2017), Orbis suffers from weak coverage of many developing countries and tax havens, as discussed by Kalemli-Ozcan et al. (2015), Clausing (2016) or Garcia-Bernardo et al. (2017). Thus, although I use firm-level data in chapters 4 to 6, I believe that country-level data with comparatively better coverage of developing countries may be useful in profit-shifting research. For example, while I use country-level foreign direct investment data in chapters 8 and 10, I use government revenue data in chapter 9. Therefore, in my future research I would like to use combinations of firm-level and country-level data. While much of my research focuses on developing countries, chapters 5, 6 and 7 are specifically dedicated to the Czech Republic.

Chapter 5 of my habilitation thesis focuses on profit shifting out of the Czech Republic; the paper is co-authored with Ondřej Kokeš (Janský and Kokeš 2015) and I assess my contribution to be approximately 75 %. The paper strives to contribute to a growing body of systematic evidence of profit shifting by analysing the situation in the Czech Republic. The utilized empirical strategy and data source, i.e. Orbis, is similar to chapter 4. We present evidence suggesting that while the effect of MNEs' links with tax havens on the debt ratio of companies in the Czech Republic is consistent with profit shifting, results regarding profits and taxes are not conclusive. This is to some extent consistent with profit shifting and especially with the debt shifting channel. While tax havens are considered as a group in this chapter, the next chapter describes an alternative approach.

Chapter 6 of my habilitation thesis focuses on profit shifting out of the Czech Republic to three specific European tax havens; the paper is co-authored with Ondřej Kokeš (Janský and Kokeš 2016) and I assess my contribution to be approximately 75 %. This chapter begins with an observation that most existing research, including my research presented in chapters 4 and 5, considers tax havens as a group. Chapter 6 deals with this shortcoming by considering individual tax havens separately and empirically testing whether or not ownership links with specific tax havens are associated with profit shifting. Once this approach is applied to the Czech Republic's company-level Orbis data, results suggest that profits shift through debt financing from the Czech Republic to Luxembourg, Switzerland and, to a lesser extent, the Netherlands. We also provide rough estimates of the impact of this profit shifting on tax revenues for MNEs with links to the Netherlands. In this respect, we were among the few to do so on the basis of firm-level data analysis, especially since empirical studies conducted by other academics seldom include estimates of profit shifting to revenue effects. There are of course exceptions and their number is increasing over time, as reviewed in chapter 10. Huizinga and Laeven (2008) were an early exception; their estimates of tax revenue losses for European countries have, until recently, been rarely emulated. I provide such country-level tax revenue estimates for as many countries as possible in chapters 8, 9, and 10.

Chapter 7 of my habilitation thesis, a sole-authored paper available as a working paper (Janský 2016) and forthcoming in *Post-Communist Economies* (Janský forthcoming), focuses on potential corporate income tax revenue loss in the Czech Republic due to international corporate tax avoidance and especially profit shifting. In order to quantify the loss, I first review existing estimates and subsequently provide several new – albeit merely illustrative – estimates, including those extrapolated for the Czech Republic from six international studies. In addition to concluding that reliable estimates for the Czech Republic are missing, I ascertain that the extrapolations are likely some of the more reliable estimates and that their median estimate of revenue loss stands at 10 % of current corporate income tax revenues. These findings support the case for the implementation of policy recommendations designed to deal effectively with international corporate tax avoidance. However, they also highlight the need for more research, both specifically tailored to the Czech Republic and with global outreach; this thus forms the focus of the next three chapters.

Chapter 8 of my habilitation thesis estimates the misalignment between the location of economic activity carried out by MNEs in the United States and the location of their profits; the paper is co-authored with Alex Cobham (Cobham & Janský, 2017c) and I assess my contribution to be roughly 50 %. The paper has developed a new, straightforward method designed to measure what we have termed misalignment, with profit shifting likely responsible for a part of this phenomenon. For each country we have estimated misalignment as the amount of profit being reported outside of where economic activity takes place. This method was applied to a Bureau of Economic Analysis data set of all US

MNEs. One of the advantages of our method is that we not only quantify how much money countries lose to tax havens, but also how much individual tax havens might be benefiting. We show that tax havens are of first-order importance for the world economy, with several countries with low average effective tax rates systematically attracting a disproportionate amount of profit with respect to their economic activity. The Netherlands, Ireland, Bermuda, Luxembourg, Singapore and Switzerland are responsible for the majority of misaligned profits at the expense of countries where the real economic activity in fact takes place. Overall, we estimate that as much as a quarter of the global profits of all US MNEs may be shifted to locations other than where the underlying real activity actually takes place. This estimate amounted to approximately USD 660 billion in 2012, i.e. almost 1 % of world GDP. Since US MNEs are responsible for approximately one fifth of global foreign direct investment, it is not inconceivable that the scale of profit shifting by all MNEs worldwide may be even higher than suggested by other existing estimates discussed in chapters 9 and 10.

Chapter 9 of my habilitation thesis estimates the effects exerted by tax havens on the corporate tax revenues of other countries; the paper is co-authored with Alex Cobham (Cobham and Janský forthcoming) and I assess my contribution to be roughly 75 %. This chapter re-estimates the work of the International Monetary Fund's Crivelli et al. (2016) and, to a large extent, confirms their findings. We find their results to be mostly robust to the use of different government revenue data, a different definition of tax havens and the use of average effective tax rates instead of statutory tax rates. Compared to the USD 650 billion established by Crivelli et al., our preferred global estimate figure of international corporate tax avoidance stands at approximately USD 500 billion. Furthermore, we publish country-level revenue loss estimates, establishing that losses relative to GDP are substantially greater in low- and lower middle-income countries, specifically in sub-Saharan Africa, South Asia, Latin America and the Caribbean. This appears to support two key conclusions: lower-income countries suffer more intensively from profit shifting and the substantial variations between countries warrant the close attention of policy makers to their specific situation.

Chapter 10 of my habilitation thesis estimates the scale of profit shifting and tax revenue losses related to foreign direct investment; the paper, co-authored with Miroslav Palanský (Janský and Palanský 2017), is available as a working paper and is currently under consideration for publication in *International Tax and Public Finance*. I assess my contribution to be approximately 50 %. This final chapter attempts to point out which countries' tax revenues are most affected by tax havens. While this research question is similar to the one posed in chapters 8 and 9, a different methodological approach based on foreign direct investment data is employed here. To estimate the scale of profit shifting, we start by observing that the higher the share of foreign direct investment from tax havens, the lower the reported rate of return on investment. Like the United Nations Conference on Trade and Development's 2015 World Investment Report (UNCTAD 2015), we assume

that the reported rate of return is lower due to profit shifting. However, unlike the report, we also provide illustrative country-level estimates of profit shifting and improve the methodology in a number of aspects. We find that in terms of corporate tax revenue relative to their GDP, OECD member countries lose the least while lower-income countries lose the most. We compare our results with three other recent studies which use different methodologies to derive country-level estimates of tax revenue losses which may be related to profit shifting. Specifically, we make comparisons with estimates described in chapter 8, 9 and with Clausing (2016). In the first such comparison made, we find that while every study identifies differences across income groups, the nature of these differences varies across the four included studies. Two of them have limited data for lower-income countries while the other two, i.e. chapters 9 and 10, show that these countries lose more corporate tax revenue relative to their GDP.

In conclusion to this introductory chapter, I would like to offer a brief summary of some of the most important existing policy recommendations aimed at curtailing the negative effects of tax havens. All four below mentioned specific policy proposals are currently being discussed either by the EU, the OECD or by other international institutions. First, I would like to stress the importance of ensuring the availability of high-quality beneficial ownership information. This data should ideally be made publicly available so that information about the beneficial owner of any company would be available to anyone who requests it. Second, I support the full, global implementation of automatic exchange of tax information so that tax authorities are informed of their taxpayers' income sources in other countries. Third, I would like to see the public country-by-country reporting for MNEs implemented so that companies have to report where their economic activities are conducted, where their profits are reported and where their taxed are paid. The fourth proposal addresses the flaws of the current system of international corporate taxation most substantially: I support the introduction of a common consolidated corporate tax base for the EU and its consideration globally. Following this reform, each MNE would be considered a unitary business rather than a network of independently profit-maximising affiliates, as is the case under the current arms-length principle (Picciotto, 2017). The Czech Republic should aim to support international policy agreements which include these four specific policy proposals in order to thus improve the system of international corporate taxation for the benefit of its citizens as well as those of other countries.

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Chapter 2

The Financial Secrecy Index: Shedding New Light on the Geography of Secrecy[1]

Abstract: Both academic research and public policy debate around tax havens and offshore finance typically suffer from a lack of definitional consistency. Unsurprisingly then, there is little agreement about which jurisdictions ought to be considered as tax havens—or which policy measures would result in their not being so considered. In this article we explore and make operational an alternative concept, that of a secrecy jurisdiction and present the findings of the resulting Financial Secrecy Index (FSI). The FSI ranks countries and jurisdictions according to their contribution to opacity in global financial flows, revealing a quite different geography of financial secrecy from the image of small island tax havens that may still dominate popular perceptions and some of the literature on offshore finance. Some major (secrecy-supplying) economies now come into focus. Instead of a binary division between tax havens and others, the results show a secrecy spectrum, on which all jurisdictions can be situated, and that adjustment for the scale of business is necessary in order to compare impact propensity. This approach has the potential to support more precise and granular research findings and policy recommendations.

Keywords: offshore finance, financial secrecy, geography of financial secrecy, tax havens, finance

JEL classification: F36, F65

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2.1 Introduction

> *Many citizens of developing (and developed) countries now have easy access to tax havens and the result is that these countries are losing to tax havens almost three times what they get from developed countries in aid.*
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> —Jeffrey Owens, Director, Organzation for Economic Cooperation and Development (OECD) for Tax Policy and Administration, in Owens (2009)
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> *We will set down new measures to crack down on those tax havens that siphon money from developing countries, money that could otherwise be spent on bed nets, vaccinations, economic development and jobs.*
>
> —Gordon Brown, UK Prime Minister setting out the G20 agenda, in Brown (2009)

Where are tax havens? In its special issue on tax havens, the *Economist* in 2013 (Valencia (2013) acknowledges the many ways in which the term, as much as its sibling *offshore financial center*, is blurred—to the point of conceding that Delaware, a U.S. state, can be a tax haven. In this article we argue that the term *tax haven* is an ill-defined misnomer, which has supported the creation of a misleading dichotomous economic geography of tax pariahs. Much as Sidaway and Pryke (2000) find the term *emerging economy* to be both interest driven and lacking a convincing definition, the imprecision of the term *tax haven* has led to various problems. In policy making, it has not only allowed questionable pressure on a group of typically small, politically isolated jurisdictions, but it has also underpinned the failure, to date, to find a comprehensive global response to the financial secrecy that thwarts the effective taxation of income and profit, and facilitates money laundering, abuses of market regulations, and the financing of terrorism.

In academic literature, the lack of clear and agreed definitions on tax havens and offshore finance has contributed to important and systematic weaknesses in the resulting analyses, whether in international political economy, economic geography, or international economics. The most obvious problem to stem from this failure of definition is the difficulty posed for the robustness of results, when the category of tax haven is not so much disputed as taken for granted without explicit definition. Without clear and verifiable criteria on how lists of tax havens have been derived, studies such as Hines and Rice (1994) or Johannesen and Zucman (2014) expose themselves to the risk of creating invalid results by falling prey to selection bias in the construction of their data.

The term *offshore financial center* (or later simply *offshore*) has widely assumed the successor role to the term *tax haven*, at least in economic geography (Johns 1983; Cobb 1998; Roberts 1994; Hampton 1996; Hudson 1998a, 2000; Maurer 2008; Warf 2002). However, it has arguably failed to break free from some of the constraints imposed by both the imprecise and binary nature of the terminology (e.g., the apparently contradictory results in the studies of Kudrle [2013] and Haberly and Wójcik [2014] on the relevance of

time zone differences as causal factors for determining the use of offshore witness to the wanting robustness of empirical research findings relying on offshore as an independent variable). A solid base of comparable research findings is unlikely to emerge without greater consistency of definition.

This article's objective is to introduce the concept of a *secrecy jurisdiction* to economic geography. We argue that more robust research findings and greater definitional consistency are likely to emerge only when the focus of attention is shifted away from tax aspects or *offshoreness* onto (specific, measureable components of) the financial secrecy that is offered by jurisdictions. Largely underexplored and overlooked by academics in general, and economic geographers in particular, the issue of financial secrecy merits greater attention since it is an inherent part of most, if not all, of the economic activity undertaken offshore. For this purpose, we propose a new framework of analysis whose backbone is a secrecy jurisdiction.

A secrecy jurisdiction's central characteristics relate to the legislative provision of financial secrecy to those who are physically resident elsewhere. We propose criteria that reflect both the specific choices made by jurisdictions and the potential importance of those choices for other jurisdictions. The resulting Financial Secrecy Index (FSI) thereby captures both the intensity of jurisdictions' commitment to financial secrecy, and their external scale, giving a ranking of tax haven importance according to what Held et al. (1999) term *impact propensity*. Once explicit, detailed, and verifiable criteria are applied, the results cast doubt over the common, dichotomous distinction between countries and tax havens or offshore financial centers. Rather, all reviewed countries offer various components of financial secrecy, suggesting a *secrecy spectrum* upon which all jurisdictions can be situated. The mapping of financial secrecy is not, therefore, an exercise in separating sheep from goats. Like offshore for Wójcik (2012b), it is a matter of degree.

The geography of financial secrecy revealed by the FSI confirms some of the conventional wisdom. For example, Switzerland, Luxembourg, Hong Kong, Cayman Islands, and Singapore rank as the top five jurisdictions responsible for global financial secrecy and associated harm. More surprisingly perhaps, the United States ranks sixth and Germany eighth, and if the entire British sphere of influence was ascribed to London, the United Kingdom would rank far above all other jurisdictions as the single greatest provider of financial secrecy worldwide.

In terms of policy making, these results point to the fundamental importance of G8 nations leading by example, if they wish to make serious progress on areas such as offshore tax evasion, money laundering, and other forms of high-level corruption. The FSI suggests that the traditional, subjective lists of tax havens have given undue weight to relatively secretive but globally less important players—while the range of financial secrecy components are found to extend across most major economies.

This article contributes to the body of literature linking geographic approaches to various policy fields (e.g., Swords 2013; Dixon 2014, Kitchin et al. 2013; Loopmans 2008), which has been growing since Martin (2001) decried the *missing agenda* of policy-relevant economic geography research. The FSI establishes a critical, geographic, and policy-relevant perspective on the issues of offshore finance and tax havens. In addition, it contributes to the emerging strand of literature around the geography of secrecy or transparency by providing further indicators of transparency (Wójcik 2012b).

The article proceeds in four sections. The second section addresses the issue of defining tax havens, surveying the various approaches taken over time, and ultimately reaches a preference for the term *secrecy jurisdiction*. In the third section, we develop a set of metrics for this definition, on the basis of internationally comparable data. The fourth section outlines the approach taken to generate a measure of the relative scale of each jurisdiction in the global trade in financial services. In the fifth section, we combine the measures of secrecy and scale to propose a ranking, the FSI, and demonstrate how the implied geography of financial secrecy differs from that of a number of the main blacklists that are, or have been, in use. A brief conclusion reflects on policy and theoretical implications and offers suggestions for future research.

2.2 Defining tax havens: approaches and implications

> *The term "tax haven" has been loosely defined to include any country having a low or zero rate of tax on all or certain categories of income, and offering a certain level of banking or commercial secrecy. Applied literally, however, this definition would sweep in many industrialized countries not generally considered tax havens, including the United States.* (Gordon 1981, 14)
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> *Therefore, the broadest definition of a tax haven would include any country whose tax laws interact with those of another so as to make it possible to produce a reduction of tax liability in that other country. By such a definition virtually any country might be a "haven" in relation to another.* (Picciotto 1992, 132)

For rigorous analysis of the impact of jurisdictions offering financial secrecy, a specific and objectively quantifiable definition is needed.[2] The most common term—tax haven—is probably also the most problematic. In 1981, the Gordon Report to the U.S. Treasury finds that there was no single, clear objective test that permits the identification of a country as a tax haven—instead offering a range of potential definitions, which could potentially include any jurisdiction (Gordon 1981). It is interesting to note from the quote above that Gordon effectively rules out any definition that might include the United States as a tax haven. While originally understood to imply a jurisdiction with lower tax rates than elsewhere, the term came to be used to cover jurisdictions with a great range of functions,

[2] This section draws on Cobham (2012).

many largely unrelated to taxation. Gordon stresses opacity: "By definition, all of the jurisdictions with which we are concerned afford some level of secrecy or confidentiality to persons transacting business, particularly with banks" (1981, 15).

More recent literature has sought, more or less unsatisfactorily, to identify more specific definitions by drawing out subcategories. Eden and Kudrle (2005), for example, identify one group of havens based on type of taxation, following Palan (2002), and one based on activity, following Avi-Yonah (2000) and Kudrle and Eden (2003). Palan, Murphy, and Chavagneux (2010) create an ideal typology of tax havens refined by the niche strategies each tax haven may engage in. Notwithstanding the intersecting nature and complication of these various definitions, analysis under the heading tax haven tends to focus, understandably, on tax aspects. This view is most commonly associated with the Organization for Economic Cooperation and Development (OECD). While an earlier report (OECD 1987) focuses on reputation, there is somewhat more precision in an OECD (1998) report. Specifically, the 1998 report emphasizes no, or only nominal, taxes as the starting point for the identification of a tax haven, but it also emphasizes the lack of an effective exchange of information, lack of transparency, and the absence of substantial activities.

The overarching rationale for the existence of tax havens that emerges from this approach is the provision of relief to businesses or individuals from the rates of tax that apply elsewhere. To achieve this, either the economic activity (in substance) has to be moved to a new location from the original jurisdiction, or alternatively taxing rights have to be transferred by other means (manipulation of the form).

This dichotomous approach, separating jurisdictions into nonhavens and varying categories of tax havens, remains fraught with difficulty for research purposes. Two high-profile economic articles, two decades apart, illustrate the issue. Hines and Rice (1994) and Johannesen and Zucman (2014) assess the impact of tax havens on U.S. corporate tax and the true net foreign asset positions of rich countries, respectively. Hines and Rice (1994: 40) note the absence of a clear definition, and that "this vague characterization makes the process of classifying tax haven countries somewhat arbitrary," before combining IRS and other lists, along with some ad hoc decisions around scale of finance. Johannesen and Zucman (2014) apply a list drawn from work undertaken by the OECD over the course of many years, which the authors have adjusted in vague terms.[3] Both articles, however, draw clear conclusions about the scale of impact of tax havens.

In early work by economic geographers on the subject, the term tax haven has been described as a narrow, outdated and possibly stigmatizing label, which the authors mostly discarded in favor of the (then) new, more neutral and broader term offshore financial center (e.g., Roberts 1994; Cobb 1998; Hampton 1996; Warf 2002; Hudson 1998b). Another implicit rationale for the shift toward using offshore financial center instead of tax

[3] Similarly, Zucman (2014) provides no definition but offers a broad discussion of some typical activities and a list in the appendix.

haven was the greater relevance in the global economy resonating with the former term. This trend of ascribing a growing role to what is understood as offshore finance is encapsulated well by Maurer's (2008: 160) famous quote: "Far from a marginal or exotic backwater of the global economy, offshore in many ways is the global economy."

The uncertainty stemming from a dichotomous approach as to what should be rightfully labeled onshore or offshore has, however, been inherited from the tax haven terminology. By some, offshore is used to indicate virtually all cross-border economic phenomena, such as in the literature on offshoring (Clark and Monk 2013; Grossman and Rossi-Hansberg 2008). Others have used the terminology to include some subset of cross-border economic activity by focusing on certain characteristics (such as low regulation, low taxation, or secrecy) (Wainwright 2013) or by comparing those characteristics with onshore (Roberts 1994). Hampton (1996) differentiates between tax havens and three types of offshore financial centers. While the former are defined by "no, or at best, low, direct and indirect tax rates compared with the other jurisdictions," the latter are seen as centers that host "financial activities that are separated from major regulating units (states) by geography and/or by legislation" (Hampton 1996 4–5, 10). However, as the author acknowledges, the operationalization of both terms, as well as differentiating between them, remains very difficult.

The lines of the offshore/onshore dichotomy blur further in Hudson's (1998a) work. He defines offshore as meaning "beyond the regulatory reach of the onshore authority," and frames the setting up of International Banking Facilities (IBFs) in New York as an attempt to create "offshores onshore," adding valuable complexity but further eroding the conceptual clarity of a dichotomous divide Hudson's (1998a, 6). Wójcik (2012a, 7) explicitly acknowledges that being an offshore jurisdiction or not "cannot be answered with a simple yes or no. Just like world cityness, it is a matter of degree." In a similar vein, Coe, Lai, and Wójcik (2014, 765) discuss the problems of drawing a clear-cut division between offshore and onshore by pointing to midshore finance centers, which are a chimera of both, or the counterintuitive finding that "some onshore jurisdictions (e.g. Delaware, Miami) could be more lax than offshore ones."

The latest approach for empirical analyses around offshore is exemplified by (Wójcik 2012a, (7), who defines offshore jurisdictions as "jurisdictions that specialize in attracting the registration of [investment vehicles] with foreign sponsors." Emphasis is placed on the term investment vehicle, which appears to exclude a priori important banking centers, such as Switzerland or Germany, by focusing heavily on the place of registration of certain legal entities such as shell companies, trusts, special purpose vehicles, and mutual funds. The operationalization of an offshore jurisdiction employed by Wójcik (2012a) relies on a consensual approach originally pioneered by Palan, Murphy, and Chavagneux (2009), later relabeled expert agreement (Haberly and Wójcik 2014).

This expert agreement approach relies on a metalist of tax havens, fed by a review and scoring of the numbers of hits by 11 lists of tax havens and offshore financial centers compiled over the course of over 30 years by different international organizations and researchers (Haberly and Wójcik 2014). The authors use varying levels of expert agreement around tax haven listings and offshore financial centers to empirically test the offshoreness of foreign direct investment (FDI), acknowledging the possible futility in insisting on a conceptual division between tax havens and offshore financial centers. Instead, the authors maintain (Haberly and Wójcik 2014, 5) that "What defines offshore finance, however, is less the jurisdiction within which transactions are booked or conducted, than their conduct in a networked transnational legal space produced by the lack of a clear legal basis for multinational activity." As this suggests, understanding tax havens and offshore finance requires an analysis of extraterritorial impact. The important challenge thus appears to be how to move from a realization that offshore is a pervasive aspect of the world economy, rather than a group of troublesome (small) jurisdictions, to a definition that can be made operational for research and policy purposes.

Beyond economic geography, offshore financial center (or OFC) is preferred, for example, by the International Monetary Fund (IMF), the mandate of which is more closely aligned to issues of international financial regulatory oversight and stability than to issues of tax. Palan (1998, 64) explores some of the difficulties of consistent definition in this case, noting that in the financial literature "offshore is used […] to describe unregulated international finance […] Rather confusingly, however, the International Monetary Fund and the Bank for International Settlements consider only tax havens as Offshore Financial Centres, though the City of London, which does not qualify as a tax haven, is considered the hub of global offshore finance.".

An important IMF Working Paper by Zoromé (2007, 7) discusses the definitional issues in some detail, proposing a specific, measurable definition: "an OFC is a country or jurisdiction that provides financial services to nonresidents on a scale that is incommensurate with the size and the financing of its domestic economy." He goes on to identify such OFCs by examining the ratio of net financial service exports to gross domestic product (GDP) from IMF balance of payments data and by looking at jurisdictions with especially high values (an approach that we discuss further and build on later in this article).

The key difference between the IMF's preexisting list and Zoromé's (2007) findings is the addition of the United Kingdom, which neatly illustrates the value of using objective criteria: a level playing field (including politically uncomfortable findings) may be more likely to emerge. Where Hudson (1998b), for example, is explicit about London as the long-standing home to offshore business—most obviously, the Eurodollar market—neither the London nor the United Kingdom appears on any of the common lists. Despite the advantage achieved by using quantitative criteria, Zoromé's (2007) approach retains the preference for a binary list of locations of concern.

The third main term used—and increasingly so since it was defined and promoted by Murphy (2008)—is secrecy jurisdiction. It is not entirely clear when the term was used for the first time, but, according to Peet and Dickson (1979), it featured in a report by the U.S. House of Representatives (1970). The focus remains on specific actions taken, but by employing the word jurisdiction, the legal realm is emphasized. This follows the logic of Palan (2002), who discusses the commercialization of sovereignty: the decision by certain jurisdictions to obtain economic advantage by allowing selected political decisions (over, for example, the taxation of nonresidents) to be dictated by those likely to benefit from the decision (for example, financial, legal, and accounting practitioners). [4]

The emphasis on secrecy is necessary, Murphy (2008) argues, because it is this that allows nonresidents to take advantage of favorable features in the jurisdiction's legal framework with the confidence that they will not run afoul of the legal system in the places where they reside. There are thus two key characteristics that define a secrecy jurisdiction:

"The secrecy jurisdiction creates regulation that they know is primarily of benefit and use to those not resident in their geographical domain"

"The creation of a deliberate, and legally backed, veil of secrecy that ensures that those from outside the jurisdiction making use of its regulation cannot be identified to be doing so." (Murphy 2008, 6)

By focusing on what makes them attractive, the secrecy jurisdiction concept therefore relies, above all, on an assessment of the comparative advantage of the jurisdictions in question. The route the secrecy jurisdictions have chosen, in order to attract (the declaration of) foreign economic or financial activity is the provision of relatively favorable terms to nonresident users. In effect, this indicates a reliance on regulatory arbitrage (potentially, but not necessarily, including tax regulation).

To be successful over time, such behavior should be hidden as far as possible from the views of regulators in those other jurisdictions, elsewhere, who may take countermeasures to frustrate the arbitrage. A major role of secrecy therefore is to facilitate changes in the form, but not the substance, of economic activity so that for regulatory purposes, it appears to take place elsewhere. In the extreme, structures are established such that activity appears for regulatory purposes to take place nowhere (Murphy 2008). For example, the recent U.S. Senate hearings into Apple discovered that the information technology giant had managed to create corporate entities in Ireland, which for tax purposes had no jurisdiction—most significantly, Apple Operations International, which reported net income of $30 billion from 2009 to 2012 and filed no corporate tax return anywhere (U.S. Senate Permanent Subcommittee on Investigations 2013).

[4] The idea that political decision making can be distorted, so that becoming a secrecy jurisdiction may damage democratic representation, is explored further under the name *the finance curse* (Shaxson and Christensen 2013).

The ideal approach for the identification of secrecy jurisdictions might therefore contain two separate components: one reflecting each jurisdiction's (objectively measurable) performance against key indicators of secrecy—that is, how far they have gone in terms of Murphy's (2008) second criterion above—and one reflecting each jurisdiction's importance in the global provision of financial services to nonresidents (i.e., their quantifiable scale)—that is, their success according to Murphy's first criterion. Equally, these components can be considered in the terms of Held et al. (1999) as measures of intensity and extensity, combined to show impact propensity. In addition they combine emphasis on internal policy decisions, and—in line with van Hulten (2012)—extraterritorial reach. In the following two sections, we lay out the basis for our attempt to assess each component.

This approach has two main theoretical and conceptual advantages over the other two terminologies. First, by focusing on secrecy and transparency, the empirical determination of a jurisdiction's intensity of providing secrecy becomes inherently easier than for tax or other regulatory aspects. Since properly enforced transparency should be easily observable in many cases, the comparative evaluation of a jurisdiction's policies becomes more feasible. The resulting secrecy spectrum on which a jurisdiction's policies can be positioned results in overcoming the dichotomy trap, a second major advantage over the other terminologies.

There is a potential, conceptual drawback to this approach. Popular views rely heavily on tax: for example, the Cayman Islands are a tax haven because of the absence of any taxes on individual income and corporate profits, and regardless of any other characteristics such as transparency.[5] Arguably this viewpoint confirms the weakness of the term tax haven, for even in this example, the concern would not be with the Cayman Islands' competing, through low tax rates, to attract real activity. Rather, the concern is that the Cayman Islands may attract profits or incomes that are, in fact, derived from economic activity taking place elsewhere: so that the central feature of the behavior is not to offer lower tax for the same activity but to separate the recording and accounting of the tax base from the jurisdiction where it actually arises. What makes the low or zero tax rates attractive for this type of process, as opposed to the relocation of real activity, is the potential to hide relevant details from the jurisdiction where the tax base arises but from which it has now been separated.

Similarly, consider recent 'Luxleaks' (ICIJ 2014) revelations about near-zero taxation agreements for certain financial activity of multinationals in Luxembourg. Irrespective of their lawfulness, they resulted in major tax losses in other jurisdictions; but while this had been known in some circles for some time, it is only the current wave of public transparency that has resulted in political pressure to make such activity impossible. As such, the unacceptable feature (for other EU countries) of the process was not the low tax rates, but

[5] We are grateful to an anonymous reviewer for highlighting this view.

rather the ability to hide the large shifts of tax base. (Whether the key to acceptability was hiding this from tax authorities, or from citizens, is an interesting research question.)

Equally, revelations about Irish tax treatment of major multinationals (e.g. Pinsent Masons, 2014)) has caused intense pressure for adjustment of the approach. While again the low or zero tax rate provided the ultimate benefit for business, it was the lack of transparency that made the arrangements politically sustainable. In both the Luxembourg and Ireland cases, the true tax rate was itself hidden so that any external assessment based on the statutory rate or on effective rate constructed from public data would not have reflected the full tax haven-ness of these states.

An alternative approach to the secrecy jurisdiction focus could be to consider a jurisdiction's tax haven-ness as depending on the degree to which it is able to attract the tax base of economic activity that takes place elsewhere. This would align with an ongoing policy process: at the behest of the G8 and G20 groups of countries, the OECD is currently in the middle of a two-year process, the Base Erosion and Profit Shifting (BEPS) initiative, which has the explicit aim of reforming international corporate tax rules to achieve better alignment between the location of corporate profits and the underlying, real economic activity (OECD 2013). BEPS Action Point 11 (out of 15) requires creation of a baseline estimate, hitherto lacking, on the extent of misalignment.

Current work using survey data on U.S .multinationals (IMF 2014) and global balance sheet data (Cobham and Loretz 2014) identifies a set of jurisdictions that systematically obtain a disproportionately high share of the corporate tax base in relation to their hosting of (real) economic activity: for example, Luxembourg, Ireland, and the Netherlands are identified in both studies. While the samples in these studies are dominated (in both home and host economies) by rich countries, it is conceivable that future work will overcome these constraints in order to produce a more balanced, global picture of the jurisdictions that lead in this measurable aspect of tax haven-ness. Even then, of course, being a hub for corporate profit shifting is just one aspect of haven-ness (probably the most researched so far as in Karkinsky and Riedel [2012] or Janský and Prats [forthcoming]); other measures would be needed to capture, for example, jurisdictions' role in the evasion of personal income and wealth taxation (see, e.g., Zucman 2014).

As the secrecy jurisdiction has not yet been used by economic geographers except for a cursory mention from Wójcik (2012a), it is an objective of this article to establish the concept. For the remainder of this article we define secrecy jurisdiction in line with Meinzer (2012a, 1) as a jurisdiction that "provides facilities that enable people or entities to escape or undermine the laws, rules and regulations of other jurisdictions elsewhere, using secrecy as a prime tool."

2.3 Secrecy scores, from policy measures

A situation of financial transparency may be characterized (1) by relevant information being placed on public record for all stakeholders to access; (2) by access on certain private financial data only by authorized authorities (such as tax administrations, police, etc.); or (3) by collecting, analyzing and sharing relevant information effectively with foreign counterparts. These are the areas in which we address the creation, by policy, of secrecy.

We have constructed 15 explicit, detailed, and verifiable indicators that measure the secrecy provided to nonresidents in the laws and regulations of jurisdictions. As a proxy for secrecy provided to nonresident investors, these key financial secrecy indicators (KFSI) change over time subject to refinement and data availability. Taken together, these indicators result in one compound secrecy score allocated to each jurisdiction. The scores are normalized to a range of zero (perfect transparency) to 100 (complete secrecy) and in practice vary between 32.4 (Sweden) and 88 (Samoa). For the FSI 2013, 82 jurisdictions are included, and the data set used for this article includes an additional five jurisdictions, bringing the total to 87.[6]

The data set underlying the 15 KFSIs is available online for review, and linked to underlying sources (FSI 2013a). The main and preferred data sources were official and public reports by the OECD; the associated Global Forum on Transparency and Exchange of Information for Tax Purposes (hereafter Global Forum; Meinzer 2012b); the Financial Action Task Force (FATF); IMF; and the U.S. State Department's annual International Narcotics Control Strategy Report (e.g., U.S. Department of State (2013), which in one volume contains country reviews, including specific and comparative anti–money laundering data.

In addition, specialist tax databases and websites such as by the International Bureau of Fiscal Documentation, PriceWaterhouseCoopers (Worldwide Tax Summaries), Lowtax.net, and others have been consulted.[7] Furthermore, surveys have been sent to the ministries of finance and the financial intelligence units of all 87 reviewed jurisdictions, which included targeted questions about the jurisdiction's tax and regulatory system. The questionnaires sent to the ministries of finance and to the financial intelligence units can be viewed online: see FSI (2013b) and FSI (2013c), respectively. All jurisdictions had the opportunity to provide up-to-date information by answering the questionnaires.

Out of a maximum of 202 variables available in the database for each jurisdiction, up to 49 are used to compute the secrecy score. Each of the 15 indicators is weighed equally. For

[6] The relevant data on five additional countries were generated for the Center for Global Development, to be used as part of the Commitment to Development Index, which ranks rich countries on the development impact of their policies and incorporates the FSI (Janský forthcoming).

[7] These databases were accessible at the following addresses: http://www.ibfd.org/IBFD-Tax-Portal/About-Tax-Research-Platform, http://taxsummaries.pwc.com/uk/taxsummaries/wwts.nsf/ID/PPAA-85RDKF, http://www.lowtax.net/.

some indicators, data availability and comparability is a problem. For instance, a publication by the OECD (2013) with specific comparative information on tax administrations used for two of the 15 indicators contains information for a total of 52 countries, out of which only 34 are included in the FSI 2013. For these two indicators, this leaves 48 countries of the FSI 2013 without a primary data source. If a jurisdiction did not respond to the questionnaires, and if (in some cases) follow-up enquiries with local researchers did not yield additional insights, this absence of data is reflected in the database by marking the relevant field as *unknown*. However, when constructing the indicators, the jurisdictions without data have been assessed under these circumstances as if their policies with respect to the particular indicator under assessment provide secrecy. Absence of data was awarded a secrecy score.

The guiding principle for data collection was to always look for and assess the lowest standard (or denominator) of transparency available in each jurisdiction. For example, if a jurisdiction offered three different types of companies, two of which required financial statements to be published online, but the third is not required to disclose this information, then we have answered the particular question about the online availability of accounts with *no*.

The 15 KFSIs can be grouped around four broad dimensions of secrecy: (1) knowledge of beneficial ownership (three KFSIs); (2) corporate transparency (three KFSIs); (3) efficiency of tax and financial regulation (four KFSIs); and (4) international standards and cooperation (five KFSIs). A brief discussion of the four groups follows below; a more complete description of each indicator is provided in the Methodology report, available online (Tax Justice Network 2013a).

For the first group of indicators, the notion of beneficial ownership of assets and legal entities and structures has its roots in the anti–money laundering discourse that began in the 1990s (Blum et al. 1998; Cuellar 2003; Levi 2002; Pieth and Aiolfi 2003; Carrington and Shams 2008; Unger 2007; UN Office on Drugs and Crime 2007).

The FATF (2012, 110) defines beneficial owners as the "natural person(s) who ultimately owns or controls a customer and/or the natural person on whose behalf a transaction is being conducted. It also includes those persons who exercise ultimate effective control over a legal person or arrangement." This view is shared only partly by the international tax community. In a report published at the request of the Financial Stability Forum, OECD (2001) explicitly uses the notion of a beneficial owner being a natural person. Contrary to this, the influential model tax convention of the OECD (2008) suggests that a beneficial owner can be a legal entity.

The OECD's annual tax cooperation reports ((OECD 2006, 2007, 2008, 2009a, 2010)) 2006–10 also illustrate the confusion here. While OECD (2006, 148) clearly defines the term *legal owner*, it refers to the term *beneficial owner* only in circular logic: "Legal ownership refers to the registered owner of the share, which may be an individual, but also

a nominee, a trust or a company, etc. Beneficial ownership reporting requirements refers to a range of reporting requirements that require further information when the legal owner is not also the beneficial owner."

For the purposes of the FSI, we apply the concept of beneficial ownership broadly, as defined by the FATF, to bank accounts (KFSI 1), trusts and foundations (KFSI 2), and corporate entities with limited liability (KFSI 3).

The second dimension of financial secrecy relates to companies. Given the pervasiveness of companies in offshore finance as the basic vehicle to commit crimes and engage in abusive behavior, and considering their privileges granted by society, for instance, in terms of limited liability, it can be argued that corporations ought to be subject to a higher standard of transparency than merely submitting information to some registry. In order to prevent market failures and distortions through information asymmetries, the public at large, regulators, investors, and consumers should be able to easily find out about the activities of any corporate vehicle along various dimensions. KFSI 4 assesses if beneficial, or at the very least, legal ownership is accessible over the Internet for less than 10US$/€. KFSI 5 reviews whether the financial statements of each type of company with limited liability is accessible online again for less than 10US$/€. KFSI 6, in turn, asks if countries require companies to submit and publish certain financial data on a country-by-country basis.

Third, we are concerned with the efficiency of tax and financial regulation. While at first glance, efficient tax or financial regulation is not related directly to financial secrecy, one way of preserving secrecy in financial matters is to encourage a culture of noncompliance by, among others, not monitoring domestic economic actors by failure to collect basic information (KFSI 7). Similarly, dispensing with basic tools for efficient tax administration (such as the reliance on taxpayer identification numbers for matching information from various sources) can help to encourage noncompliance (KFSI 8). Furthermore, if countries create strong incentives for other countries to enter into bilateral tax treaties, this opens new doors for tax avoidance and increases secrecy through complexity in international taxation (McGauran 2013; Weyzig 2012; Rixen 2008; Picciotto 1992). On the other hand, countries can also create strong incentives for other nations to lower their tax rates and thereby encourage investors from all over the world to seek low or zero tax rates, which, in turn, invite undeclared, secretive investments for tax evasion or avoidance purposes (KFSI 9).

Finally, compliance with international standards and the level of international cooperation is assessed. Over the last decades, international efforts at enhancing cooperation in financial matters have increased either by *hard* international law or through best practice standards and associated evaluations of their implementation (*soft law*; Abbott and Snidal 2000). Most relevant for assessing financial secrecy are the evolving anti–money laundering regimes (KFSI 11), various tax information exchange initiatives (KFSI 12 and 13), as well as generic international judicial cooperation (KFSI 15), as an important law enforcement

tool mostly for high-profile crimes beyond *simple* tax evasion. Furthermore, a series of thematic international conventions contain commitments related to financial transparency (KFSI 14).

A possible drawback to the secrecy jurisdiction approach is the following. The conceptual basis allows objective, verifiable criteria to be used in place of the expert list approach that has been necessary to make any progress with the term *tax haven*. However, the choice of criteria is necessarily subjective, as in any index. While the criteria reflect a range of international standards and related mechanisms, any given observer could reasonably make a case for focusing only on some aspects—on, say, the extent of company beneficial ownership information and its international exchange, while setting aside banking secrecy and much else.

While the eventual choice of FSI criteria has developed over time through wide engagement with country and thematic experts, the basis for this particular choice is similar to that for expert lists of tax havens. One difference, of course, is that the process itself and the criteria are entirely transparent and verifiable, allowing any observers to corroborate the degree of secrecy of any particular jurisdiction or, instead, to fashion their particular choice of criteria into an alternative secrecy score.

In what follows, we present the FSI as published and consider how the resulting geography of secrecy differs from other analyses. At the same time, we recognize that narrower, broader, or differently weighted combinations of secrecy components would yield (sometimes substantial) variations. Equally, the FSI could be seen as a complementary instrument to the analysis of tax rates, for example. However, for the reasons discussed above, robust measures of *haven-ness* based on public tax rate data alone are likely to remain elusive, even if definitional issues can be resolved.

2.4 Global scale: the provision of financial services

We are interested in which countries affect financial secrecy globally, rather than in countries with high secrecy scores, but without significant impact. Therefore the second component of the FSI is the global scale weight (GSW) attributed to each jurisdiction, and this is based on the assessment of the size of each jurisdiction's share of the global market for financial services provided to nonresident clients. We explain how this assessment is made, before considering potential criticisms of the approach. Our methodology for the calculation of the GSW builds on the work of Zoromé (2007). Zoromé relies on the relative *intensity* of the provision of financial services to nonresidents by taking a measure of financial services exports and scaling by jurisdictional GDP.

Here we are concerned not so much with intensity (domestically), but impact (globally), so we measure the market share of each jurisdiction (that is, each jurisdiction's provision of financial services to nonresidents, as a ratio to the total global provision of services to

nonresidents across all jurisdictions, rather than as a ratio to the jurisdiction's own GDP). As Cobham (2012) shows, taking global contribution rather than relative intensity in the provision of financial services to nonresidents leads to quite a different picture: with 2007 data, the former criterion points to Cayman Islands, Luxembourg, Switzerland, the United Kingdom, and the United States, while the latter points, instead, to Bermuda, Cayman Islands, Guernsey, Jersey, and Luxembourg.

The global scale weights are based on publicly available data about the trade in international financial services of each jurisdiction. The preferred data source is the IMF's Balance of Payments Statistics (BOPS), which provides data on international trade in financial services, and this extends to 53 of our 87 jurisdictions. We employ data from BOPS based on two different manuals, BPM5 (IMF 1993) and BPM6 (IMF 2013a). When available—mostly years 2005 to 2011—we use data on the basis of BPM 6. Otherwise—mostly for years prior to 2005—we use an earlier edition, BPM 5. We do not find substantial empirical differences between the two. For 2011, the recent year with most available data, the BOPS cover 116 jurisdictions for exports.[8]

For the rest of the sample, we extrapolate from IMF data on stocks of internationally held financial assets to derive trade or flow estimates (again following Zoromé, 2007). Data on stocks of portfolio assets and liabilities are taken from two IMF sources: the Coordinated Portfolio Investment Survey (CPIS) (IMF 2013b) and the International Investment Position (IIP) (IMF 2013c) statistics, of which the latter is part of the BOPS. CPIS data for 2011 cover 76 jurisdictions for total portfolio assets, and 215 jurisdictions for total portfolio liabilities, which are derived from reported assets. IIP data for 2011 cover 112 jurisdictions, and is filtered (again following Zoromé, 2007) to exclude FDI, reserve assets, and all assets belonging to general government and monetary authorities.

There is an argument for preferring liability data to asset data, since it ought to reflect—for example—that French clients holding assets in German banks create a German services export and a German liability. However, there are two reasons to use assets. First, it is assets that are directly reported by jurisdictions. These data are therefore more likely to capture the full range of assets, rather than liability data, which are inferred by inverting the stated asset claims of other jurisdictions, and hence are likely to be incomplete. Second, a jurisdiction's overseas assets, beyond a certain point dictated by their domestic economic structure (a different point for the United States compared to that for the island of Jersey, for example), will be managed on behalf of nonresidents and hence also indirectly reflect the export of financial services. As would be expected given the nature of financial markets, there is a strong correlation between assets and liabilities where data for both are present.

We use liabilities data to extrapolate values of assets where neither assets nor financial services exports are reported. The adjusted data on stocks of assets are then used to estimate

[8] The 2013 index is based on data available in mid-2013. More timely updates of this important data set would, in general, allow more recent data to be used.

current flows of financial services. We aim to improve on the IMF extrapolation by using a panel of data (2001–11) rather than a single year on which to base the extrapolation, which appears to allow marginally more accurate estimation of flows from stock data. The implied coefficients (all significant at the 1 percent level) are very similar regardless of the specification chosen, including fixed-effects panel regressions. We ultimately select a pooled ordinary least squares (OLS) regression to allow the constant to be constrained to zero (allowing a nonzero constant only trivially affects the goodness of fit, which is between 0.83 and 0.85 under each specification we consider).

We also use liabilities data to assess the reasonableness of reported assets, which leads us to identify a discrepancy specific to the Cayman Islands. Here the recorded value for liabilities—that is, that based on the recording of other jurisdictions—far exceeds the declared value for assets. To see this, we consider the difference in recorded values of liabilities minus assets, as a ratio to jurisdictions' GDP. This allows us to scale the size of the difference according to jurisdiction so that, for example, Jersey is not necessarily more likely to stand out than the United States. We use GDP from the World Bank's World Development Indicators (World Bank 2013) or, when not available, from the CIA's World Factbook (CIA 2013). Also, where necessary we use the values of GDP from the closest year available.

The ten highest recorded values of liabilities minus assets as a ratio to jurisdictions' GDP all relate to one jurisdiction: the Cayman Islands. For only one other jurisdiction is there a ratio greater than 10 in any year (for the Netherlands Antilles that no longer exists). For all 11 of the Cayman observations from 2001 to 2011, the ratio exceeds 250, with the highest values (in excess of 500 times GDP) all recorded in the most recent years.

This feature of Cayman-declared data is confirmed by IMF researchers Lane and Milesi-Ferretti (2010) and by Zucman (2014), who noted that it results from the Cayman Islands—unlike all other major reporters—reporting only on its banks' portfolio holdings and excluding those of its large hedge fund industry.

We therefore impute a value for Cayman Island assets. We proceed with the assumption that the liabilities data—as recorded by all other reporting jurisdictions—is the most accurate reflection of the Caymans' activity and therefore extrapolate an alternative asset measure.

To do this, we perform a simple OLS regression of our asset value on CPIS reported liabilities, with no constant, using the pooled data for all jurisdictions except the Cayman Islands, from 2001 to 2011. Taking the coefficient (2.05) as the average ratio of assets to liabilities in our data set, we multiply the 2001–11 values for Cayman Island liabilities by this to obtain a value for Cayman Island assets, which we believe reflects more closely the actual scale of Cayman Island activity in offshore financial services. Given the IMF analysis (Lane and Milesi-Ferretti 2010), this is likely if anything to be an underestimate.

In total, we are able to create flow data (true or extrapolated) for a total of 217 jurisdictions, which we believe cover the majority of the global provision of financial services to nonresidents (and a vast majority of the total of 245 jurisdictions considered in our analysis).

Finally, we can use the total level of financial service exports for the 217 jurisdictions and take the exports of each of the FSI jurisdictions with available data as a share of this global total. This creates a global scale weight reflecting the relative importance of each jurisdiction.

The Global Scale Weight is defined as

$$Global\ Scale\ Weight_i = \frac{Exports\ of financial\ services\ (true\ or\ extrapolated)_i}{Sum\ of\ all\ world\ exports\ of financial\ services\ (true\ and\ extrapolated)}.$$

The total global scale weight for the 80 FSI jurisdictions with data is 96.85; rising to 97.27 when we include the additional five countries assessed separately.

It is important to note that this weighting alone does not imply harboring or supporting inappropriate behavior by the jurisdictions in question. Arguably, those near the top should be congratulated on their success in the field of international trade in financial services (although in light of recent examples, such as Iceland, Ireland, and Cyprus, they may, of course, also want to consider the extent of their reliance on this risky sector). Rather, the GSW is an indicator of the potential for a jurisdiction to contribute to the global problem of financial secrecy, *if* secrecy is chosen in the range of policy areas discussed above.

We believe that this methodology represents the most robust possible use of the available data, given its limitations, as a means to evaluate the relative contribution of different jurisdictions to the global total of financial services provided to nonresidents. The fact that researchers must follow such a convoluted path to reach this point is evidence of the failure of policy makers to ensure that global financial institutions and national regulators have access to the necessary data to track and understand international finance.

2.5 The FSI: a new geography of financial secrecy

The FSI reveals a new geography of financial secrecy, with two main features. First, the FSI reveals the dominant role of a number of major economies—in contrast with the emphasis on small island states that tax haven lists prepared by multilateral organizations have long exhibited. Second, the FSI shows a contrasting view of corruption to that of the most high-profile alternatives such as Transparency International's Corruption Perceptions Index (CPI) (Transparency International 2012).

The final step in creation of the FSI is to combine the ranking by scale of activity with the secrecy scores, in order to generate a single number by which jurisdictions can be ranked,

reflecting the potential global harm done by each. As with the choice of secrecy indicators and their relative weighting in the secrecy score, and with the focus on financial services exports to determine relative scale, the method of combination cannot be objective. Underlying the choice made is a desire for neither secrecy nor scale to dominate the final ranking.

In practice, there is significantly more variation in the scale weighting than the secrecy score, so we transform the two to generate a series with variations of a similar order. The simplest transformations that achieve this are to take the cube of the secrecy score and the cube root of the scale weight so that for each country i

$$Financial\ Secrecy\ Index\ 2013_i = Secrecy\ Score_i{}^3 * \sqrt[3]{Global\ Scale\ Weight_i}$$

The full index for 2013 is available online (Tax Justice Network 2013b). Table 1 compares the top 10 jurisdictions on the FSI, with those ranked separately by the secrecy score and by GSW. Clear differences in the geography of secrecy or of corruption are apparent: GSWs point to the largest financial centers, secrecy scores point to the smallest, traditionally noncooperative jurisdictions, while the FSI itself combines the last two to provide a picture of scale-weighted secrecy. Some major economies now come into focus, reflecting their importance in the global provision of financial services. The most secretive jurisdictions are of so little importance that they do not make the top 10 of the FSI overall; but most of the biggest players by scale are also sufficiently secretive to feature in the FSI top 10. Only the United Kingdome is sufficiently transparent to move far down the FSI (with a secrecy score just below 40, it ranks twenty-first in the FSI despite being responsible for 18.5 percent of global financial services exports).

Researchers using the index should, of course, consider the particular aims of their own work before deciding on the appropriate measure to use. Research focusing on the relative risk of illicit financial flows in transactions with different jurisdictions, for example, may require pure secrecy scores. In contrast, understanding global changes in secrecy may require a weighting, such as that in the index, in order not to be unduly swayed by the experience of a few small, highly secretive jurisdictions. The combined FSI also allows for comparison of the extraterritorial importance of jurisdictions' financial secrecy.

Table 2.1 shows two related indices: the CPI(Transparency International 2012), which combines 13 different sources based on expert opinion surveys to rank countries according to the perception of corruption and has been criticized for presenting only the perceptions of an international, largely corporate elite (Christensen 2007; Cobham 2013); and the Basel Anti–Money Laundering Index (BAMLI) (Basel Institute on Governance 2013), which is more obviously similar to the FSI and rates countries according to money laundering and terrorist financing risk, on the basis of components including international organizations' ratings. We use the detailed BAMLI Expert Edition Data, as of July 15, 2013. Note that the BAMLI includes components based on scores from the CPI (10 percent) and the FSI (25 percent).

In the BAMLI meanwhile, and above all in the CPI, some of the lowest-income countries perform worst. Simple regressions of each index or component on per capita income confirm this pattern: there is a significant positive correlation for the CPI, with income *explaining* 57 percent of variation in *corruption*, and the BAMLI (R^2 of 37 percent). Secrecy scores also tend to be worse for lower-income countries, but income only *explains* 20 percent of the variation in secrecy; for the overall FSI, the pattern disappears, with explanatory power of income falling to just 8 percent.[9]

Table 2.1: Top Ten Jurisdictions by FSI, FSI Components, and Other Indices

Ranking by	FSI	Secrecy Score	GSW	BAMLI	CPI
1	Switzerland	Samoa	United States	Somalia	Afghanistan
2	Luxembourg	Vanuatu	United Kingdom	Afghanistan	Korea, DR
3	Hong Kong S.A.R. of China	Seychelles	Luxembourg	Iran, Islamic Rep.	Somalia
4	Cayman Islands	St. Lucia	Switzerland	Cambodia	Sudan
5	Singapore	Brunei Darussalam	Cayman Islands	Tajikistan	Myanmar
6	United States	Liberia	Germany	Iraq	Turkmenistan
7	Lebanon	Marshall Islands	Singapore	Guinea-Bissau	Uzbekistan
8	Germany	Barbados	Hong Kong S.A.R. of China	Haiti	Iraq
9	Jersey	Belize	Ireland	Eritrea	Venezuela, Rep. Bol.
10	Japan	San Marino	France	Myanmar	Burundi
Average Secrecy Score	69.0	83.4	59.3	n/a	n/a
Sum of GSW	58.9%	0.07%	80.4%	0.023%	0.014%

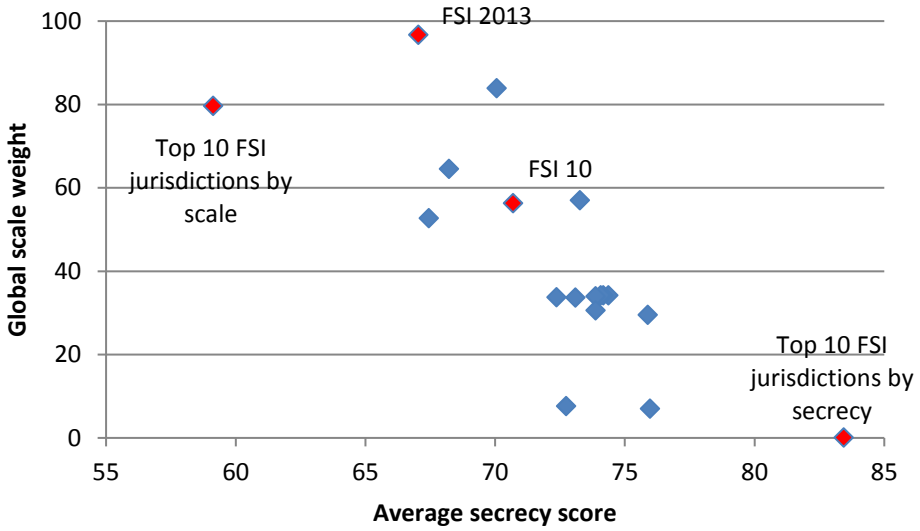
Note: FSI and BAMLI results for 2013, CPI results for 2012. Secrecy scores have not been calculated for any of the top 10 countries by BAMLI or by CPI.

In Figure 2.1, we compare the FSI results with 14 current and historic lists of tax havens by average secrecy score of included jurisdictions and total global scale weight. The information on 11 lists come directly from Murphy (2009), Irish (1982), Hines Jr. and Rice (1994), Financial Stability Forum (2000), IMF (2000), OECD (2000), FATF (2000, 2002), Hampton and Christensen (2005), Lowtax.Net (2008), Zoromé (2007), and Levin (2007). We also include three more recent lists: that of the U.S. Government Accountability Office (2008); OECD (2009), and ActionAid UK (2013), as used by the Enough Food For Everyone IF campaign, which saw more than 100 nongovernmental organizations campaign beginning in 2012 for the United Kingdom and other governments to deliver policy changes at the 2013 G8 summit. Six small jurisdictions that appear separately on one or more lists are dropped because we either do not analyze them (Anjouan, Campione

[9] Regressions not reported; available on request.

d'Italia, Ingushetia, and Turkish Republic of Northern Cyprus), or include them elsewhere (Alderney and Sark).

Figure 2.1: Tax haven lists and the FSI (by secrecy and scale)



Source: Authors.

In addition, we include the top 10 jurisdictions by scale, by secrecy, and on the FSI overall. With only one exception, the listed jurisdictions account in total for a smaller share of the GSW than the 10 biggest jurisdictions in the FSI—while their average secrecy is generally, but not always, somewhat higher than the average secrecy score for either the whole FSI or the top 10. The lists, almost without exception, have focused attention on smaller, somewhat more secretive jurisdictions—to the exclusion of only somewhat more transparent, much bigger players.

While this assessment is far from definitive, two main conclusions are suggested. One is that measures of de facto and de jure compliance with specific anticorruption measures—whether in the BAMLI or FSI secrecy score components—seem much less strongly correlated with per capita income levels than is the CPI. The other is that by including a measure of the scale of jurisdictions' potential contribution to the global problem of secretive flows, rather than seeing each jurisdiction in isolation, the FSI highlights the major financial players—instead, perhaps, of jurisdictions with poor performance but minimal impact on others. In this way the FSI presents a new view of the geography of financial secrecy: one that highlights the influence that jurisdictions exert extraterritorially through financial secrecy.

2.6 Conclusions

The FSI reflects an effort to assess financial secrecy on the basis of verifiable, empirical data. As such, it shows a spectrum of secrecy rather than a binary distinction between tax havens and others. The resulting global mapping reflects the pervasiveness of secrecy and the leading role of some major economies including those of the United States and the United Kingdom. This article's theoretical contribution lies in two strands of literature. Martin's (2001) landmark discussion of the "missing agenda" of policy-relevant economic geography research has created a body of literature that theorizes around institutional change (Varró 2014; Isserman and Markusen 2013; Woods and Gardner 2011, among many others) or relates geographic approaches with specific policy fields such as industrial agglomeration (Swords 2013), finance (Dixon 2014), social media (Kitchin et al. 2013) or urban planning (Loopmans 2008). The FSI contributes to both strands of policy-relevant economic geography by providing an economic geographic perspective in the policy field of international taxation and "tax competition." At the same time, the FSI argues that a shift is required from a narrow tax focus onto broader financial secrecy and transparency matters in order to facilitate effective policy change. Because increased financial transparency has the potential for educating and mobilizing the electorate about the harm caused through financial secrecy, there is greater likelihood for democratic societies to overcome the resistance of powerful vested interests in favor of maintaining the status quo (Meinzer forthcoming).

In an earlier work on an ill-defined but popular term, Sidaway and Pryke (2000: 187) consider the case of *emerging markets*. Among their findings is that the use of the term to reflect the strange and exotic other "belies deeper continuities with colonial geographical imaginations"; in other words, the use of the term, and its uncertain definition, reflects, to some extent, a power dynamic and a set of interests.

The parallel here is that the use of the term *tax havens* by policy makers is almost uniquely associated with expressions of dismay and belligerence (cracking down, or shutting havens), or of denial and otherness (the common refrain, *we are not a tax haven*).[10] While many of the jurisdictions in question are revealed in the FSI to be highly secretive, and sometimes to play a potentially major role in global secrecy, the difference in our approach is that major economies are ranked by the same standard—rather than being able to rely on political power to ensure they remain outside any lists compiled.

The largely futile attempts to tackle tax havens over the last decades bear witness to the inadequacy of the chosen terminology and methods. Johannesen and Zucman (2014, 65) show that the recent crackdown only modestly affected offshore funds, and at best "caused a relocation of deposits [to] the benefit of the least compliant havens." We argue that the

[10] For a collection of recent statements of this form from jurisdictions, see http://www.taxjustice.net/2014/03/14/tax-haven/.

misguided division into tax havens and others lies at the heart of this failure to provide a more comprehensive (and effective) response. In contrast, the policy agenda developed at the G20 and more recently at the 2013 G8 summit mirrors the shift undertaken by the FSI in focusing on financial secrecy instead of direct tax aspects, and hence in starting with major economies rather than small financial centers.

It is not inconceivable that a rigorous, widely held definition of tax havens could emerge; and over time, advances in data could allow such a definition to become robustly measurable in a way that supports more nuanced findings and more detailed research and policy analysis. At present, however, only the FSI or some variation on this approach appears to offer that possibility.

The shift of emphasis away from tax, which is embodied by the FSI, leads to a second, emerging strand of economic geography literature on the geography of transparency (Wójcik 2012b). As Wójcik (2012b) finds for country-by-country reporting by multinational companies, the FSI seeks on a broader basis to "help keep alive a public deliberation on the architecture of the international tax system." The FSI's criteria-based approach, and the resulting spectrum of secrecy, offers the potential to inform more sustainable and effective policies for changes. In a similar way, it could also contribute to more robust research findings than those that rely on tax haven lists. The detailed secrecy scores can also allow researchers to explore whether particular types of secrecy play a particular role in determining, for example, the benefits, or otherwise, of particular economic and financial flows (e.g., is economic growth more or less likely to result from FDI made through jurisdictions that allow secrecy about company ownership?).

Further extensions could include the development of country-specific rankings, recognizing that different secrecy jurisdictions will be more relevant for some countries than for others. The construction of such a ranking would rely on the same scoring of secrecy but would substitute for GSWs with weights to reflect the importance of bilateral partner jurisdictions for the country in question—so we might call this a *bilateral FSI*. Such an analysis carried out for the Czech Republic, using the 2011 FSI, revealed a top five of Austria, United States, Belgium, the Netherlands, and Panama.

This approach can identify country-specific vulnerabilities, revealing further detail about the geography of financial secrecy. As Cobham (2014) illustrates for a range of African countries, it is also possible to use other bilateral economic data in order to rank vulnerabilities in other areas (e.g., to compare the risk a country faces in its direct and portfolio investment). This kind of analysis could be particularly useful for countries with limited resources to tackle illicit financial flows, by highlighting for policy makers the most relevant secrecy jurisdictions for a given country and type of economic activity.

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Chapter 3

Updating the Rich Countries' Commitment to Development Index: How They Can Help Poorer Ones through Curbing Illicit Financial Flows[1]

Abstract: Over the recent years illicit financial flows have attracted increasing attention from researchers and policy makers because of their negative effects on poor countries. In 2013 the mostly rich countries' OECD acknowledged illicit flows as an issue of "central importance". Since 2003, the Center for Global Development has been publishing the Commitment to Development Index (CDI) which ranks rich countries on their policies which affect poor countries. This essay rationalizes the inclusion of indicators of policies affecting illicit financial flows in the CDI, in addition to the previously included policies of aid, trade, migration, environment, security, technology and investment. It provides a survey of existing approaches to measuring illicit financial flows, discusses possible metrics which could be included in the CDI, evaluates how such indicators might be incorporated into the CDI, and proposes changes to current CDI indicators. The qualitative indicators of the Financial Secrecy Index emerge as the best contribution to the newly renamed and updated finance component of the CDI. This proposed change has been implemented in the latest edition of the CDI published in November 2013.

Keywords: fight against poverty; policy coherence for development; Commitment to Development Index; Financial Secrecy Index; financial secrecy; illicit financial flows

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3.1 Introduction

For the past decade the Center for Global Development has been publishing the Commitment to Development Index (CDI) which ranks rich countries on their contribution to development abroad. The CDI assesses countries' performance in 7 policy areas: aid, trade, migration, environment, security, technology and investment. The CDI does not pretend to be a complete measure of the impact of the policies of rich countries on the developing world. Rather it aims to focus on the most important policies, to the extent that data are available. The CDI has adapted and evolved over the years, in the light of changes in the understanding of the impact of policies on development and as a result of changes in available data. In recent years there has been growing recognition of the harm done to development by illicit financial flows, and the role of rich countries in providing an environment which tolerates or discourages them.

This essay investigates whether and how indicators of illicit finance should be included in the CDI. It explains the rationale for including illicit finance in CDI, explores the most relevant indicators, and discusses their advantages and limitations. It proposes the inclusion of the secrecy score of the Financial Secrecy Index (FSI) into the investment component of CDI. This recommendation has been accepted, and the FSI has been added to the 2013 CDI. The FSI has been added to the investment component (now renamed finance) which assesses rich countries' contributions to financial transparency and promoting investment in poor countries. This essay rationalizes this decision and explains the dilemmas faced with updating the composite index, the CDI, with a part of another composite index, the FSI.

The academic literature on the CDI is relatively limited. Sianes (2013) puts the CDI firmly within the context of policy coherence for development. He describes the CDI as the most acknowledged and accurate way of measuring policy coherence for development as an outcome. Sianes, Dorado-Moreno, & Hervás-Martínez (2013) discuss the CDI and propose the use of an ordinal classification to rate, not rank, the performance of rich countries. These two papers together with the methodology provided by the CDI's authors, Roodman (2012), can serve also as useful introductions to the CDI and its general rationale. In the past, some authors have provided the rationale and estimation for new countries Janský & Řehořová (2013), whereas this essay is explaining the rationale for expansion in its policy areas, namely illicit financial flows.

The CDI has also attracted some criticism and, for example, the linear and equal weighting of the seven components has been challenged by Sawada, Kohama, Kono, & Ikegami (2004) or Chowdhury & Squire (2006), but largely supported by Stapleton & Garrod (2008) using an information theory approach. Furthermore, Roodman (2011) uses the CDI as an example of composite indices to argue for the benefits of aggregation across conceptual dimensions.

The rest of the essay is structured as follows. Section 2 explains the rationale for including policies relating to illicit financial flows in the CDI. It explains what the illicit financial flows are, why they are bad for poor countries and what the policies of the rich ones can do about it. Section 3 introduces the existing ways of measuring illicit financial flows and the policies of the rich countries affecting them. Section 4 discusses which of these indicators are best suited to be included in the CDI and how this update should implemented. It also discusses the detailed results of the 2013 CDI. Section 5 concludes.

3.2 Development and Illicit Financial Flows

3.2.1 Why include policies relating to illicit financial flows in the Commitment to Development Index?

What kinds of measures can rich countries take to curtail the illicit financial flows out of poor countries, and to ensure that the global financial system supports and does not detract from the development of the poorer countries? The answers to these and other questions below involve a certain amount of conjecture.

While the topic of illicit financial flows is currently on the rise in research, political and media agendas, it remains generally understudied, and a number of key research questions have yet to be fully and rigorously answered. That is because of the topic's illicit nature, and the generally low availability of data, as well as the relatively limited attention that was paid to it by researchers in the past. Although I do not repeat this disclaimer, it holds for most of the discussed questions below. Nevertheless, even though the evidence base for the impact of illicit financial flows' on poor countries is not yet comprehensive, and despite a number of uncertainties, there is now a widespread belief among many policymakers and other experts that illicit financial flows impact poor countries and deserve more attention as presented in Busan Partnership for Effective Development Cooperation (2011), OECD (2013c) or, in more detail, in OECD (2013d). A case in point would be their inclusion in the CDI.

Financial flows are crucial for poor countries and have played an important role in some countries that have made development progress. Nevertheless, since not all financial flows are good for development, the integration of poor countries into the global financial system poses opportunities as well as risks. Illicit financial flows seem to facilitate many of these risks and seem to have an overall negative impact on poor countries.

Illicit financial flows are estimated to be large in magnitude and are thought to have an overwhelmingly negative impact on poor countries. According to Kar & Freitas (2012), illicit financial flows out of poor countries are significantly higher than aid inflows. The head of the OECD, Gurría (2008), stated that poor countries could be losing three times the amount they receive in aid because of illicit financial flows in the form of tax evasion and avoidance through tax havens. Even if the illicit financial flows were somewhat lower than these estimates suggest, they would still be large enough to deserve more attention and

curtailing them would still represent a huge opportunity for poor countries. Therefore, curtailing the illicit financial flows could significantly help the financial needs of many poor countries. This potential source of finance for poor countries has become even more promising in recent years, given that aid flows from rich countries have in general not lived up to expectations and promises OECD (2013a). Rich-country policies can affect illicit financial flows, and, given the magnitude of these flows, relatively small policy changes could make a significant difference for poor countries.

3.2.2 What are illicit financial flows?

There is no clear consensus on a single definition of illicit financial flows, since the word illicit can be understood to mean both illegal and legal, but legally or morally contentious and otherwise not fully legitimate. One good definition, used by Kar & Freitas (2012), is the following: „Illicit financial flows are funds that are illegally earned, transferred, or utilized and cover all unrecorded private financial outflows that drive the accumulation of foreign assets by residents in contravention of applicable laws and regulatory frameworks." But there are many reasons why finance flows out of poor countries illicitly, often in contravention of national or international rules. An illustrative overview of these various reasons is provided by Fontana & Hansen-Shino (2012) and discussed also by Fontana & Hearson (2012). The word illicit in illicit financial flows is used with the meaning of illegal or legally contentious, as opposed to licit or legal and as used, for example, by a recent special report on offshore finance in The Economist, Valencia (2013), but the distinction between the two types of flows is not always clear. Indeed, the definitions are a source of controversy.

So rather than insisting on one definition, I explain the understanding of the term through classifying illicit financial flows into three groups: illegal (or criminal), individual illicit, corporate illicit (or commercial). Three caveats apply. First, there might obviously be other illicit financial flows that do not fit well in any of these groups, but these are probably not of significant volume or importance. Second, although I do group them, illicit financial flows are very diverse. They range from something as simple as an individual transferring income abroad without having paid taxes, to complex money laundering schemes involving criminal networks creating anonymous companies to transfer stolen funds. Third, the groups are partly overlapping. For example, all of them include tax evasion – an illegal activity practiced by both corporations and individuals.

Income from illegal activities transferred across borders is considered as the first group of illicit financial flows. The original sources of these illicit financial flows can be both illegal (e.g. drug trafficking) and legal (e.g. some legitimately generated funds can be transferred in an illicit way to another country for the purpose of reducing tax obligations in the country of origin). This group includes illegal activities such as money laundering, drug and human trafficking, smuggling, illegal trade with weapons, counterfeiting, corruption, bribery, customs fraud, or terrorist financing. These illegal activities may be practiced by

individuals, corporations, governments or other entities. Cross-border financial flows associated with any of these illegal activities are considered illicit financial flows.

In the case of the second group, individual illicit, illicit financial flows are associated with tax avoidance (which is not illegal), tax evasion (which is illegal) and other illicit and illegal practices by individuals, often so-called "high net worth" individuals. These illicit financial flows might not account for a high proportion of the total amounts, but they are very visible in the media and in politics.

Corporate illicit is the third group, and a major source of illicit financial flows. A large proportion of illicit financial flows derive from corporations that strive to maximize profit and avoid taxes. Financial flows involved in tax evasion as well as tax avoidance, profit shifting and other similar practices by corporations and other legal entities are considered to be illicit financial flows. Corporations might engage in mispricing trade and other transfers or otherwise shifting profits out of poor countries into others, including rich countries and tax havens. Although the empirical evidence is not conclusive, transfer and trade mispricing are estimated to be important sources of illicit financial flows and short descriptions of these practices follow.

Transfer pricing is used by multinational corporations to price transactions between affiliates in different countries. The practice of transfer mispricing, also known as transfer pricing manipulation or abusive transfer pricing, involves the manipulation of transfer prices – interest payments, license fees or payments for goods and services transferred between subsidiaries of the same multinational company in different countries – contrary to international agreements and often in order to reduce taxes. Therefore, transfer pricing permits large financial flows that are viewed as illicit. For example, corporations might use transfer mispricing to reduce their taxes and thus enrich themselves by failing to specify properly the price at which natural resources are exported from poor countries.

Trade mispricing is transfer mispricing beyond the limits of a single multinational corporation, and refers to transactions between both related and unrelated parties when trade documents use false prices. While the transfer may be legal, the underlying contract might either result from corrupt dealings between officials and corporations, or the result of corporations optimizing their profits without adhering to the laws and best practices. Therefore trade mispricing is deemed to be important both as a source of tax evasion and as a channel for the movement of illicit funds.

An important source of estimates of the size of the various sources of illicit financial flows is the research by Global Financial Integrity, Kar & Freitas (2012). OECD (2013b) discuss profit shifting and the existing evidence on rich countries including the convincing study of Huizinga & Laeven (2008), whereas Fuest & Riedel (2012) focus on poor countries and rigorously investigate the role of international profit shifting in poor countries and Janský & Prats (2014) provide additional evidence of profit shifting our of poor countries.

3.2.3 Why are illicit financial flows bad?

Together with the excessive global financial secrecy that facilitates them, illicit financial flows are a worldwide obstacle to global development. Although illicit financial flows are a problem for both rich and poor countries, there are good reasons to believe poor countries are more vulnerable to their negative effects than rich countries. Ragnar Torvik in Norwegian Government Commission on Capital Flight from Poor Countries (2009) argues that the negative effects of tax havens are greater for developing countries than for other countries. Azémar (2010) supports this argument by finding that that low degrees of law enforcement are associated with higher income shifting.

The harmful impacts of illicit financial flows include hampering the poor countries' ability to mobilize their own private and public funds and therefore lowering the amounts of finance available for consumption and investment in poor countries, undermining their institutions, distorting economic activity and facilitating illegal activities. There are three broad channels through which illicit financial flows can damage poor country development, but it is important to keep in mind that their impacts differ across the various types of illicit financial flows and more research is needed into the empirics and heterogeneity of these impacts.

First, illicit financial flows may directly reduce the funds available to the government. For instance, this can happen as a result of reduced tax revenue or inappropriate spending that could be otherwise used on public services such as schooling or health care. Together with the assets held illicitly abroad by high net worth individuals, illicit financial flows seem to increase the inequitable distribution of tax revenues and can contribute to income inequality both within and between countries. Relatedly, Christensen, Mathiason, & Shaxson (2012) discuss the relationship between financial secrecy and inequality. Picciotto (1992) , Corbridge, Thrift, & Martin (1994) and Palan (2002) were among the first to discuss the various negative roles of financial secrecy.

Second, illicit financial flows may directly reduce private funds and prevent countries from receiving appropriate benefits from their economic production, and furthermore lower national savings and capital available for private investment. Lower investment translates into less infrastructure, fewer jobs and lower long-term development prospects. Motivated by tax evasion or other crimes or incentives, illicit financial flows enable resources to flow to informal parts of the poor countries, or to other countries. Illicit financial flows have been discussed as a contributing factor in the recent global financial crisis and they pose a risk to the stability of financial markets and undermine effective financial regulation, which has been articulated, for example, by Leading Group on Solidarity Levies to fund development (2008) and discussed by Cobham, Baird, & Hogg (2008). Also, for some countries, illicit financial inflows might pose bigger risks than outflows, through mechanisms like exchange rate changes, which might be the case with countries that supply the world's drug trade, as discussed by Reuter (2012).

Third, and probably most importantly, illicit financial flows may harm institutions. They can weaken the role of government, citizens' willingness to pay taxes, undermine tax systems' morale and governments' accountability towards citizens, and lower investors' confidence and overall institutional environment. Illicit financial flows often catalyze illegal activities or tax avoidance. For example when illicit financial flows are used to launder the proceeds of corruption and bribery, they could help keep corrupt politicians and other elites in their positions, sustain criminal activities, or hide the profits of their crimes. Further negative effects associated are discussed by Shaxson & Christensen (2013). Also, the fact that some illicit financial outflows are actually misappropriated aid inflows does not increase support for aid and other development policies in poor as well as rich countries.

These negative impacts of illicit financial flows on most countries are facilitated by countries which allow illicit financial flows to thrive, such as tax havens, offshore financial centres, secrecy jurisdictions and other countries providing similar regulatory and secrecy services. I prefer to use the term secrecy jurisdiction, defined as a jurisdiction which provides facilities that enable people or entities escape or undermine the laws, rules and regulations of other jurisdictions elsewhere, using secrecy as a prime tool. This definition is based on U.S. Senate (2001) and Meinzer (2012) and it was discussed and promoted by Murphy (2008).

Also some other economic entities can play an important role in illicit financial flows such as certain banks, law and accounting firms: so called secrecy, intermediaries, providers or enablers. So although the focus in this essay is on the policies of countries, it is important to note that the practices of other economic players, such as banks, law and accounting firms, hedge funds and wealth managers, also have a major influence. For evidence and discussion of some of these other economic players see Harari, Meinzer, & Murphy (2012) or a section on accounting firms in Valencia (2013). Some multinational companies also seem to take advantage of the weaker institutional, legislative, technical and administrative environment, or corrupt officials, in the poorer countries, to avoid paying their full share of taxes. One specific corporate example is analyzed in detailed by Action Aid (2013) and another, the case of Swiss commodity trade, by Cobham, Janský, & Prats (2014). These issues are more systematically discussed in the relevant parts of this essay as well as in OECD (2013b) and more systematic empirical evidence for poor countries is provided, for example, by Fuest & Riedel (2012) and also by Janský & Prats (2014). All those who facilitate illicit financial flows enable related illegal activities and tax avoidance and other negative phenomena that are an obstacle for the development of poor countries.

There might be specific circumstances in which illicit financial flows are less harmful, or in which the behavior that leads to illicit flows has benefits which should be taken into account. For example, if a country has an especially corrupt government whose resources are mainly used to enrich a small elite, then increasing government revenues by enforcing taxes might lead to a worse allocation of resources than if firms and individuals find ways

successfully to avoid the burden of taxation. In these cases, the possible benefits would need to be set against the general harm that is done by undermining the norm that companies and citizens should generally comply with taxes that are legally and properly imposed.

This is in line with the concept of the Commitment to Development Index that seeks to measure the extent to which wealthy countries pursue policies which generally contribute to shared prosperity and a reduction of poverty: but the inclusion of a particular policy measure in the index does not imply that this policy is always and everywhere beneficial. For example, in the aid component, countries are given credit for increasing their foreign aid as a share of national income, even though there are many examples in which aid has been ineffective and sometimes harmful. Similarly, the inclusion of illicit financial flows in the Commitment to Development Index would reflect an assertion that such flows are generally harmful for development, not the stronger claim that they are always and everywhere damaging. Further research is needed on whether there might be benefits to keeping resources out of the hands of some developing country governments and, if so, how these can be weighed against the costs, including the likely long-term harm to local institutions and the social contract.

3.2.4 Which rich-country policies influence illicit financial flows?

Both rich countries' national policies and their influence over internationally agreed upon policies influence the impact of illicit financial flows on poor countries and, more generally, how the global financial system works, or does not work for poor countries. Recent confirmation of this by rich countries themselves is found in OECD (2013c) and OECD (2013d).

In terms of indicators of illicit financial flows, I distinguish between direct policy measures that aim to curtail (or reduce or limit) the flows, and indirect policy measures that aim to curtail underlying activities that generate or motivate illicit financial flows. The focus here is more on the former, although the two are often interconnected. At one extreme, rich countries could in theory be actively and explicitly supporting illicit financial flows and the activities behind them. At the other extreme, considered here as the desired one, rich countries could be doing all they can to curtail the illicit financial flows and related activities. Rich countries should change these policies to be more favorable and less damaging to poor countries in the sense of the concept of policy coherence for development, as discussed by Sianes (2013). Most of the rich countries are probably currently in between, though some seem to be closer to the former (generally including tax havens and secrecy jurisdictions) and some closer to the latter extreme.

The policies governing financial relationships between countries create a complex system of various multilateral and bilateral agreements, treaties and organizations with varying degrees of formality, explicitness and accountability. These policies include improving transparency, policing foreign corruption, international tax cooperation, and preventing

excessive transfer mispricing and profit shifting out of poor countries. Importantly, if a rich country serves itself as a secrecy jurisdiction – or lets its policies allow other jurisdictions under a direct or indirect influence to serve as such –, it helps to facilitate illicit financial flows, profit shifting, under-declaration of income or assets by individuals and therefore their negative impacts on poor countries, for example, by letting multinational corporations avoid tax payments in poor countries.

In many of the issues related to illicit financial flows it is in the very interests of rich countries to support a global financial system that works for poor countries as well. This is therefore one of the policy issues where the interests of rich and poor countries are, or at least should be, often aligned. Still, there are important cases when rich countries benefit from excessive financial secrecy or tax avoidance at the expense of a poor country, such as when a multinational company headquartered in a rich country is using transfer mispricing to shift its profits out of a poor country's subsidiary to its headquarters, or when the rich countries in question serve as tax havens or secrecy jurisdictions.

Although illicit financial flows are a problem for rich as well as poor countries, poor countries are less likely to find themselves in a position of strength, since they have a smaller influence on the global financial system and in shaping bilateral rules through unilateral actions. Therefore two things are often beneficial for poor countries. First, if a multilateral international agreement on common policy measures is reached, in contrast to bilateral or unilateral measures. Second, if that agreement takes into account the interests of poor countries – in contrast to some measures that have been proposed by groups or institutions dominated by rich countries, such as the OECD.

The argument for a global approach is further strengthened by the fact that although rich countries' policies play an important role, each individual country's policy has a limited effect due to the availability of excessive financial secrecy in other countries, to which illicit activities can be relatively easily moved. Therefore, global policy coordination and international agreements are crucial.

Nevertheless, some, such as Peter Reuter in chapter 15 of Reuter (2012), continue to question whether it is a good idea to focus policy efforts on illicit financial flows despite their nature and despite their importance, if only because they are usually the consequence of the underlying problems such as corruption or other illegal activities that policy can, at least in theory, deal with more directly. On the basis of the existing evidence, I believe that although illicit financial flows are mostly symptoms of other problems identified as the reasons behind these flows, the flows are so important and so large that – alongside dealing with the other problems of governance or crime – there is also a need to address the flows directly.

3.3 Indicators of illicit financial flows

How can illicit financial flows be measured? In theory in many ways, but in practice there are only some available currently. For example, it might seem suitable to evaluate the impact of illicit financial flows and consider such measure for the CDI, but there are hardly any results that could be used. Currently there are mainly two kinds of measures available, either of the volumes of the flows or, arguably more relevant for the CDI, of the policies and policy efforts aimed at curtailing illicit financial flows. Starting with the discussion of the first kind, there are some metrics that look at how much finance flows out of poor countries illicitly. Nonetheless, even though it is expanding, the empirical evidence on the size of the flows and their determinants remains rather scarce. Ideally, there would be reliable and comparable measures of various illicit financial flows and their impact but the evidence base is relatively limited for a number of reasons, which include the very nature of illicit flows and associated lack of data and low information quality. Furthermore, academic and other researchers, as well as policy makers, have so far paid inadequate attention to these issues given the importance of the phenomenon.

Illicit financial flows are obviously difficult to measure. Still, there are different ways of estimating illicit financial flows, which reflect both the variety of mechanisms available for tax evasion or money laundering and various methodological approaches including surveys, case studies, interviews, statistics or composite measurements. I group the estimates of illicit financial flows into three interlinked groups: tax revenue lost, trade mispricing and new methods. This order approximately corresponds with the development of the estimates over time and somewhat increasing rigorousness, though possibly decreasing in how accessible the results are to the media and the general public.

First, early research succeeded in highlighting the importance of illicit financial flows and bringing these issues to wider attention. Among the first were non-governmental organizations such as Oxfam (2000), who estimated that poor countries suffered a yearly loss of around USD 50 billion due to tax havens, or Transparency International (2004), who estimated that 10 of the most notoriously corrupt heads of states in poor countries may have together been responsible for as much as USD 60 billion in illicit financial flows out of their countries during their respective tenures in office. Similarly, Raymond Baker, the director of Global Financial Integrity, in his book, Baker (2005), estimated that more than USD 540 billion flows out of poor countries each year thanks to a combination of tax evasion, fraud in international trade, drug trafficking, and corruption, by combining various methods and conducting hundreds of interviews. Tax Justice Network (2005) estimated that the value of assets held offshore lies in the range of USD 11 - 12 trillion. Cobham (2005) on the basis of Tax Justice Network (2005) implied a loss to poor countries of around USD 51 billion a year. Henry (2012) estimated that a global super-rich elite had at least USD 21 trillion hidden in tax havens by the end of 2010 and that poor countries could be losing USD 189 billion in associated tax revenue every year. James Henry in a similar

way estimated that at least USD 6 trillion of poor country wealth is held offshore by individuals, depriving poor countries‘ governments of annual tax receipts of between USD 64 and 124 billion (Oxfam, 2009).

Second, research based on trade price data usually explores trade mispricing, which includes transactions between both related and unrelated parties (in contrast to a more narrowly defined transfer mispricing that includes transactions between related parties only, usually within a multinational corporation). Trade mispricing uses the so-called re-invoicing process to shift profits out of developing countries either through import over-invoicing or export under-invoicing.

There are two main groups of models using internationally comparable and available data. One is the so called World Bank residual and hot money models are based on balance of payments data. The World Bank residual model subtracts the total of funds actually used by a country from the total of funds entering that country and, if there are more funds coming in than funds being used, the resulting shortfall is considered to be illicit flows. The hot money model considers all errors in a country’s external accounts as illicit flows. The other group of models is based on trade data and estimates trade mispricing and trade misinvoicing, which is trade mispricing for trade between unrelated parties. This kind of methods have been applied in Hogg, McNair, & Pak (2009), who provide evidence on the scale of trade mispricing and revenue losses for poor countries, and Tax Justice Network (2007) among other projects. Hogg, Baird, Mathiason, & Cobham (2010) provide an illustrative example with Zambia, which is a major copper exporter and whose economy is dominated by copper, and a more general treatment of this phenomenon is discussed and analyzed in Cobham et al. (2014).

These methods capture the quantity of illicit flows by contrasting what a country claims it imported from (or exported to) the rest of the world with what the rest of the world states it exported to (or imported from) that given country. It is also possible to combine these two types of models and create a composite measure. Most notably, the research by Global Financial Integrity uses the World Bank residual and hot money models and further makes adjustments for trade misinvoicing. Their hot money-based model estimates that the developing world lost USD 859 billion in illicit outflows in 2010 (significantly more than the USD 129 billion in aid by OECD countries in 2010). Their estimates, Kar & Freitas (2012), suggest that bribery, kickbacks, and the proceeds of corruption continued to be the primary driver of illicit financial flows from the Middle East and North Africa, while trade mispricing was the primary driver of illicit financial flows in the other regions. On the basis of this kind of estimates, Hollingshead (2010) uses national corporate income tax rates to estimate the tax revenue loss from trade mispricing in poor countries between USD 98 billion and USD 106 billion annually over the years 2002 to 2006.

The third group is the new methods of illicit financial flows. The increasing availability of detailed data sets, statistical apparatus and other recent development allows new

methodologies of estimating illicit financial flows to be developed. Also rather than estimating the aggregate illicit financial flows, it is possible to focus on country-specific evidence, which has been done quite well in the case of estimating the extent of profit shifting. (OECD, 2013b) discuss profit shifting and the existing evidence including the evidence of Huizinga & Laeven (2008) on the scale of profit shifting within Europe, whereas Fuest & Riedel (2012) focus on poor countries and relatively rigorously investigate the role of international profit shifting in poor countries. Janský & Prats (2014) build on their research by providing additional evidence of profit shifting out of poor countries. These studies use detailed firm-level financial and ownership data for multinational corporations to estimate the extent of profit shifting. Also the Financial Secrecy Index, Tax Justice Network (2011), and other similar research belongs to this third, heterogeneous group of new methods.

There are difficulties with these estimates; usually each estimation method has its pros and cons, and together they have many problems. Some of the more detailed criticism of individual methods is in Reuter (2012), Fuest & Riedel (2012) or Hines (2010). I briefly discuss three groups of problems that most of them share: assumptions, interpretation and policy. Most of the methods necessarily rely on strong assumptions about the sizes of flows or assets or tax rates that can seldom be verified. Many of the estimates do not allow a straightforward interpretation, because usually there is no counterfactual available. Furthermore, most of the estimates do not shed more light on specific policy measures - the results seldom provide more guidance for policy other than a general recommendation to reduce illicit financial flows or recover the assets held offshore.

Alternatively, it is possible to measure policies aimed at curtailing illicit financial flows, rather than measuring the extent of flows themselves. There are various measures and proposed systematic changes focused on curtailing illicit financial flows and, correspondingly, it is possible to evaluate these efforts towards the implementation and effectiveness of these measures. Many of these measures are largely influenced by rich countries' policies with overwhelming impact on poor countries. Also, some rich countries such as Norway have focused their efforts on curtailing illicit financial flows more than others.

Ideally the policies should be comprehensive and they should focus in their entirety on excessive and often abusive financial secrecy, a crucial phenomenon interconnected with illicit financial flows. When rich countries allow excessive financial secrecy to prevail in the global financial system, they also allow illicit financial flows to blossom and, in effect, significantly lower public as well as private funds and weaken the associated institutions in poor countries.

Although the role of rich-country policies in curtailing illicit financial flows and excessive financial secrecy is difficult to identify and quantify, in the discussed respects the most detailed, complex and overall suitable metric is the Financial Secrecy Index (FSI), which

is managed by Tax Justice Network and the latest edition was published in 2013 with the next one prepared for the autumn of 2015. The FSI is also the first ever to make a comprehensive global effort to identify countries' contributions to excessive financial secrecy.

The FSI evaluates countries according to how much they contribute to global financial secrecy and how much they serve as a secrecy jurisdiction, i.e. how much financial secrecy they provide. According to the FSI, harmful financial secrecy comes in three broadly defined flavors: the most well-known, bank secrecy (such as that offered by Austria, Luxembourg, and Switzerland); the second, less well known, but more important on a global scale, involves jurisdictions permitting the creation of entities (whether trusts, corporations, foundations, or others), whose ownership, functioning or purpose is kept secret; the third level of secrecy involves jurisdictions putting up barriers to co-operation and information exchange. Many of these three flavors involve complex systems that are difficult to identify. Policies that aim to regulate financial relationships between countries are also complex and this fact is reflected in the similarly complex construction of the FSI, especially its secrecy score that identifies a number of policy measures, both direct and indirect.

The FSI consists of a quantitative part (so called global scale weights reflect the countries' contributions to offshore finance) and a qualitative part (so called secrecy score reflects the excessiveness of financial secrecy). The FSI thus captures some important distinctions such as countries that are very secretive, but do not provide many financial services, and countries that are not very secretive but have large offshore financial sectors. The global scale weights are based on the International Monetary Fund's balance of payments data of exports of financial services, which are complemented by those of portfolio liabilities and assets. The following are the fifteen categories that are used to assess jurisdictions and together comprise the secrecy score:

1. Banking Secrecy
2. Trusts and Foundations Register
3. Recorded Company Ownership
4. Published Company Ownership
5. Published Company Accounts
6. Country by Country Reporting
7. Fit for Information Exchange
8. Efficiency of Tax Administration
9. Avoids Promoting Tax Evasion
10. Harmful legal vehicles
11. Anti Money Laundering
12. Automatic Information Exchange
13. Bilateral Treaties
14. International Transparency Commitments
15. International Judicial Co-operation

Financial secrecy facilitates the evasion of personal income and wealth taxes on individual assets held abroad and is well captured by the FSI, but it might be somewhat weaker in reflecting the trade and transfer mispricing used in aggressive corporate tax planning, tax avoidance and tax evasion practices. The FSI reflects many, but not all important factors. To a full extent, the FSI does not evaluate countries according to how much they serve as a tax haven in a narrow tax sense, i.e. how low their tax rates are or to what extent they indirectly help to access very low tax rates through being conduit countries. Still, overall, the FSI seems a straightforward indicator of rich countries' commitment to curb illicit financial flows.

3.4 How to update the Commitment to Development Index with regard to illicit financial flows?

Before 2013, the CDI has not taken into account the issues discussed here, and as discussed above, it was clear that its new editions would clearly benefit from reflecting these. A number of questions arose. What metrics could be appropriate for inclusion in the CDI? How do considerations of practicality, cost, relevance, and timeliness affect these choices? The most straightforward way to update the CDI would be to include some of the existing metrics in the CDI. Specifically, there appear to be two main alternatives, the FSI and the estimates by the Global Financial Integrity and we discuss them below.

3.4.1 Include the Financial Secrecy Index or the Global Financial Integrity estimates in the Commitment to Development Index?

Let me provide original analysis and discuss the advantages and drawbacks of including the FSI in the CDI, especially in contrast with the estimates of illicit financial flows by Global Financial Integrity. Let me start with the upsides of the FSI. The FSI, and especially its secrecy scores, seems very suitable for the task at hand. It provides very detailed evaluations of countries' policies that are country-specific, transparently researched, and well established. The FSI was first published in 2009 and has since then been updated to incorporate feedback and new developments. The great transparency and detail of the FSI should give the CDI the option of including only some of the indicators included in the FSI (secrecy score), and not others (global scale weights). Furthermore, the country coverage should not be any problem, since the FSI covers all countries evaluated in the CDI from the FSI's 2013 edition onwards.

The drawbacks of the FSI for the CDI include the fact that, at least so far, the FSI has been published only every other year (2009 and 2011 and 2013) and so the use of the FSI by the CDI either would require a change to annual publication of the FSI or would necessitate the use of one-year-old FSI results every other year in the CDI. Also, the quantitative part (global scale weights) is not very robust due to limited data availability, and usually relies on data two-year-old data and estimation methods. The FSI might be relevant for some illicit financial flows more than for others. Financial secrecy facilitates the evasion of

personal income and wealth taxes on individual assets held abroad and is well captured by the FSI, but it might be weaker in reflecting the trade and transfer mispricing used in aggressive corporate tax planning, tax avoidance and tax evasion practices.

Another drawback of the FSI is common to most of the other metrics discussed here, and to country indices more generally. In an attempt to evaluate countries, a simplified view of the world as a collection of countries is often necessary, but this is also unhelpful in highlighting some important issues. For example, the United Kingdom is, especially through the City of London, a leading financial centre, but is also in one way or another responsible for a number of other financial centres, including its Crown dependencies and overseas territories, such as Jersey or the Cayman Islands.

Another disadvantage of the FSI, or of any similar indicator, is that it naturally focuses more on the areas where there are available data and available policy efforts or agreements to be evaluated. Therefore other important areas may be omitted due to the lack of data or existing policies, although their importance would warrant inclusion. It is naturally hard to estimate the extent of this bias, when secrecy and illicit activities are involved. A potential further drawback is connected with the way the FSI evaluates jurisdictions' secrecy scores in cases when the jurisdiction in question consists of a number of parts (such as the USA). Currently, it considers the worst score (Delaware in the case of the USA) to be the representative score for the whole jurisdiction.

The advantages of using the estimates of illicit financial flows by Global Financial Integrity or of a similar type are obvious from their relative success – they provide clear figures that many people can relate to, and that the media as well as researchers and policy makers can reference. The drawbacks might be less obvious, but seem more numerous and important. These estimates indicate the extent of the flows rather than the policy efforts, which are the focus of the CDI. The models rely on official statistics that are generally of poor quality, especially in poor countries, and that do not take into account flows resulting from illicit activities, such as smuggling or black market activity, because proceeds from such activities are not captured in national accounts. Also, no single model measures the totality of illicit flows and there are no consistent models for measuring all the types of flows including corruption money, criminal money and tax evasion. Due to data publication time lags, the Global Financial Integrity has a nearly two-year delay in publication of its estimates, similar to the delay to the quantitative part of the FSI. Additionally, they provide results for individual poor countries, but not for their rich country counterparts; these results could possibly be arranged with Global Financial Integrity or re-estimated.

All in all, after weighing up the pros and cons, the secrecy scores of the FSI seem better suited for the CDI than the estimates by the Global Financial Integrity. Therefore, the FSI is the best candidate to be included in the CDI and was actually included in the 2013 CDI.

3.4.2 Do any policies currently rewarded in the Commitment to Development Index contradict the concern about illicit financial flows and should these lead to revisions?

The worry that I deal with in this section is that some of the policies rewarded in the CDI before 2013 might be seen as contradictory to concern about illicit financial flows, but only minor revisions seem sufficient to deal with these issues. The potentially contradictory policies are in the CDI's investment component. The investment component addresses five issues: official provision of political risk insurance; avoidance of double taxation of profits earned abroad; actions to prevent bribery and other corrupt practices abroad; other measures to support foreign direct investment; policies that affect portfolio flows, as described in Moran (2012) and Roodman (2012). Almost all of them are relevant to the issues discussed in this current essay, maybe with the exceptions of political risk insurance and other measures that are relatively narrowly aspects of foreign direct investment in poor countries.

Both the existing investment component and the FSI take into account so called double taxation avoidance agreements, but they seem to highlight different aspects of this issue. The existing investment component focuses on how to avoid a situation in which profits earned in poor countries are taxed in both the poor country and the rich country. I believe that it focuses too narrowly on this objective and ignores other important issues. The discussion of double taxation does not properly reflect the potential costs of double taxation avoidance agreements. Specifically, it does not consider how some of the details can fuel tax competition in poor countries and incentivize them to lower their tax rates in order to attract foreign investment. Also, and importantly for the proposed finance component, the investment component seems not to reflect the practice where double taxation avoidance agreements could facilitate so-called "double non-taxation," when a corporation is not adequately taxed in either the poor or the rich country.

As a consequence, the section on double taxation was dropped from the investment component to avoid conflict, and also double-counting, with the FSI and to be in line with the rationale exposed in this essay. For example, tax sparing and tax credits were positively awarded by the CDI before 2013. The investment component gave a maximum and a high score for tax sparing and tax credits, respectively, while the FSI gives a zero score for tax sparing in line with the changes in international policy consensus, in contrast with OECD (1998), and only credit for tax credit system in a spectrum of payments. These specific differences stemmed from more general ones. Neither I nor the FSI agree with the investment component's argument for low tax rates and tax holiday, for which Moran (2012) argues that "a tax sparing agreement helps the developing country to attract foreign direct investment by offering a low tax rate or a tax holiday", whereas the FSI in a 2013 methodology celebrates that "countries wishing to attract foreign investment will not feel compelled to lower the tax rates in the hope of increasing their inward stock of foreign

investment". There are also some other common issues in the areas of actions to prevent bribery and other corrupt practices abroad, but without any conflicts.

3.4.3 How to Include the Financial Secrecy Index in the Commitment to Development Index?

With the choice of suitable indicator and revisions to the existing CDI decided, one further indicator design issue remains to be discussed. There are two ways of incorporating concern about illicit financial flows into the CDI: either a new 8th component based on the FSI, or an update of the existing finance component with the FSI. There are some arguments in favor of a new component, such as the fact that it would adequately highlight the importance of illicit financial flows for poor countries, alongside the other mostly financial components of aid and investment.

However, the arguments against the creation of a new component seem to be stronger. First, if the new component was called, for example, finance, such a name could mislead the reader into thinking that it is dealing with all the aspects of rich country policies regarding finance (much of which is beyond both it and the scope of this essay), when it is in fact focused only on illicit financial flows. In this respect, a two-word name such as illicit finance might be more appropriate, but would break the good tradition of one-word names for the CDI components. Also, if the FSI was integrated into the investment component, renaming the combined metrics a finance component would seem more suitable. Furthermore, eight components might be simply too high a number for the CDI, as for any other composite policy index.

Overall, the merge of the existing investment component with the FSI, giving both an equal weight of 50 % and renaming the resulting component as finance seems the best option. The Finance component would reward countries both for catalyzing the good flows and for penalizing the bad flows. The table 3.1 below shows the final results of the 2013 CDI that already include finance as one of the components. In addition, the last two columns show the two halves of this new component.

Table 3.1: Results of the 2013 Commitment to Development Index after the update with regard to illicit financial flows

Rank	Country	Aid	Trade	Finance	Migration	Environment	Security	Technology	Overall (Average)	Investment support	Financial transparency
12	Australia	3.84	7.13	5.75	6.90	3.82	5.05	4.66	5.31	5.87	5.63
10	Austria	2.91	5.45	4.02	7.36	6.59	6.31	5.64	5.47	5.22	2.81
10	Belgium	6.25	5.11	5.67	6.20	7.21	3.68	4.44	5.51	5.71	5.63
13	Canada	3.75	6.05	5.32	7.58	2.63	5.61	5.33	5.18	6.43	4.22
24	Czech Republic	1.43	4.95	4.52	1.26	7.50	2.01	5.42	3.87	4.82	4.22
1	Denmark	11.04	5.31	6.17	4.22	7.03	7.22	6.60	6.80	5.30	7.03
5	Finland	6.13	5.48	6.33	3.21	7.77	6.44	5.65	5.86	5.63	7.03
17	France	4.09	5.12	5.54	4.22	7.06	2.60	6.56	5.03	5.46	5.63
13	Germany	3.95	5.38	4.42	6.95	7.07	3.48	5.07	5.19	6.03	2.81
21	Greece	1.57	4.90	4.70	4.46	5.86	5.63	2.74	4.27	3.78	5.63
22	Hungary	1.10	4.97	4.82	1.57	8.04	5.51	3.21	4.17	4.02	5.63
7	Ireland	8.48	5.28	5.16	4.42	6.74	6.94	3.75	5.82	3.29	7.03
18	Italy	1.84	4.96	5.50	4.59	6.90	5.08	3.93	4.69	5.38	5.63
26	Japan	1.01	1.60	3.90	2.26	3.81	4.47	6.25	3.33	4.98	2.81
4	Luxembourg	11.89	5.21	3.58	6.83	5.76	4.90	4.14	6.04	4.34	2.81
5	Netherlands	9.74	5.90	5.00	4.20	6.94	4.22	5.20	5.89	5.79	4.22
9	New Zealand	3.35	8.10	4.20	6.72	6.02	7.13	4.43	5.71	4.18	4.22
3	Norway	10.62	1.20	5.87	9.64	2.83	7.39	5.71	6.18	6.11	5.63
23	Poland	0.88	5.47	6.05	1.84	7.57	3.67	2.53	4.00	5.06	7.03
13	Portugal	3.29	5.11	5.54	2.39	7.70	6.20	6.39	5.23	5.46	5.63
24	Slovakia	0.94	4.94	3.58	0.92	8.56	5.55	2.63	3.87	4.34	2.81
26	South Korea	1.11	-1.21	4.88	5.69	4.33	1.30	6.82	3.27	5.54	4.22
16	Spain	2.90	5.31	6.09	5.73	6.70	3.43	5.43	5.08	5.14	7.03
2	Sweden	12.78	5.89	6.17	8.99	7.80	0.28	4.51	6.63	5.30	7.03
19	Switzerland	5.38	1.80	3.15	6.43	6.13	4.58	4.88	4.62	4.90	1.41
7	United Kingdom	6.47	5.51	5.91	5.82	7.34	5.40	4.19	5.80	6.19	5.63
19	United States	2.98	7.09	5.14	3.62	4.31	4.58	4.68	4.63	4.66	5.63

Source: The official 2013 CDI results.

The results provide an interesting insight into the reality of policy coherence of development. While some rich countries seem to be consistently supporting poor countries through both investment support and financial transparency at similar moderate (the Czech Republic) or relatively high (Australia) levels, some other countries seem to be examples of having incoherent policies. Switzerland, topping the overall FSI, has an average score from investment support (4.90), but the lowest in financial transparency (1.41).

Poland is one of the countries with the highest financial transparency scores and it helps it to substantially improve its overall ranking – it jumps ahead of its neighbors, the Czech Republic and Slovakia, in contrast with the counterfactual situation in which only investment support was included in the finance component. Similarly, Finland, Ireland and Australia are among the countries, whose ranking has improved thanks to the inclusion of financial transparency indicator. On the other hand, Switzerland and Austria are among the countries with higher financial secrecy and therefore have worse ranking with financial transparency included in the CDI.

3.5 Conclusion

Over the recent years illicit financial flows have attracted increasing attention from researchers and policy makers because of their negative effects on poor countries. In 2013 the mostly rich countries' OECD acknowledged illicit flows as an issue of "central importance". Since 2003, the Center for Global Development has been publishing the Commitment to Development Index (CDI) which ranks rich countries on their policies which affect poor countries. This essay rationalized the inclusion of indicators of policies affecting illicit financial flows in the CDI, in addition to the previously included policies of aid, trade, migration, environment, security, technology and investment. It provided a survey of existing approaches to measuring illicit financial flows, discussed possible metrics which could be included in the CDI, evaluated how such indicators might be incorporated into the CDI, and proposed changes to current CDI indicators. The qualitative indicators of the Financial Secrecy Index (FSI) emerge as the best contribution to the newly renamed and updated finance component of the CDI.

Illicit financial flows seem very high and there is thus a great opportunity for poor countries if they can be curtailed. Even if that was the only reason, the topic of illicit financial flows warrants further research: to advance the estimates, to learn whether and how poor countries are affected differently by these flows compared to rich countries, and to compare rigorously the costs of illicit financial flows with their benefits, if any.

Even with what is now known, it seems safe to say that both illicit financial flows and financial secrecy do make most countries poorer, especially those that are already poor. Rich countries' policies regarding financial secrecy vary, and there is good cause for all of them to become more responsible with respect to illicit financial flows and poor countries. Updating the CDI with illicit financial flows is a significant contribution in this direction.

Since there is not a lot of reliable data available, the FSI is the best option for including an indicator of illicit financial flows in the CDI. At the time of writing, this proposed change has been implemented, but the interlinked fights against global poverty, inequality and illicit financial flows continue.

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Chapter 4

International Profit Shifting out of Developing Countries and the Role of Tax Havens[1]

Abstract: This article contributes to the debate of how tax avoidance and evasion can hamper development efforts by investigating the link between profit shifting out of developing countries and tax havens. The analysis of financial and ownership data of more than 1500 multinational corporations (MNCs) operating in India shows that in 2010 those MNCs with links to tax havens reported lower profits and paid less in taxes per unit of asset than MNCs with no such links. This confirms the notion that when corporations have tax haven links they face higher incentives, because of the low tax rates in tax havens, and opportunities, because of the secrecy provisions tax havens offer, to shift income.

Keywords: profit shifting; multinational corporations; developing countries; tax haven; India

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4.1 Introduction

In recent years, the link between international taxation and development has attracted increasing attention from academics, development agencies and policy-makers. Two of the major research areas, clearly interrelated, appear to be international tax evasion and avoidance by MNCs and high net-worth individuals, and the role played by tax havens in both increasing the incentives for, and enabling tax evasion and avoidance practices.

In February 2013, the Organisation for Economic Co-operation and Development (OECD) published its report Addressing Base Erosion and Profit Shifting (BEPS). The OECD (2013a) report is the OECD's initial response to the mandate it received in 2012 from some political leaders in developed countries, which showed concern about the problem of tax base erosion and profit shifting by MNCs.

At their meeting in June 2012, the G20 leaders explicitly referred to 'the need to prevent base erosion and profit shifting' in their final declaration. This message was reiterated at the G20 finance ministers' meeting in November 2012, the final communiqué of which states: 'we welcome the work that the OECD is undertaking into the problem of base erosion and profit shifting and look forward to a report about progress of the work at our next meeting'.

Also in November, the UK's Chancellor of the Exchequer, George Osborne, and Germany's Minister of Finance, Wolfgang Schäuble, issued a joint statement (which was backed by France's Economy and Finance Minister, Pierre Moscovici) calling for coordinated action to strengthen international tax standards and for states to back efforts by the OECD to identify loopholes in tax laws. US President Barack Obama voiced similar concerns in the President's Framework for Business Tax Reform, which states that 'empirical evidence suggests that income-shifting behaviour by multinational corporations is a significant concern that should be addressed by tax reform'.

In its BEPS report, the OECD makes a comprehensive analysis of the underlying causes and main consequences of the problem of base erosion and profit shifting. The OECD acknowledges that the current international tax system, characterised by inter-state tax competition, rather than by co-operation, has not kept pace with developments in the business environment, providing MNCs plenty of opportunities to exploit legal loopholes and enjoy double non-taxation of income (i.e. tax-free earnings). According to OECD (2013a), profit-shifting strategies by MNCs raise serious issues of fairness and compliance: 'What is at stake is the integrity of the corporate income tax'.

This paper continues the debate by investigating the link between tax evasion and avoidance by MNCs and tax havens. India might not be representative of all developing countries, but it

certainly is an interesting case.[2] Our research, based on the analysis of financial and ownership data of almost 1,500 MNCs operating in India, suggests that MNCs with tax haven links use profit-shifting strategies to evade and avoid taxes. As a result, the government of India may have lost tax revenues that could otherwise have been used to invest in human development.

Although India's gross national income (GNI) has more than doubled between 1995 and 2010 according to United Nations Development Programme (2011), the country is still home to one-quarter of the world's population who are undernourished, and is far from achieving the first of the millennium development goals (MDGs).[3] As the Nobel Prize winner Amartya Sen put it in Drèze & Sen (2011): 'there is probably no other example in the history of the world development of an economy growing so fast for so long with such limited results in terms of broad-based social progress'.

The rest of the article is organised as follows. Chapter 9.2 of this paper briefly explores the connections between tax evasion and avoidance, and development. Chapter 9.3 explains our research goals and methodology of investigating the links between corporate profit shifting and tax havens, and chapter 9.4 shows our research results. Chapter 9.5 concludes and provides some suggestions for further research as well as policy recommendations.

4.2 How tax avoidance and evasion hinder development

Tax evasion and avoidance strategies adopted by MNCs in developed countries have been well documented. Research conducted mostly for developed countries shows that MNCs use various strategies to shift income from high-tax to low-tax countries.[4] Strategies include the distortion of intra-firm transfer prices, the distortion of the corporate debt-equity structure, and the strategic location of assets and overhead costs. Evidence for developing countries is more limited however and this is well discussed by Fuest & Riedel (2012).[5] The lack of reliable and consistent data is often one of the most significant constraints faced by researchers.

[2] There is some history of international taxation connected with India discussed for example by Graham (2000) and Baker (2013). Crabtree & Mallet (2013) report that "Seventy per cent of all global transfer pricing litigation is in India". There is a lot of anecdotal evidence, for example Arun (2013), on the use of tax havens.

[3] According to Food and Agriculture Organisation of the United Nations (2012), the prevalence of hunger in India in 1990 was 26.9 per cent. In 2012, it decreased down to 17.5 per cent, which is still far away from the 2015 goal of 13.45 per cent.

[4] See for instance Clausing (2003), Bartelsman & Beetsma (2003), Huizinga & Laeven (2008), Buettner & Wamser (2007), Karkinsky & Riedel (2012).

[5] Evidence for taxation in developing countries very often does not deal with corporate taxation and we often know very little even about the other forms of taxation (Gemmell & Morrissey, 2005), (Sindzingre, 2007). This is fortunately changing in recent years, for example with establishment of the International Centre for Tax and Development, more research from universities, international organisations as well as civil society organisations with research papers such as Cobham, Janský, & Prats (2014).

The recent global financial recession and the associated policies for fiscal consolidation have made tax evasion and avoidance a prominent issue for developed countries. However, the effects of tax avoidance and evasion are probably more significant for developing economies. While tax revenues in OECD countries represent around 35% of their gross domestic product (GDP), developing countries obtain on average only 13% according to International Development Committee (2012). The low amount of tax raised by developing countries often leads to a situation where governments cannot obtain the financial resources required to guarantee citizens' access to essential services, such as healthcare, clean water and sanitation, and education. In addition, low tax revenues often imply the need for governments to increase debt and aid levels, which in turn can skew accountability towards creditors and donors.

The low level of tax revenues raised in developing countries is caused by a number of reasons. The existence of large informal sectors, high levels of poverty and the consequent inability of poorer citizens to pay taxes, the abuse of tax incentives (for example tax holidays) to attract foreign direct investment, and tax avoidance and evasion by corporations and individuals can be identified as the most relevant causes, coupled with the existence of weak institutional capacity to expand the tax base and enforce taxpayers' compliance.

Determining the economic and social impact of each of these factors is not an easy task to accomplish, not even at a national level. Nonetheless, research available provides useful insights. In relation to the losses caused by the existence of a shadow economy and on the basis of results of Schneider (2005), Cobham (2005) estimated that developing countries could lose as much as US$285bn (£188.6bn). As for the revenue foregone because of tax incentives, Government of India (2012) indicated that losses could have represented in 2011 as much as 5 % of GDP. Similar staggering figures were suggested in recent research by Tax Justice Network-Africa & ActionAid International (2012) on the use of tax incentives in east and central Africa. Finally, Gurría (2008), the head of the OECD has stated that developing countries could be losing three times the amount they receive in aid because of tax evasion and avoidance through tax havens.

This statement would justify why tax havens have been incorporated into the analysis as one of the fundamental elements of the systems and strategies associated with tax evasion and avoidance practices. Two main reasons may explain why tax havens play an important role:

1. Tax havens offer nil or low tax rates (for example through bilateral tax treaties), so they can produce an important incentive for corporations and individuals to shift income from high-tax jurisdictions.

2. Tax havens often offer secrecy provisions (for example banking secrecy, lack of exchange of tax information with other jurisdictions, disguise of beneficial ownership, etc.), so they enable tax evasion and avoidance practices, allowing the taxpayer to remain hidden from tax authorities elsewhere.

Both elements – low tax rates and secrecy – combine to increase the capacity of tax havens to attract foreign capital, which is much easier to move between countries as a result of intensive globalisation and financial de-regulation since the 1970s. However, tax havens should not be seen as just geographical locations. Because of their connectedness to major international financial centres, tax havens need to be understood as a fundamental element of a broader system and industry that supports tax evasion and avoidance, as argued, for example, by Shaxson (2011).

The role of third jurisdictions in profit-shifting may not be limited to low tax rates and financial secrecy however, and, for example, some might be part of tax treaty networks. If countries create strong incentives for other countries to enter into bilateral tax treaties, this opens new doors for tax avoidance and increases secrecy through complexity in international taxation (McGauran, 2013; Weyzig, 2012; Rixen, 2008; Picciotto, 1992).

We use the term tax havens in most of this paper, but we recognize that there are at least two other frequently used terms, offshore financial centres and secrecy jurisdictions, and that academic research and public policy debate around these concepts typically suffer from a lack of definitional consistency. Therefore there is little agreement about which jurisdictions ought to be considered as tax havens, or treated as such for policy purposes. We use two definitions that correspond with the two main reasons discussed above: tax havens and secrecy jurisdictions.

In defining a tax haven, we follow a "consensual approach"¨, originally pioneered by Palan, Murphy, & Chavagneux (2009) and later relabelled "expert agreement" Haberly & Wojcik (2013). This approach relies on a meta-list of tax havens fed by a review of numbers of "hits" by a number of lists of tax havens compiled by different international organisations and researchers. This list-based approach has some disadvantages, discussed in detail by Cobham (2012). In the light of them and to distinguish between the two roles of tax havens discussed above, we supplement this approach in the empirical analysis with an alternative one using the concept of secrecy jurisdiction. Furthermore, we define a secrecy jurisdiction in line with Murphy (2008) and according to Meinzer (2012) as a jurisdiction which "provides facilities that enable people or entities escape or undermine the laws, rules and regulations of other jurisdictions elsewhere, using secrecy as a prime tool".

One of the research avenues in past years has focused on estimating the wealth stock deposited in tax havens' bank accounts and its associated tax losses for developing countries. A recent report by Tax Justice Network by Henry (2012), for instance, estimates that as much as US$32tn (£21.2tn) could be held offshore. The same report states that developing countries could be losing US$189bn (£125.1bn) in associated tax revenue every year.

The importance of and role played by tax havens in today's world economy becomes clear by looking at some Foreign Direct Investment (FDI) figures. According to OECD (2013a), in 2010 Barbados, Bermuda and the British Virgin Islands received more FDI (combined 5.11% of global FDI) than Germany (4.77%) or Japan (3.76%). During the same year, these three jurisdictions

made more investments into the world (combined 4.54%) than Germany (4.28%). On a country-by-country position, in 2010 the British Virgin Islands were the second largest investor into China (14%) after Hong Kong, while Mauritius is the top investor into India (24%).

Other studies have focused on the losses caused by MNCs' tax evasion and avoidance through profit-shifting strategies. Much of the existing research exploring the impact of tax evasion and avoidance by MNCs on developing countries uses trade price data, including research conducted by De Boyrie, Pak, & Zdanowicz (2005), Tax Justice Network (2007), Hogg et al. (2008), and research by the Global Financial Integrity such as Kar & Freitas (2012). Research based on trade price data usually explores trade mispricing, which includes transactions between both related and unrelated parties. The general idea of these studies is to identify abnormally priced import and export transactions. For example, Hogg, McNair, & Pak (2009), using trade data available from the EU and the US, calculated the amount of money lost by non-EU countries into the EU and the US through trade mispricing. It is estimated that during 2005-07 the capital flow through mispricing was in the region of £229.7bn to EU countries and £351.7bn to the US: a total of £581.4bn from non-EU countries to the EU and the US. As a consequence, the overall tax loss to particularly poor countries is estimated at US$160bn (£105.9bn). While this research approach presents some data and methodological challenges discussed, for example, by Fuest & Riedel (2012), it has been useful to illustrate how tax evasion and avoidance can hamper development efforts.

Other recent research methodologies have also suggested that MNCs widely engage with profit-shifting strategies. Fuest & Riedel (2012) analysed data at firm level from a variety of countries and concluded that a) MNCs report less profit and pay less in tax than national companies, and b) MNCs with links to tax havens report less profits and pay less taxes than MNCs with no links to tax havens.

The importance of tax variables as determinants of foreign direct investment has been very much debated, too. Research conducted by the Ruding Committee Report, Gammie (1992), shows that variables such as the market size, and the quality of labour force and of infrastructures are some of the most often-mentioned determinants of FDI, but tax factors are also relevant as criteria for corporations to choose the location of their foreign investment. In effect, tax competition to attract FDI (often manifested in the progressive reduction of corporate income tax rates, the proliferation of tax incentives, and the increase in the number of tax havens) has often led to the prominence of tax-driven investments, i.e. those whose main goal is precisely to help the corporation reduce its tax bill.[6] However, more recent research such as Tanzi & Zee (2000) or McKinsey Global Institute (2003) suggests a negligible role of tax incentives in location decisions for FDI.

[6] According to OECD (2013a), the statutory corporate income tax rate in OECD member countries dropped on average of 7.2 percentage points between 2000 and 2011, from 32.6 per cent to 25.4 per cent.

The lack of capacity in most developing countries to obtain useful information on taxpayers and counter tax evasion and avoidance practices by some MNCs significantly contributes to the problem. In the past, many developed countries have adopted measures to prevent profit outflows from their borders, such as general anti-avoidance rules, thin-capitalisation rules, specific transfer pricing legislation, and controlled foreign company (CFC) rules. These strategies often focus on deterring, detecting and responding to aggressive tax planning.[7] However, these measures do not exist in many developing countries, and where they do exist, research on their effectiveness has not been carried out. In the case of India, the country explored in this paper, the government reported to have made transfer pricing adjustments of close to US$9bn (£6bn) for fiscal year 2007-8 according to Picciotto (2012), and the tax losses due to abusive transfer pricing in 2011-2 were estimated at US$12.6bn (£8.3bn) according to . Currently, around 3,500 cases are in litigation according to Prats (2013).

In February 2013, the OECD launched its report Addressing Base Erosion and Profit Shifting (BEPS), OECD (2013a), which clearly identifies profit shifting by MNCs as a fundamental cause of base erosion. In line with the conclusions reached by the Ruding Committee, the BEPS report acknowledges the increased segregation between the location where actual business activities and investment take place and the location where profits are reported for tax purposes. More concretely, the OECD describes how some MNCs transfer mobile activities to where they benefit from a favourable tax treatment, thus avoiding the payment of tax.

Within this context, identifying new research avenues to explore the magnitude and mechanics of profit-shifting strategies by MNCs operating in developing countries can provide valuable information for policy-makers.

4.3 Investigating the links between corporate profit shifting and tax havens

In our research, we seek to obtain new empirical evidence about the links between corporate profit shifting and tax havens. Our identification strategy, which is largely based on Fuest & Riedel (2012), builds on the notion that MNCs operating in developing countries differ with respect to their ability and opportunities to shift income out of their host countries. More concretely, our hypothesis is that firms that belong to multinational groups with tax haven links have greater incentives and better opportunities to transfer income out of developing countries than those MNCs without tax haven connections. Of course, this approach requires access to detailed information on the MNCs' financial accounts and ownership structures.

[7] See page 37 of OECD (2013a) for details.

According to previous empirical research on corporate income-shifting activities in developed countries, and as stated above, some MNCs use different mechanisms to transfer taxable resources to other jurisdictions, mainly the distortion of intra-firm trade prices and the debt-equity structure, as well as the relocation of profitable assets (often intangible assets such as corporate patents). To test for this type of profit shifting, we use information on corporate pre-tax profits, corporate tax payments and debt ratios, because profit-shifting outflows are expected to lower the first two variables and increase the third one. Thus, following our identification strategy, we expect MNCs with tax haven connections to report lower pre-tax profits per unit of assets, pay less in taxes per unit of assets and per unit of profit, respectively, and hold higher fractions of intra-firm debt than MNCs with no connections to tax havens.[8]

As stated by Fuest & Riedel (2012), one of the challenges of this identification strategy is to account empirically for a potential selection of firms with differing characteristics. Strategies to solve this problem have been presented in earlier papers for the developed world.[9] If, after accounting for all these issues, no differences between the considered profit-shifting variables are found, our profit-shifting hypothesis would be rejected. In our own research, we opted to introduce concrete specifications in our regression model in order to control for differences in companies' size and sector.

Our research is based on one specific country (India) and uses financial and ownership data compiled in the Orbis database, a private database commercialised by Bureau van Dijk (company information specialists). The Orbis database contains information on 108 million corporations worldwide. Data is derived from the official balance sheets, profit and loss accounts, and financial statements notes, and is complemented with news, market research, and information from official bodies, stock exchanges and private correspondence. The producer of the data has developed a uniform format that is applied to each entity analysed in order to address comparison issues stemming, for example, from differences in accounting standards across countries.

The Orbis database includes a number of variables that are relevant for our analysis. Financial data includes consolidated and unconsolidated sales, pre-tax profits, tax payments and debt. The financial variables are recorded in US$1,000s, with the exchange rate at each closing date of the year. Ownership variables include country and name of all direct and indirect shareholders, as well as of all direct and indirect subsidiaries up to a tenth level of ownership relationship.

[8] Profitability can be expressed using different measures of one of two generic types of performance: how much a firm makes with what it has (for example return on assets, profit per assets), and how much it makes from what it takes in (for example profit margin, profit per revenue). The downside of using the latter measure based on revenue is endogeneity. Revenue, or turnover, is directly affected by profit-shifting activities (for example by transfer price distortions). Hence, assets-based measures are preferred for our research.

[9] For example (Desai, Foley, & Hines, 2006), (Egger, Eggert, & Winner, 2010) or (Maffini, 2009).

However, as shown by Fuest & Riedel (2012), where research results are based on eight Asian developing countries but driven mainly by China, data for corporations operating in developing countries is sometimes scarce. Some countries, especially in Africa, are comparably poorly represented.

The possibility of obtaining a reasonable amount of data on MNCs operating in India, coupled with the fact that India, presents a relative low level of tax revenue as a share of GDP – 16.7% according to Prats (2013) – given its upper-middle income status, explains why India was considered as an interesting case to explore.

Although our research methodology is based on the one developed by Fuest & Riedel (2012), some important differences need to be noted. First, we analyse data of all firms available in Orbis, while Fuest & Riedel (2012) use only large and very large firms in their analysis. Second, we use more recent data from 2010 instead of pre-global financial crisis data from 2006.[10] Finally, tax havens are defined differently: while Fuest & Riedel (2012) define tax havens according to the OECD's tax haven list, OECD (2013b), we use two alternative approaches as discussed above.

The first approach considers a jurisdiction a tax haven if it is considered as such in at least seven of the 13 lists explored with details in table A3 in the appendix.[11] This is partly because the OECD list(s) kept changing over the time and also because we want to have a more complex view of tax havens, not using one specific list but rather a meta-analysis of a number of lists. We include the results of this approach in the main text.

The second approach focuses on secrecy jurisdictions and we operationalise the definition above by using the 2011 values of secrecy scores of the Financial Secrecy Index, a policy index organised by the Tax Justice Network and explained in Cobham et al. (2014). Values above 60 indicate a secrecy jurisdiction, where we choose to use 60 in line with suggestions in Meinzer (2012). The specific values and countries are again in the appendix in table A3 and we include the results of this approach in the appendix.

In our research, we define MNCs, as opposed to national corporations, as those firms that belong to a group with subsidiaries in at least two different countries. We consider an MNC to have links

[10] Similarly to Fuest & Riedel (2012), we use data only for a single year since we had no reliable data for several periods available, which would however be optimal to allow for unobserved differences between companies.

[11] There is no internationally recognised definition of tax havens and therefore we opt to define a tax haven by being listed by a majority of these 13 tax haven lists. We carried out a robustness check by estimating the results using the definition used by (Fuest & Riedel, 2012), which did not yield widely different results. The source of the 13 lists used is the following. The first 11 lists come directly from (Murphy, 2009), which lists them as (we reference these as in (Murphy, 2009)): (International Bureau of Fiscal Documentation, 1977), (Irish, 1982), (Hines Jr & Rice, 1994), (Financial Stability Forum, 2000), (International Monetary Fund, 2000), (OECD, 2000), (Financial Action Task Force, 2000) and (Financial Action Task Force, 2002), (Hampton & Christensen, 2005), (Lowtax.Net, 2008), (Zoromé, 2007), (Levin, 2007). The remaining two lists are the results of Financial Secrecy Index 2009 and Financial Secrecy Index 2011 and both come from Tax Justice Network (2013).

to tax havens, as opposed to MNCs with no links to tax havens, when at least one of the subsidiaries or owners is located in a jurisdiction that has been considered a tax haven or secrecy jurisdiction, respectively. According to these definitions, we could classify firms into three different groups: national firms, MNCs with no connections to tax havens, and MNCs with connections to tax havens.

To avoid distortions through outliers, four companies with a negative value of assets were deleted, and observations with a pre-tax profitability below -100% or a pre-tax profitability above 100% were dropped, in line with the approach taken by Fuest & Riedel (2012).

Although 46,276 companies are registered in Orbis as companies operating in India, a large percentage of the registries did not contain all the information we required to conduct our analysis. For instance, for our first ratio in our descriptive statistical analysis, we could work with a sample of 9,545 corporations, of which 8,020 were national and 1,525 multinational. Within the group of MNCs, 738 were found to have links to tax havens, and 787 were not found to be connected to tax havens.

4.4 Empirical results

We first used simple descriptive statistics to compare our two main treatment groups on a number of variables:

- profitability (defined as pre-tax profits per 100 units of assets, and used as a proxy for the corporation's tax base)
- tax payments per 100 units of profits (used as a proxy for the corporation's effective tax rate)
- tax payments per 100 units of assets and
- debt ratio (defined as the corporation's total debt as a share of total assets).

Table 4.1 below shows our key findings on the basis of the mean values obtained for each ratio explored.

Table 4.1: Results of the analysis of financial and ownership data of MNCs operating in India in 2010 – tax havens

	MNCs with no tax haven links		MNCs with tax haven links		How much less profits reported, less paid in taxes and higher debt fraction when the MNC has a tax haven link
Indicator	Number of observations	Results obtained for our sample	Number of observations	Results obtained for our sample	
Profits reported per 100 units of assets	787	6.6	738	6.5	1.5%
Taxes paid per 100 units of assets	722	2.3	685	1.9	17.4%
Taxes paid per 100 units of profits	714	24.1	683	16.8	30.3%
Debt ratio	544	21.9	615	24.4	11.4%

Source: The authors.

The results obtained thus confirm our established hypotheses (i.e. they cannot be rejected). On the basis of our sample of MNCs operating in India, we find that MNCs with tax haven connections reported 1.5% less profits and paid 17.4% less in taxes per unit of asset, 30.3% less in taxes per unit of profits and had 11.4% higher debt ratios than MNCs with no such links.

Our results are also consistent with those found by Fuest & Riedel (2012), largely driven by observations of corporations operating in China. In addition to the analysis carried out by Fuest & Riedel (2012), we apply a simple statistical test, specifically the independent group t-test, to examine the statistical significance of the differences of the variables across the foreign links. We find that MNCs with and without tax haven links differ at least at the 0.10 statistical significance level only in terms of tax per assets, but not so in terms of profitability, tax per profits and debt ratio. This implies that we should we cautious when interpreting the results and especially individual numbers, but – also given the evidence presented in Fuest & Riedel (2012) – we consider this also an opportunity to call for further research which could investigate these questions with even more detailed data for more years and countries.

Results obtained in our descriptive statistics are to a large extent supported using regression analysis with results in table 4.2, where different specifications were established in order to control for size and sector, two of the most relevant potential sources of heterogeneity. Our regression model is based on a sample that includes all companies for which data is available. The table 4.2 shows the results for nine regressions (three per each of the variables analysed): profitability, taxes paid per unit of assets, and taxes paid per unit of profit.

Table 2: Results of the regression analysis of financial and ownership data of MNCs operating in India in 2010 – tax havens

Regression number	1	2	3	4	5	6	7	8	9
Dependent variable	Profitability	Profitability	Profitability	Tax per assets	Tax per assets	Tax per assets	Tax per profits	Tax per profits	Tax per profits
MNCs with no tax haven links	4.104***	3.608***	1.905***	1.087***	0.851***	0.724***	19.31	31.49	26.84
	(0)	(6.7e-11)	(0.000734)	(0)	(1.98e-09)	(6.27e-07)	(0.558)	(0.352)	(0.443)
MNCs with tax haven links	3.952***	3.443***	0.806	0.671***	0.441***	0.247	10.26	23.54	16.30
	(0)	(1.17e-09)	(0.178)	(2.44e-06)	(0.00253)	(0.109)	(0.760)	(0.498)	(0.662)
Total assets (log, 2010)			0.721***			0.0572***			2.332
			(0)			(0.000132)			(0.597)
Industry NACE dummies included	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Number of observations	9,545	9,466	9,466	9,212	9,135	9,135	7,988	7,916	7,916

Source: The authors.

*Notes: p-value in parentheses: *** p<0.01, ** p<0.05, * p<0.1.*

The first specification in each block of regressions (specifications 1, 4 and 7) shows the results for a simple ordinary least squares model that regresses the dependent variable on two dummy variables: MNCs with connections to tax havens and MNCs with no connections to tax havens. Specifications 2, 5 and 8 control for sector heterogeneity. This is done by incorporating a full set of two-digit industry dummies, as provided by the Orbis database. Finally, specifications 3, 6 and 9 control for corporations' size by including the logarithm of the firm's total assets as an additional control variable. As the parameters for industry dummies and total assets are largely significant, their inclusion improves the regression specifications. Therefore, regressions 3, 6 and 9 (i.e. those that include all these explanatory variables) can be considered as the most suitable for interpretation.

The results presented here are based on the lists-based definition of a tax haven and in the appendix we present the results on the basis of secrecy jurisdictions with a 2011 Financial Secrecy Index secrecy score of above 60. The results, using this alternative approach to defining tax

havens, in tables A1 and A2, are largely in line with those in tables 1 and 2 and the difference between the two concepts therefore does not seem to be of high importance in this case.

In contrast with Fuest & Riedel (2012), the results obtained indicate that firms belonging to multinational groups report higher pre-tax profits per total assets and pay more in taxes than national firms, whereas the corporations with tax haven links seem to report lower profits and pay less in taxes than corporations with no tax haven links However, the statistical significance is not very strong for some of the results, such as the tax per profits specifications or the MNCs with tax haven links, and this calls for caution when interpreting the results as well as further research. All the specifications yield comparable results and show evidence that is consistent with the descriptive analysis.

It needs to be noted that reasons different to profit shifting and more generally aggressive tax planning may have also influenced our results, for example the impact of tax incentives or the effects of the existence of Advanced Pricing Agreements (APAs), but it seems to be very unlikely that these factors alone explain the differences observed between the groups of MNCs.

Additionally, we aimed to investigate the relationship between Mauritius and India when it comes to investment in the latter since the existing literature seems to suggest that it is special (Sharman, 2010), (Bell, 2004), (Klein & Hirji, 2001) and (Sinha, 1996). We wanted to carry out the empirical analysis again with a new definition of Mauritius as the only tax haven, but the lack of relevant data hindered that. The lack of observations for Indian companies with ties to Mauritius calls itself for more research and it is also a reason why we can sensibly run neither a regression model nor an independent group t-test. The high Financial Secrecy Index secrecy score of Mauritius might be an indication of why we cannot observe too many such firms. Further research should focus on this special relationship and data and methodology better suited for the study of bilateral tax treaties or foreign investment should be considered.

Furthermore, why national firms in India are found to report less profits and pay less in taxes than MNCs would require further research. However, it needs to be noted that profit shifting by domestic companies in India that try to benefit from the tax incentives offered in special economic zones has been identified as a problem by the Indian tax revenues authorities and researchers such as Reddy (2012).

4.5 Conclusion and recommendations

Our findings suggest that MNCs with connections to tax havens engage in profit shifting more intensively than those MNCs with no tax haven links. Specifically, our analysis of financial and ownership data of more than 1500 MNCs operating in India shows that in 2010 those MNCs with links to tax havens reported lower profits and paid less in than MNCs with no such links. Although the statistical significance is somewhat weak, the findings support the notion that when corporations have tax haven links they face higher incentives (because of the low tax rates in tax

havens) and opportunities (because of the secrecy provisions tax havens offer) to shift income than corporations that do not have any tax haven links. Profit shifting by MNCs can significantly reduce the tax revenues raised by governments. In countries where taxes raised as a percentage of GDP are very low such as India, the revenue foregone can seriously undermine efforts to tackle poverty and invest in human development.

Our results are aligned with the analysis made by the OECD in its recent report, OECD (2013a). Our research indicates that profit shifting to low tax jurisdictions could be a major cause for base erosion in India. The findings also suggest that the current transfer pricing rules and counter measures (at least those adopted by the government of India) might not be effective to tackle tax evasion caused by corporate's profit shifting.

As the OECD states, the current international tax system has not kept pace with the business environment. One of the key problems relates to the fact that the different separate legal entities that form an MNC are still treated from a tax perspective as if they were independent. However, reality shows that these different legal entities follow an overall business strategy, and their managing and reporting structures have links that clearly go beyond the national boundaries.

According to the OECD, this situation calls for a 'review of the fundamentals of the current international tax system'. In our view, any changes to the current international tax rules should seek to:

- Redress the unjust distribution of the global tax base. Each country should be able to tax a fair share of the profits earned by MNCs operating in its territory.
- Treat MNCs as what they really are: complex structures that are bound together by centralised management, functional integration, and economies of scale.
- Ensure MNCs pay their taxes where their economic activities and investment are really located, rather than in jurisdictions where the presence of the MNC is sometimes fictitious and driven by tax avoidance strategies.

The current G20 and OECD Action Plan to address base erosion and profit-shifting could be a first step in this direction. More concretely, its Action 11 (Establish methodologies to collect and analyse data on BEPS and the actions to address it) should offer new research avenues to better understand the magnitude of, and the strategies adopted for, profit-shifting into lower tax jurisdictions; Action 12 should bring in new requirements for taxpayers to disclose their aggressive tax planning arrangements; Action 13 should help tax administrations improve the efficiency and effectiveness of risks assessments through the adoption of country-by-country reporting; finally, other actions in the plan (for example actions 8 to 10) seek to align transfer pricing outcome to value creation.

Some authors and NGOs such as Picciotto (2012), however, have pointed out that, while the OECD Action Plan can be effective to improve the coherence of the current system for the

taxation of MNCs, it will not address some of its most fundamental flaws. In this sense, some views support the evolution towards a unitary approach for the taxation of MNCs, as opposed to the current separate entity approach on which the arm's length principle is based. Given the relevance of the analysis provided by OECD (2013a), which is supported by the findings of our own research, we suggest that the OECD and the United Nations Tax Committee jointly explore to what extent an evolution towards unitary taxation with profit apportionment would be more appropriate for the taxation of MNCs and lead to a fairer international tax system.

Unitary taxation would not be a perfect system, so there are a number of areas that would require further research, such as what constitutes a unitary business, how to define an MNC's global tax base, finding formulas that fairly split profits among the different jurisdictions where the company operates, and how to adapt the system to the nature of different sectors, for example the extractive industries.

However, a unitary approach to the taxation of MNCs could better reflect how MNCs operate today. It could also lead to a more transparent and easy-to-administer system. Under unitary taxation of MNCs, artificial profit-shifting to companies based in tax havens, often with no real economic activity, would become pointless.

4.6 References

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4.7 Appendix

Table A1: Results of the analysis of financial and ownership data of MNCs operating in India in 2010 – secrecy jurisdictions

	MNCs with no secrecy jurisdiction links		MNCs with secrecy jurisdiction links		How much less profits reported, less paid in taxes and higher debt fraction when the MNC has a secrecy jurisdiction link
Indicator	Number of observations	Results obtained for our sample	Number of observations	Results obtained for our sample	
Profits reported per 100 units of assets	708	6.6	802	6.5	0.7%
Taxes paid per 100 units of assets	652	2.3	741	2.0	13.8%
Taxes paid per 100 units of profits	644	23.5	739	18.1	29.7%
Debt ratio	492	22.7	652	23.8	4.9%

Source: The authors.

Table A2: Results of the regression analysis of financial and ownership data of MNCs operating in India in 2010 – secrecy jurisdictions

Regression number	1	2	3	4	5	6	7	8	9
Dependent variable	Profitability	Profitability	Profitability	Tax per assets	Tax per assets	Tax per assets	Tax per profits	Tax per profits	Tax per profits
MNCs with no secrecy jurisdictions links	4.063*** (0)	3.545*** (8.01e-10)	1.840*** (0.00174)	1.065*** (0)	0.838*** (1.54e-08)	0.713*** (2.54e-06)	18.41 (0.594)	24.21 (0.494)	20.18 (0.580)
MNCs with secrecy jurisdictions links	4.106*** (0)	3.566*** (6.11e-11)	0.946 (0.102)	0.759*** (3.02e-08)	0.505*** (0.000332)	0.315** (0.0350)	12.37 (0.703)	34.69 (0.300)	28.46 (0.431)
Total assets (log, 2010)			0.721*** (0)			0.0565*** (0.000158)			2.022 (0.647)
Industry NACE dummies included	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Number of observations	9,545	9,466	9,466	9,212	9,135	9,135	7,988	7,916	7,916

Source: The authors.

*Notes: p-value in parentheses: *** p<0.01, ** p<0.05, * p<0.1*

Table A3: The lists of tax havens used in this research, the secrecy score of the Financial Secrecy Index 2011 and a comparison with OECD 2009 used by Fuest & Riedel (2012)

Country	List 1	List 2	List 3	List 4	List 5	List 6	List 7	List 8	List 9	List 10	List 11	List 12	List 13	Sum of 13 lists	Tax haven (1 = yes)	The list used by Fuest & Riedel (2012)	The secrecy score 2011	Jurisdiction (1 = yes)
Bermuda	1	1	1	1	1	1	1	1	1	1	1	1	1	13	1	1	85	1
Bahamas, The	1	1	1	1	1	1	1	1	1	1	1	1	1	13	1	1	83	1
Guernsey	1	1	1	1	1	1	1	1	1	1	1	1	1	13	1		65	1
Jersey	1	1	1	1	1	1	1	1	1	1	1	1	1	13	1		78	1
Cayman Islands	1	1	1	1	1	1	1	1	1	1	1	1	1	13	1	1	77	1
Malta	1	1	1	1	1	1	1	1	1	1	1	1	1	13	1		48	
Panama	1	1	1	1	1	1	1	1	1	1	1	1	1	13	1	1	77	1
Netherlands Antilles	1	1	1	1	1	1		1	1	1	1	1	1	12	1	1	83	1
Barbados	1	1	1	1	1	1		1	1	1	1	1	1	12	1		79	1
Cyprus	1		1	1	1	1	1	1	1	1	1	1	1	12	1		58	
Isle of Man	1		1	1	1	1	1	1	1	1	1	1	1	12	1		65	1
Liechtenstein	1	1	1	1	1	1	1	1		1	1	1	1	12	1	1	81	1
British Virgin Islands	1	1	1	1	1	1	1	1		1	1	1	1	12	1	1	81	1
Vanuatu	1	1	1	1	1	1		1	1	1	1	1	1	12	1	1	88	1
Switzerland	1	1	1		1	1		1	1	1	1	1	1	11	1	1	78	1
Gibraltar	1		1	1	1	1	1	1		1	1	1	1	11	1	1	78	1
Hong Kong S.A.R. of China	1	1	1		1	1		1	1	1	1	1	1	11	1		73	1
Singapore	1	1	1		1	1		1	1	1	1	1	1	11	1	1	71	1
Turks and Caicos Islands	1	1	1	1	1	1		1		1	1	1	1	11	1	1	90	1
St. Vincent and the Grenadines	1		1	1	1	1	1	1		1	1	1	1	11	1	1	78	1
Antigua and Barbuda	1		1	1	1	1	1	1		1		1	1	10	1	1	82	1
Belize			1	1	1	1	1	1		1	1	1	1	10	1	1	90	1
Cook Islands			1	1	1	1	1	1		1	1	1	1	10	1	1	75	1
Grenada	1		1	1	1		1	1		1	1	1	1	10	1	1	83	1

Ireland	1	1	1		1	1		1	1		1	1	1	10	1		44		
St. Kitts and Nevis			1	1	1	1	1	1		1	1	1	1	10	1	1	81	1	
Luxembourg	1		1		1	1		1	1	1	1	1	1	10	1	1	68	1	
Monaco	1		1	1	1	1	1	1			1	1	1	10	1	1	75	1	
Nauru	1	1		1	1	1	1	1		1		1	1	10	1	1	93	1	
Andorra	1		1	1	1	1		1			1	1	1	9	1	1	73	1	
Anguilla			1	1	1	1		1		1	1	1	1	9	1	1	79	1	
Bahrain		1	1	1	1	1		1	1			1	1	9	1	1	78	1	
Costa Rica	1	1			1	1		1		1	1	1	1	9	1	1	77	1	
St. Lucia			1	1	1	1	1	1		1		1	1	9	1	1	89	1	
Marshall Islands			1	1	1	1	1	1			1	1	1	9	1	1	90	1	
Mauritius				1	1	1	1	1	1		1	1	1	9	1		74	1	
Aruba				1	1	1		1		1	1	1	1	8	1	1	74	1	
Dominica			1	1	1		1	1		1		1	1	8	1	1	80	1	
Liberia	1	1	1	1				1			1	1	1	8	1	1	81	1	
Seychelles	1			1	1	1		1			1	1	1	8	1		88	1	
Samoa				1	1	1	1	1		1		1	1	8	1	1	85	1	
Lebanon			1		1	1	1	1				1	1	7	1		82	1	
Macao, China			1		1	1		1				1	1	6			83	1	
Montserrat			1	1	1			1				1	1	6		1	86	1	
Malaysia					1	1		1			1	1	1	6		1	77	1	
United Kingdom		1						1	1			1	1	5			45		
Maldives			1	1				1				1	1	5			92	1	
Niue				1	1	1	1	1						5		1			
United Arab Emirates								1			1	1	1	4			79	1	
Brunei Darussalam	1										1	1	1	4		1	84	1	
Hungary							1	1				1	1	4			47		
Israel							1	1				1	1	4			58		
Latvia									1	1		1	1	4			45		
Netherlands	1							1				1	1	4			49		
Philippines		1					1					1	1	4		1	73	1	
Portugal								1			1	1	1	4			51		
United States		1						1				1	1	4			58		
Uruguay								1	1			1	1	4		1	78	1	

Virgin Islands (U.S.)			1			1		1	1	4		68	1
Belgium						1		1	1	3	1	59	
Austria								1	1	2	1	66	1
Botswana							1		1	2		79	1
Germany						1			1	2		57	
France	1								1	2		NA	1
Guatemala					1				1	2	1	81	1
Italy						1			1	2		49	
San Marino			1						1	2	1	79	1
Tonga			1			1				2			
South Africa	1					1				2			
Alderney						1				1			
Anjouan							1			1			
Canada									1	1		56	
Campione d'Italia						1				1			
Denmark									1	1		40	
Egypt					1					1			
Spain									1	1		34	
Ghana									1	1		79	1
Honduras	1									1			
Indonesia					1					1			
India									1	1		53	
Iceland						1				1			
Ingushetia						1				1			
Jordan		1								1			
Japan									1	1		64	1
Korea, Rep.									1	1		54	
Sri Lanka	1									1			
Myanmar					1					1			
Northern Mariana Islands						1				1			
Nigeria					1					1			
Puerto Rico	1									1			
Palau				1						1			
Russia					1					1			

Somalia		1		1	
Sao Tome and Principe		1		1	
Sark		1		1	
Taiwan Province of China		1		1	
Turkish Republic of Northern Cyprus		1		1	
Ukraine	1			1	
Melilla		1		1	
Chile					1

Source: Authors, Murphy (2009) and Tax Justice Network (2013).

Notes: The source of the 13 lists used is the following and the order corresponds to the naming of the lists in the above table (lists 1 to 13 in this order follow): The first 11 lists come directly from (Murphy, 2009), which lists them as (we reference these as in (Murphy, 2009)): (International Bureau of Fiscal Documentation, 1977), (Irish, 1982), (Hines Jr & Rice, 1994), (Financial Stability Forum, 2000), (International Monetary Fund, 2000), (OECD, 2000), (Financial Action Task Force, 2000) and (Financial Action Task Force, 2002), (Hampton & Christensen, 2005), (Lowtax.Net, 2008), (Zoromé, 2007), (Levin, 2007). The remaining two lists and the last two columns are the results of Financial Secrecy Index 2009 and Financial Secrecy Index 2011 and both come from Tax Justice Network (2013).

Chapter 5

Corporate Tax Base Erosion and Profit Shifting out of the Czech Republic[1]

Abstract: We contribute to the growing systematic evidence of corporate tax base erosion and profit shifting out of most countries into other countries, including tax havens, by analysing a situation in one of the post-communist economies. We analyse financial and ownership data of 13603 companies operating in the Czech Republic, including multinational corporations (4124), some of which have links to tax havens (528). We present empirical evidence suggesting that the effect of the multinational corporations' links with tax havens on the debt ratio of companies in the Czech Republic is positive. The evidence on the profits and taxes is not so conclusive. We provide policy implications and conclude with questions for further research.

Keywords: corporate tax base erosion; profit shifting; multinational corporations; tax haven; Czech Republic

JEL classification: H25, F23, H26, C33

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5.1 Introduction

Multinational companies (MNCs) may attempt to shift their tax base to the most suitable jurisdiction to minimise their tax outlays. This practice might be especially appealing if one of the subsidiaries is in a specific jurisdiction, a so called tax haven. There are multiple practices that these companies can employ in order to limit their taxable income in countries, especially in those with high corporation taxes, such as mispricing of intercompany trade or debt sharing. These usually legal activities allow multinational companies to skew their before tax incomes.[2] Our aim is to look at systematic differences between companies with and without links to tax havens in the Czech Republic. This will allow us to conjecture that the tax haven link allows these companies to engage in such activities that tax authorities would want to know about. Profit shifting is likely to affect the tax revenues of countries' governments as well as to hinder growth.

In a major policy and analytical move in February 2013, the Organisation for Economic Co-operation and Development (OECD) published its report Addressing Base Erosion and Profit Shifting (BEPS). The OECD (2013) report is the OECD's initial response to the mandate it received in 2012 from some political leaders in developed countries, which showed concern about the problem of tax base erosion and profit shifting by MNCs. In its BEPS report, the OECD makes a comprehensive analysis of the underlying causes and main consequences of the problem of base erosion and profit shifting. The OECD acknowledges that the current international tax system, characterised by inter-state tax competition, rather than by co-operation, has not kept pace with developments in the business environment, providing MNCs plenty of opportunities to exploit legal loopholes and enjoy double non-taxation of income (i.e. tax-free earnings). According to OECD (2013a), profit-shifting strategies by MNCs raise serious issues of fairness and compliance: 'What is at stake is the integrity of the corporate income tax'. International Monetary Fund followed in the footsteps of, and was at the same time somewhat critical of, of the OECD with analytical paper in 2014 (International Monetary Fund, 2014).

Clearly, the phenomenon of profit shifting within multinational companies has been a known phenomenon in developed countries, but has only recently reached the attention of policy makers in post-communist, transition and developing countries as well as at the global level. This paper contributes to this debate by investigating the link between tax evasion and avoidance by MNCs and tax havens for the economy of the Czech Republic and thus contributes to the pioneering research by Fuest & Riedel (2012) as well as Janský

[2] When assessing profit shifting and related activities, one can differentiate between illegal activities (tax evasion) and limiting tax outlays by legal means (tax avoidance). While the former may result in a criminal justice investigation, the latter concerns tax authorities and may call for more financial oversight. The eventual goal is similar in scale, but the legal ramifications of tax evasion make that option less appealing. While tax fraud in general impacts a company's goodwill, may affect the stock price and valuation in general, tax avoidance is often widely known due to its legality.

& Prats (2014), who applied a similar methodology but so far to other than Eastern European and post-communist countries (a range of developing countries and India, respectively), who are known for low tax morale (Torgler, 2003). One of the benefits is that by extending the research to new regions, we can observe whether the measurements of tax avoidance are consistent across regions and thus widely applicable or if research has to be done on a country-by-country basis. Of course, the Czech Republic might not be representative of all eastern European countries, but it certainly is an interesting case. Our research, based on the analysis of detailed financial and ownership data of more than 13 thousand companies operating in the Czech Republic, suggests that MNCs with tax haven links use debt-shifting strategies to evade and avoid taxes. As a result, the government of the Czech Republic may have lost tax revenues. The rest of the article is organised as follows. Section 2 briefly explores the indicators of base erosion and profit shifting. Section 3 explains our research goals and methodology of investigating the links between corporate profit shifting and tax havens, and section 4 discusses our research results. Section 5 concludes and provides some suggestions for further research as well as policy recommendations.

5.2 Indicators of Base Erosion and Profit Shifting

There are various ways multinational companies can leverage tax differentials in the countries of their subsidiaries. Shifting of pre-tax can be done through inter-company trade or sharing of debt and, since there is usually no account of these activities, one has to analyse available financial data and see if there are indications of such practices. There are different ways these strategies manifest and that is the reason why we analyse multiple indicators in this paper. For example mispricing of trade will affect before tax profitability, but debt sharing will affect effective tax paid on gross profits. Observing only one indicator would thus skew the analysis. One also has to consider the variation across industries, something we will account for by controlling for broad sectors.

Tax evasion and avoidance strategies adopted by MNCs in developed countries have been relatively well documented.[3] Research conducted mostly for developed countries shows that MNCs use various strategies to shift income from high-tax to low-tax countries. See for instance Clausing (2003), Bartelsman & Beetsma (2003), Huizinga & Laeven (2008), Buettner & Wamser (2007), Karkinsky & Riedel (2012). Strategies include distortion of intra-firm transfer prices, distortion of the corporate debt-equity structure, and strategic

[3] Recently, there have been several high profile cases in the EU, where major multinational companies faced very small tax expenses despite multibillion revenues. These include Apple, Starbucks or Fiat, who were investigated by the European Commission as such practices were supported by the tax authorities in several countries of the EU. In November, 2014, the so-called Luxembourg Leaks document how more than 300 countries moved their headquarters to leverage Luxembourg's low tax rate, being supported an EU directive that allowed a multinational company to tax in the domicile of its headquarters. While these cases point to individual companies, these are possibly only the metaphorical tip of the iceberg. The aim of academic research is to uncover the scale of these practices. Such research is constrained by the availability of tax data. Various sources, while incomplete, do give us an indication as to what extent tax avoidance is an issue within countries.

location of assets and overhead costs. Evidence for developing countries is more limited however and this is well discussed by Fuest & Riedel (2012) or Janský & Prats (2014). Evidence for taxation in developing and transition countries very often does not deal with corporate taxation and we often know very little even about the other forms of taxation (Gemmell & Morrissey, 2005). This is fortunately changing in recent years, for example with research papers such as Cobham, Janský, & Prats (2014). The lack of reliable and consistent data is often one of the most significant constraints faced by researchers.

Gurría (2008), the head of the OECD has stated that developing countries could be losing three times the amount they receive in aid because of tax evasion and avoidance through tax havens. This statement would justify why tax havens have been incorporated into the analysis as one of the fundamental elements of the systems and strategies associated with tax evasion and avoidance practices. Two main reasons may explain why tax havens play an important role: Tax havens offer nil or low tax rates and often offer secrecy provisions (for example banking secrecy, lack of exchange of tax information with other jurisdictions, disguise of beneficial ownership, etc).

The role of third jurisdictions in profit-shifting may not be limited to low tax rates and financial secrecy however, and, for example, some might be part of tax treaty networks. If countries create strong incentives for other countries to enter into bilateral tax treaties, this opens new doors for tax avoidance and increases secrecy through complexity in international taxation ((McGauran, 2013); (Weyzig, 2012); (Rixen, 2008); (Picciotto, 1992)). We use the term tax havens in most of this paper, but we recognize that there are at least two other frequently used terms, offshore financial centres and secrecy jurisdictions, and that academic research and public policy debate around these concepts typically suffer from a lack of definitional consistency as discussed recently by Cobham, Janský, & Meinzer (2015). Therefore there is little agreement about which jurisdictions ought to be considered as tax havens, or treated as such for policy purposes.

In defining a tax haven, we follow a "consensual approach", originally pioneered by Palan, Murphy, & Chavagneux (2009) and later relabelled "expert agreement" Haberly & Wójcik (2014). This approach relies on a meta-list of tax havens fed by a review of numbers of "hits" by a number of lists of tax havens compiled by different international organisations and researchers. This list-based approach has some disadvantages, discussed in detail by Cobham (2012). In the light of them and to distinguish between the two roles of tax havens discussed above, we supplement this approach in the empirical analysis with an alternative one using the concept of secrecy jurisdiction. Furthermore, we define a secrecy jurisdiction in line with Murphy (2008) and according to Meinzer (2012) as a jurisdiction which "provides facilities that enable people or entities escape or undermine the laws, rules and regulations of other jurisdictions elsewhere, using secrecy as a prime tool".

5.3 Data

The analysis is based on financial data in the Orbis database. The database contains financial and ownership data on companies worldwide, we employ a subset with information on Czech companies and multinational companies with a subsidiary in the Czech Republic. This subset contains information on 13603 companies, 528 of which have either direct or indirect links to tax havens.

The major issue with data availability is that they are usually available in higher developed countries where tax avoidance tends to be a lesser issue and forgone revenue does not affect the state's budget to such an extent as in a developing country. The dataset provides multiple years of data with 2010 having the largest number of observations, we thus chose this year in order to have our analysis as robust as possible. We did not employ the full dataset for our regression analysis due to missing data for some of the indicators.

As for tax havens, there is no one correct definition as such a property is not readily defined. Fuest & Riedel (2012) employ the OECD definition, we chose to employ a more robust indicator by combining various definitions. We compiled a list of 13 definitions and if a country is present in at least 7 of these, we consider it a tax haven[4] as we find such an approach stable and robust. In treating tax haven links, we differentiate between direct and indirect links. A direct link would mean a company has a subsidiary in a country identified as a tax haven whereas an indirect link would mean this connection is made through the parent company's ownership structure.

5.4 Methodology

In our research, we seek to obtain new empirical evidence about the links between corporate profit shifting and tax havens. Our identification strategy, which is largely based on Fuest & Riedel (2012), builds on the notion that MNCs operating in the Czech Republic differ with respect to their ability and opportunities to shift income out. More concretely, our hypothesis is that firms that belong to multinational groups with tax haven links have greater incentives and better opportunities to transfer income out of developing countries than those MNCs without tax haven connections.

[4] There is no internationally recognised definition of tax havens and therefore we opt to define a tax haven by being listed by a majority of these 13 tax haven lists. We carried out a robustness check by estimating the results using the definition used by Fuest & Riedel (2012), which did not yield widely different results. The source of the 13 lists used is the following. The first 11 lists come directly from Murphy (2009), which lists them as (we reference these as in Murphy (2009)): (International Bureau of Fiscal Documentation, 1977), (Irish, 1982), (Hines Jr & Rice, 1994), (Financial Stability Forum, 2000), (International Monetary Fund, 2000), (OECD, 2000), (Financial Action Task Force, 2000) and (Financial Action Task Force, 2002), (Hampton & Christensen, 2005), (Lowtax.Net, 2008), (Zoromé, 2007), (Levin, 2007). The remaining two lists are the results of Financial Secrecy Index 2009 and Financial Secrecy Index 2011 and both come from Tax Justice Network (2013).

Consistent with the indicators of base erosion described in Section 2, we observe several financial indicators found in the Orbis data. These include profitability per unit of asset, tax payable per unit of asset or per unit of profit, and indebtedness per unit of asset.

Summary statistics in Table 5.1 give an indication of how the data differ when stratified by the tax haven connection criterion. These results, while not a substitute for a rigorous analysis, suggest that companies with tax haven links have much higher debts per levels of assets. It also appears that, on average, profits per assets as well as tax paid per asset are slightly lower in companies with tax haven links.

The great difference in assets is similarly reflected in average revenues, which are about 40% higher in multinational companies with tax haven links, compared to other MNCs. This disparity is the reason for controlling for size of companies in our regression analysis.

Whilst we do account for the tax haven links, multinational structures, the indebtedness and size of companies, we also need to account for the sizeable heterogeneity between sectors. Grouping based on the NACE classifications is employed. The classification structure allows for stratification on multiple levels. Fuest & Riedel (2012) aggregate on the 4-digit level, we choose to aggregate on the letter level as we empirically fail to find enough heterogeneity on lower levels of stratification. That can be remedied by employing a larger dataset, but that is not available. One of the upsides is that stratifying on a smaller number of categories allows for easier interpretation of results.

Table 5.1: Summary statistics

Mean	MNCs with no TH links	MNCs with TH links	Difference	(p-value)
Profits per assets	11.63	10.41	1.22	0.06
Tax per assets	1.92	1.69	0.23	0.06
Tax per profits	17.67	18.45	-0.78	0.29
Debt ratio	5.82	10.34	-4.52	< 0.01
Assets ($'000s)	83	316	-233	< 0.01

Source: Authors, Orbis

5.5 Regression Results

While the summary statistics hinted at large differences between companies with and without tax haven links, a regression analysis paints a slightly different picture. Such analysis allows us to control for multiple factors at once and thus makes sure that stratification by the existence of tax haven links is done only after we have matched other characteristics of the companies in our sample.

We analyse the same variables as those in our summary statistics. These are profitability per 100 units of assets, taxes paid per assets and taxes paid per profits. We use these are our dependent variables and vary three different specifications for each. The first one only accounts for MNCs and tax haven links, essentially replicating our summary statistics. The

second specifications accounts for sectoral heterogeneity, the third one adds sizes of companies in terms of assets.

Results of all nine regressions are in Table 5.2. As noted, the simplest regression mimic the results from our summary statistics, but once sector-specific heterogeneity and company size are accounted for, the tax haven link dummy becomes insignificant.

Table 5.2: Regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	Profitability	Profitability	Profitability	Tax per assets	Tax per assets	Tax per assets	Tax per profits	Tax per profits	Tax per profits
MNC	2.357***	2.350***	3.621***	0.554***	0.553***	0.831***	-0.294	-0.203	-0.0189
	(0)	(0)	(0)	(0)	(0)	(0)	(0.318)	(0.497)	(0.952)
Tax haven link	-1.159*	-1.052*	-0.610	-0.221*	-0.197	-0.120	1.120	1.191	1.253*
	(0.0668)	(0.0951)	(0.326)	(0.0809)	(0.119)	(0.332)	(0.136)	(0.114)	(0.0968)
Assets			-1.530***			-0.348***			-0.224**
			(0)			(0)			(0.0272)
Sector dummies included	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Constant	9.277***	9.613***	22.50***	1.779***	1.827***	4.763***	21.64***	21.29***	23.18***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Observations	11,173	11,173	11,173	10,314	10,314	10,314	10,055	10,055	10,055

Source: Authors, Orbis

*Notes: p-value are in parentheses: *** p<0.01, ** p<0.05, * p<0.1.*

While the profitability and tax indicators do not suggest there is a significant difference between companies with and without tax haven links, the numbers on indebtedness tell a different story. We regress that indicator in the same fashion as the profitability and tax ones. Results are in Table 5.3.

We see that the tax haven connection is highly significant, suggesting a much higher indebtedness amongst these companies. The change in the intercept between the second and third equations, when the asset variable was introduced, suggests that the size of companies has a major impact on the debt levels a company can endure.

Higher indebtedness of companies with tax haven links, other relevant factors being controlled for, would suggest debt sharing. All the other results, however, do not imply different tax liabilities amongst these companies, leading to largely puzzling results.

Table 5.3: Indebtedness regressions

	(1)	(2)	(3)
Dependent variable	Long term debt	Long term debt	Long term debt
MNC	1.529***	1.211***	2.039***
	(8.19e-05)	(0.00189)	(4.84e-07)
Tax haven link	6.187***	5.141***	5.398***
	(8.33e-11)	(6.05e-08)	(1.19e-08)
Assets			-0.967***
			(0)
Sector dummies included	No	No	Yes
Constant	8.683***	8.034***	16.43***
	(0)	(0)	(0)
Observations	8,246	8,246	8,246

Source: Authors, Orbis

*Notes: p-value are in parentheses: *** p<0.01, ** p<0.05, * p<0.1.*

5.6 Conclusion

We contribute to the rare, but growing systematic evidence of corporate tax base erosion and profit shifting out of most countries into other countries, including tax havens. We analysed detailed financial and ownership data of companies operating in the Czech Republic, including multinational corporations, some of which have links to tax havens. We present empirical evidence suggesting that the effect of the multinational corporations' links with tax havens on the debt ratio of companies in the Czech Republic is positive. The evidence on the profits and taxes is not so conclusive.

Even though the practices described in this paper are not necessarily illegal, they are still of interest to policy makers as tax avoidance undoubtedly decreases the tax intake on the national level. There are several possible reactions to the research on tax avoidance and we shall discuss them in the context of our findings.

First thing to emphasise is that this phenomenon has varying impact, depending mainly on the extent of corporate tax share of total tax intake. Countries where corporate taxation forms a major part of government revenues, will benefit more from a better treatment of international financial flows and limiting base erosion. Czech government revenues equated to 36% of GDP in 2010, with income taxes amounting to 6.6% of GDP, these being fairly evenly split between personal income tax and corporate taxation (Ministry of Finance of the Czech Republic, 2014). The issue partially stems from tax differentials between states, so debates have been held about possible tax harmonisations, e.g. within the EU. While such a policy action would limit the scope of base erosion within the EU, offshore activities would not be impacted. It is thus important to understand the extent to which tax avoidance is done within the EU (for example through Ireland or Luxembourg) and how much is channelled through other tax havens.

A factor to account for is the ease of offshoring across industries. We can expect services, especially in IT, to be fairly flexible as to selecting their tax domicile, while heavy industry or retail have limited scope for international financial manoeuvres. While we do present empirical results, public bodies should replicate our analysis using collected tax data. These records are bound to be more details and thus the analysis will be more robust and representative.

While the literature on the topic is swiftly increasing in volume, there are still gaps in terms of geographical coverage and methodology. For example, there is a reason to believe that tax haven link effects would differ across industries. While we did account for NACE groupings, we did not opt to include interaction terms of industry stratification with our tax haven dummy. This would allow us to measure if there are different tendencies to shift profits in various sectors. For example, mining might differ from some service sectors. This choice was driven by the lack of available data. One way to study this in detail would be to make use of natural experiments in the form of gradual introduction of various sector-specific taxes across European countries in recent years.

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Chapter 6

Profit Shifting from Czech Multinational Companies to European Tax Havens[1]

Abstract: Although tax havens have been affecting other countries for decades, only in recent years have the associated challenges been subject to intensive scrutiny in both research and policy areas. We contribute to the growing evidence of corporate tax base erosion and profit shifting by testing multinational companies' ownership links to individual tax havens rather than to groups of them, as is the case with most previous research. Our company-level analysis suggests that profit shifts through debt financing from the Czech Republic to Luxembourg, Switzerland and, to a lesser extent, the Netherlands. We have ascertained that tax havens are not limited to tiny islands and may actually be found among European countries. We also provide rough estimates of the impact of this profit shifting on tax revenues as well as a policy recommendation.

Keywords: corporate tax; base erosion; profit shifting; multinational company; tax haven; Czech Republic

JEL classification: F23; F36; H25; H26

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6.1 Introduction

While tax havens have been affecting other countries for decades, only in recent years have the associated challenges been subject to intensive scrutiny in both research and policy areas. IMF's Crivelli et al. (2015) estimated worldwide losses of corporate tax base erosion and profit shifting (BEPS) by multinational companies (MNCs) caused by tax havens at approximately 700 billion dollars. OECD (2013) responded to governments' concerns with policy recommendations. The international tax system provides MNCs with opportunities to decrease their taxes through intra-company transfer prices, strategic location of assets or distortion of the corporate debt structure. Research shows that MNCs often shift income to tax havens from developed countries (Clausing, 2003; Huizinga & Laeven, 2008) with more recent evidence also pointing to developing countries (Fuest & Riedel, 2012; Janský & Prats, 2015).

Most existing research has grouped the so-called tax havens together, examining their joint effects in spite of the obvious difficulty of classifying jurisdictions into tax havens and other countries (Cobham, Janský & Meinzer, 2015). Our study deals with this shortcoming by viewing individual tax havens separately and empirically testing whether or not ownership links with specific tax havens are associated with BEPS indicators. We apply this approach to the Czech Republic's company-level data and thus contribute to the emerging systematic evidence of BEPS.

The article is organised as follows: Section 6.2 describes the data, methodology and results. Section 6.3 concludes the study.

6.2 Empirical methodology and results

Our empirical strategy builds on the notion introduced by Fuest & Riedel (2012), namely that MNCs differ with respect to their ability to shift profit depending on their ownership links with tax havens. While previous research has primarily treated tax havens as a homogeneous group of countries, we propose a straightforward alternative which enables us to study links to heterogeneous tax havens individually. Instead of relying on lists of tax havens, we consider one tax haven at a time. We apply this approach to Bureau van Dijk's Orbis database which includes over 13,000 Czech companies for 2010, i.e. the year for which we have the largest number of observations. Janský & Kokeš (2015) previously used similar data to locate evidence of debt shifting for a group of 30 tax havens selected on the basis of their appearance on a majority of 13 haven lists. One practical drawback of this approach was that – despite empirical evidence of its functioning as a tax haven – the Netherlands did not meet this condition (Weyzig, 2012, 2014). By contrast, the approach employed here enables us to empirically test whether any country catalyses profit shifting regardless of its appearance on tax haven lists.

First, we examine countries most often linked through ownership with MNCs in the Czech Republic. Table 6.1 lists the means of four financial indicators identified as relevant for profit shifting by previous research (Fuest & Riedel, 2012). Not surprisingly, the top ten countries include its four geographic neighbours, i.e. Germany (683 companies with ownership links to Germany), Austria (358), Slovakia (351) and Poland (145) as well as three major developed economies: France (166), the United Kingdom (119) and the United States (96).

Table 6.1: Summary statistics for ten countries most often linked with Czech MNCs

	Number of companies	Profits per assets	Tax per assets	Tax per profits	Debt ratio
Germany	683	12.7	2.4	29.0	5.2
Austria	358	12.9	2.6	24.2	3.8
Slovak Republic	351	9.7	1.8	27.4	3.7
Netherlands	348	13.3	2.6	24.7	6.8
France	166	14.6	2.9	25.6	3.8
Poland	145	11.2	1.9	23.1	4.0
Switzerland	127	10.7	2.0	22.5	8.4
United Kingdom	119	12.2	2.5	25.7	3.9
United States	96	13.9	2.9	24.5	4.4
Luxembourg	84	10.2	2.1	29.0	8.8

Source: Authors, Orbis

Perhaps more surprisingly, the not quite so big and geographically more distant economy of the Netherlands (348) was nearly tied with Austria and Slovakia for second place after Germany. However, this is not surprising when existing research is taken into consideration. The Netherlands is the world's largest conduit country with a favourable tax treaty network used to avoid host country withholding taxes (Weyzig, 2012). Weyzig (2014) shows that large companies can issue debt securities to obtain external financing or set up lowly-taxed affiliates in the Netherlands for internal debt-shifting purposes.

Similarly, Switzerland (127) and Luxembourg (84), which also appear in the top ten linked countries, are likewise often considered tax havens (Cobham et al., 2015). Furthermore, as table 6.1 show, companies with links to Netherlands, Switzerland and Luxembourg exhibit the highest debt ratios in the top ten, which is indicative of profit shifting through debt financing. We empirically test whether profits are shifted from the Czech Republic to the Netherlands, Switzerland or Luxembourg and we hypothesise that debt is the likely channel for profit shifting.

For a comparison of linked and other multinational companies, Table 6.2 shows the means of four financial indicators identified as relevant for profit shifting by previous research (Fuest & Riedel, 2012). Mean debt ratio is higher by at least one percentage point for all three countries, suggesting profit shifting through the debt channel. The difference from other MNCs is over than three and eight percentage points for Switzerland and Luxembourg as well as being statistically significant at the 0.02 level. This is consistent with profit shifting through excessive debts for the two countries, but not for the

Netherlands, with a p-value of 0.11, i.e. just over the standard level of 0.1. None of the indicators of profitability and taxes are statistically significant at the standard levels for Switzerland and Luxembourg, but two indicators of profitability and taxation are higher for the Netherlands than for other MNCs, which would suggest no profit shifting. To further our understanding in the face of this somewhat mixed evidence, we use a regression analysis separately for all three tax havens, which enables us to check for industry and assets by including industry dummies and the value of total assets.

Table 6.2: Descriptive statistics for Netherlands, Switzerland, Luxembourg

	Netherlands			Switzerland			Luxembourg		
	Link	Diff.	p-value	Link	Diff.	p-value	Link	Diff.	p-value
Profits per assets	11.54	-2.17	0.00	9.17	0.3	0.79	7.35	2.15	0.12
Tax per assets	2.05	-0.52	0.00	1.44	0.12	0.54	1.35	0.21	0.39
Tax per profits	18.14	0.13	0.89	17.42	0.85	0.58	18.8	-0.56	0.75
Debt ratio	6.61	-1.11	0.11	8.72	-3.22	0.01	14.01	-8.56	0.00

Source: Authors, Orbis

Notes: Mean values of Czech MNCs with links to the Netherlands, Switzerland and Luxembourg and their difference compared to other MNCs

Table 6.3 reports the coefficient estimates with the debt ratio as a dependent variable and confirms observations made on the basis of the summary tables. There are positive signs for coefficients of a link to one of the three tax havens in all nine regressions, but they are statistically significant only for Switzerland and Luxembourg. Coefficients for the Netherlands are substantially lower and not statistically significant. Overall, our company-level analysis suggests profit shifting from the Czech Republic to Luxembourg and Switzerland, and, to a lesser extent, potentially also to the Netherlands.

Table 6.3: Regression results

	Netherlands			Switzerland			Luxembourg		
Link	1.04	0.576	0.475	4.511***	4.592***	4.496***	10.41***	8.189***	8.100***
	(0.286)	(0.551)	(0.626)	(0.00464)	0.(00356)	(0.00448)	-7.45E-09	(5.85E-06)	(8.23E-06)
Other MNCs	-0.0541	-0.278	-0.374	0.139	-0.139	-0.226	0.18	-0.106	-0.168
	(0.908)	(0.555)	(0.439)	(0.759)	(0.759)	(0.631)	(0.689)	(0.815)	(0.722)
Assets			0.125			0.097			0.0688
			(0.381)			(0.493)			(0.627)
Sector dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Constant	6.003***	5.165***	4.102***	5.931***	5.071***	4.245***	5.864***	5.069***	4.483***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Observations	6894	6894	6894	6894	6894	6894	6894	6894	6894
R-squared	0	0.028	0.028	0.001	0.029	0.029	0.005	0.031	0.031

*P-values in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

Source: Authors, Orbis

Notes: Regression results of Czech MNCs with links to the Netherlands, Switzerland and Luxembourg, debt ratio as a dependent variable

Assuming that profit shifting occurs as suggested by our evidence, we provide rough estimates of its effect on tax revenues, knowing full well that this presents inherent difficulties (Fuest & Riedel, 2012). We estimate tax deductions of interest payments for the shifted debt, assuming interest rates of 5% and presupposing that companies would have the mean debt ratio of all other Czech companies if they did not shift debt. For the Netherlands, we estimate the upper bounds of the corporate tax gap at 2.2% of the paid taxes (this figure falls to 0.5% once we exclude one large and heavily indebted company). If all companies shifted debt in this way, the tax gap would stand at CZK 2 billion (in comparison with the total Czech corporate tax revenue of CZK 86 billion in 2010).

Regardless of the specific estimates of tax losses, the government normally does not wish to enable MNCs to shift profits elsewhere, thereby implementing various policies such as those discussed by the OECD (2013) and applying a range of analytical tools. Our research constitutes grounds for proposing an extension to tools the government could use to limit profit shifting. Our straightforward methodological approach is designed to identify specific companies which might engage in profit shifting. As one of its complementary analytical tools, the government should focus on identifying and examining in detail companies with links to specific tax havens, i.e. companies which are behind the extreme values of BEPS indicators, e.g. high values of debt ratios in the case of the Czech Republic.

6.3 Conclusion

We contributed to the body of evidence of corporate tax base erosion and profit shifting by testing it for multinational companies operating in the Czech Republic with ownership links to three European tax havens: the Netherlands, Switzerland and Luxembourg. Clearly, tax havens are not limited to tiny islands and may actually be found among European countries. We have shown that it is possible to analyse tax havens individually rather than as a group, a method which should become more frequent with increasing data availability and quality.

Future research should focus on five promising areas which should be able to pinpoint the specific jurisdictions and channels used in profit shifting. First, detailed government tax data should be used to answer the same research questions we answered with Orbis, including other channels than debt shifting and including the degree of financial secrecy or effective average tax rates in the empirical analysis. Second, an analysis of Czech double taxation treaties should shed more light on the role of the Netherlands as well as other European countries. Third, the rarely used financial data of subsidiaries and shareholders in various countries should provide even more detailed information on BEPS. Fourth, specific combinations of tax havens, analysed in the same way individual tax havens were examined here, could identify tax optimisation strategies involving more than one tax haven, e.g. the so-called double Irish arrangement. Fifth, further research should make use of natural experiments such as the gradual introduction of various sector-specific taxes across European countries in recent years.

6.4 Literature

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Chapter 7

Estimating the revenue losses of international corporate tax avoidance: the case of the Czech Republic[1]

Abstract: International corporate tax avoidance by multinational enterprises likely lowers the Czech Republic's corporate income tax revenue, but it is not clear by how much. To clarify this I first review existing estimates of the revenue losses of international corporate tax avoidance to government revenue worldwide. I then discuss research and revenue estimates relevant for the Czech Republic and develop a few new, albeit only illustrative, ones. None of the existing research focused on the Czech Republic nor the six recent international studies I examine provide reliable estimates for the Czech Republic. The extrapolations from these studies result into a revenue loss of a quite wide range with a median of 10 % of current corporate income tax revenues. The other newly prepared estimates, both using firm-level data and more aggregate observations, are of similar magnitude. I conclude with a discussion of these rough estimates as well as questions for further research and policy recommendations.

Keywords: corporate income tax; international taxation; tax avoidance; BEPS; Czech Republic

JEL classification: F23; H25; H26; O19

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7.1 Introduction

Tax revenues underpin most government expenditures worldwide and the taxation of multinational enterprises (MNEs) plays an important role in revenue mobilization efforts, which are hampered when tax is avoided. While international corporate tax avoidance and tax havens have been affecting countries worldwide for decades, only in recent years have the associated challenges been subject to intensive scrutiny in both research and policy. For example, Crivelli et al. (2015) of the IMF estimated that thee worldwide losses of corporate tax base erosion and profit shifting (BEPS) by MNEs related to tax havens amounts to approximately 600 billion US dollars, while the Organization for Economic Cooperation and Development (OECD) (2013) responded to governments' concerns with policy recommendations to better align rights to tax with economic activity. The existing research clearly indicates that the international tax system provides MNEs with opportunities to lower their taxes, but the existing literature seems inconclusive about the scale of the government revenue implications for the countries affected.

The economics literature has got better over time at identifying MNEs' specific tax avoidance mechanisms. There are three main recognised profit shifting channels: debt shifting, location of intangible assets and intellectual property, and strategic transfer pricing. All three are motivated by the MNEs' assumed desire to lower their total tax paid by at least nominally transferring their profits and thus tax bases to jurisdictions where they pay lower taxes, i.e. with lower effective tax rates. This transfer can be implemented, for example, through often unnecessary loans at high interest rates from one MNE unit located in a low-tax jurisdiction to another profitable unit. Alternatively, intangible assets and intellectual property such as brands or research and development can be stationed artificially at an MNE's subsidiary in a tax haven, to which high service fees are then paid by other parts of the MNE. The third main channel for profit shifting is to inflate or deflate the prices of goods or services being transferred between the various foreign parts of a MNE in such a way as to minimise the tax burden faced in all the countries put together. In addition to these three main channels MNEs also engage in other international corporate tax avoidance strategies, a term I use to cover various related phenomena in addition to BEPS as defined by OECD (2013), such as tax evasion, misalignment of economic activity and profits, illicit financial flows, and trade mispricing. Whatever mechanisms MNEs employ for international corporate tax avoidance, these influence not only the tax paid by MNEs, but, naturally, also the government tax revenues in the countries concerned.

The main question I aim to address in this research is what the corporate income tax revenue loss is in the Czech Republic as a result of international corporate tax avoidance. I provide new illustrative estimates and I also review existing estimates of the scale of international corporate tax avoidance and the corresponding tax revenue lost, so as to further an understanding of the associated revenue risks and to provide an evidence base for effective policy response. To answer this research question I combine various methodological

approaches, most of which build in one way or another on existing research into the revenue impacts of international corporate tax avoidance.

I focus on the Czech Republic, a medium-sized and very open central European economy, which makes an interesting case study. In the Czech revenue authority and ministry of finance as elsewhere, the limited staff and other resources imply a need for prioritisation, about which there is an ongoing discussion in the Czech Republic. The Ministry of Finance of the Czech Republic (2016) compared the tax gap associated with international corporate tax avoidance with the VAT gap. Some existing estimates of the VAT gap seem to evaluate it as bigger than the one stemming from tax havens. Both groups are inherently imprecise, but one of my objectives here is to review the existing estimates and prepare new ones of the latter thus contribute to this policy debate.

In addition to the existing scarce literature on the Czech Republic, I include an overview of existing worldwide evidence for two related reasons: first the lack of evidence specific to the Czech Republic, and second the recent emergence of cross-country estimates. Although I extend the range of estimates, there are still not many relevant findings specific for the Czech Republic and some of the most relevant evidence for the Czech Republic comes from cross-country studies for the whole world. Furthermore, a global approach reflects the interconnectedness of today's economies and the international dimension of corporate taxation, as well as recent global policy initiatives. This global approach is further supported by data availability, especially since the best available data suitable for estimating international corporate tax avoidance for specific countries, such as the Czech Republic, often comes from international rather than national sources.

I structure the remainder of this paper as follows. In section 7.2, I review existing estimates of the government revenue costs of international corporate tax avoidance. In section 7.3, I discuss the overall methodological approach taken in this paper as well as the number of specific approaches applied here. In section 7.4, I develop a number of new illustrative estimates and I discuss other existing revenue estimates relevant for the Czech Republic. I conclude with a discussion of future research and policy recommendations.

7.2 Literature review

I begin by reviewing the international literature focused on worldwide estimates of how much tax revenue governments lose due to international corporate tax avoidance and at the end I move to a discussion of the literature specifically relevant to the Czech Republic.

First I discuss some of the pioneering estimates of illicit financial flows, assets held offshore and associated government tax revenue losses by, mostly, non-governmental organisations. Early research with the ambition of providing global estimates was linked with development implications of tax havens and motivated by the realisation that tax revenues currently not collected due to illicit activities might –if collected – be used to

invest in social policy programmes, especially in poor countries. A number of studies emerged around the year 2000. For example, Oxfam (2000) estimated that poor countries suffered a yearly loss of around USD 50 billion due to tax havens, while Tax Justice Network (2005) estimated that around USD 11 trillion of assets is held offshore. In addition to these approaches based mostly on macroeconomic data, some early estimates used international trade data to approximate the scale of trade mispricing and illicit financial flows. Academic studies have used trade data, ideally at transaction level (Clausing, 2003; De Boyrie, Pak, & Zdanowicz, 2005; de Boyrie, Pak, & Zdanowicz, 2005; Pak, 2007; Zdanowicz, 2009), to broadly support the view that tax is a motivation for trade pricing decisions. More recent research using very detailed trade data has employed more reliable methodologies, but is largely limited in geographical coverage, as is the case of Vicard (2015) and Davies, Martin, Parenti, & Toubal (2015) using detailed French firm-level trade data. Overall, the earlier pioneering and trade studies succeeded in bringing international corporate tax avoidance to wider attention. However, their methodologies often share drawbacks, as discussed in detail by Fuest & Riedel (2012) or Hines (2010), such as their reliance on strong assumptions (e.g. the tax rate applied to the shifted profits) and many of the estimates cannot be straightforwardly interpreted as there is no counterfactual available.

More recent estimates have arisen partly in response to the imperfections of previous studies, as well as from the increasing availability of more detailed data sets and other recent developments, especially improved estimation methodologies. Here I discuss some recent estimates, but I provide details for those that provide cross-country estimates of government revenue losses, i.e. OECD (2015b), International Monetary Fund's (IMF) Crivelli et al. (2015), United Nations Conference on Trade and Development (UNCTAD) (2015), IMF (2014), European Parliament Research Service (EPRS) (2015) and Cobham & Janský (2017) in the methodology section. Economists often focus on estimating the sensitivity of reported income to difference in tax rates. Dharmapala (2014) reviews the literature on how the reported income changes with respect to tax rate differences across countries, represented by Hines Jr & Rice (1994), Huizinga & Laeven (2008) and Dharmapala & Riedel (2013). The consensus of the recent literature described in an unpublished manuscript of Heckemeyer & Overesch (2013), who followed the earlier meta-analysis by Mooij & Ederveen (2008), is that there is a semi-elasticity of reported income with respect to the tax rate differential across countries of 0.8. These kind of estimates capture marginal effects (i.e. the change in reported profits associated with a small change in tax rates, holding all else constant), and therefore, as Miller (2014) suggests, are not necessarily inconsistent with evidence that large amounts of income have been shifted offshore.

Neither a review by Riedel (2015) nor most other academics have developed their estimates of profit shifting into estimates of revenue impacts, with some more recent exceptions such as Clausing (2009), Zucman (2014), Clausing (2016), and Dowd, Landefeld, & Moore (2016) with their estimates for the United States. For example, Clausing (2016) uses the

Bureau of Economic Analysis survey data to estimate semi-elasticity (her average estimate is -2.92) and the US government revenue losses implied by BEPS. She then extends, speculatively, as she says, these estimates to most of the global economy using the Forbes Global 2000 data of the world's largest corporations. Her estimates of revenue losses total $279 billion for high-tax countries, 20% of their total corporate tax revenues. In a related area of research, governments around the world are concerned with a tax gap as the difference between the true amount of tax legally due and what taxpayers actually pay. According to a survey by the European Commission (2016) that covers the Czech Republic, only Germany seems to carry out and publish estimates of corporate income tax gaps, namely a top-down approach by Bach (2013), who compares the tax base reported in tax statistics with the corporate income derived from national accounts to show considerable tax base erosion, and a bottom-up one by Finke (2014), who provides novel estimates applying propensity score matching to firm-level data. While Hebous & Lipatov (2014) also use German data to confirm that firms' investment in highly corrupt countries is associated with a high probability of having affiliates in tax havens, some other research uses more global data sets to quantify the misalignment between reported profits and economic activity and thus potentially an upper limit of the corporate income tax gap (Cobham & Janský, 2017; Cobham & Loretz, 2014; Davies et al., 2015; Gumpert, Hines, & Schnitzer, 2016; MSCI, 2015; Riedel, Zinn, & Hofmann, 2015). Since the focus of this paper is the estimated impact of international corporate tax avoidance on Czech government tax revenues, I now turn to the research that focused on the Czech Republic.

I now briefly review the existing relevant studies for the Czech Republic that do not provide the revenue estimates that are the focus of this paper and discuss these in some detail in the later chapters. A couple of research papers have focused on profit shifting out of the Czech Republic and used the best available international firm-level data, Burea van Dijk's Orbis database. Janský & Kokeš (2015) provide some evidence consistent with the view that havens enable corporate tax base erosion and profit shifting from the Czech Republic. They analyse financial and ownership data from 13,603 companies operating in the Czech Republic, including multinational corporations (4124), some of which have links to so called tax havens (528). Their empirical evidence suggests that the effect of the multinational corporations' links with tax havens on the debt ratio of companies in the Czech Republic is positive, whereas the evidence on profits and taxes is not so conclusive. In similar research, Janský & Kokeš (2016) focus on a few jurisdictions with important links with the Czech Republic and suggest that profit shifts through debt financing from the Czech Republic to some European tax havens, namely Luxembourg, Switzerland and, to a lesser extent, the Netherlands, which other research has indicated to be an important tax haven (Weyzig, 2012, 2014).

Further evidence also points to the fact that some tax havens are more important for the Czech Republic than others. Bisnode (2016) regularly reports how many Czech firms have owners in their group of tax havens and the top ten jurisdictions in early 2016 were as

follows: Netherlands (4160 firms had owners in the Netherlands), United States (3016), Cyprus (2107), Luxembourg (1015), Seychelles (887), British Virgin Islands (434), United Arab Emirates (300), Panama (243), Malta (236), Lichtenstein (226). Relatedly, in his unpublished dissertation thesis, Ištok (2016) explores the possibilities of setting up new onshore and offshore companies and corporate structure settings by Slovak enterprises for the purpose of tax planning and tax optimisation using both Czech and Slovak intermediators and suggests that the Netherlands, Cyprus and Malta are among the relevant jurisdictions. Furthermore, Bisnode (2015), in cooperation with the Czech Republic's Transparency International, estimates that over the past 8 years companies with beneficial owners from tax havens (defined as including the United States among other countries) won public procurement contracts amounting to 244 billion CZK or 9 billion euros at the 2015 market rate of 27 CZK per euro (for comparison, the GDP of the Czech Republic was 4472 billion CZK or 166 billion euros in 2015), with a large share of owners from the Netherlands, Cyprus and Luxembourg. Pérez, Brada, & Drabek (2012) observe that a surprisingly large stock of Czech foreign direct investment is located in Liechtenstein and the British Virgin Islands and argue that money laundering centres account for nearly 30 % of Czech outward direct investment.

7.3 Methodology

The methods used for estimation of tax revenue losses due to international corporate tax avoidance have undergone an important development, as documented in the literature review above. Rather than contributing to this ongoing development in this paper, I apply some of the existing methods most suitable for the case of the Czech Republic, especially given the data availability concerns. I apply an array of methods that I divide into two groups in this paper. The first group includes data and information specific for the Czech Republic and mostly uses important assumptions (such as about the scale profit shifted or the tax rate at which the shifted profits would be taxed) as well as simple derivations to arrive at annual revenue loss estimates. The second group of estimates mostly assumes that the Czech Republic is similar to other countries and therefore the cross-country estimates are relevant for this country and, also given the presumed quality of the first group of estimates, extrapolations from average international estimates is warranted. I now introduce two main methodological approaches, for which I provide more details when I apply them in the following section.

First, I examine studies focused on the Czech Republic with empirical estimates of tax revenues specific to this country. I provide three new estimates myself in this paper, although mostly for illustrative purposes only: I derive revenue estimates on the basis of firm-level data, aggregate estimates of illicit financial flows and a survey of experts. Specifically, I use firm-level Orbis data from Janský & Kokeš (2015) and I apply

methodology developed by Fuest & Riedel (2012) and Janský & Kokeš (2016). This estimate captures only one type of profit shifting through debt, i.e. so called debt-shifting. I estimate tax deductions of interest payments for the shifted debt, assuming that interest rates are at 5 % and that companies would have the mean debt ratio of all other Czech companies if they did not shift debt. Also, the data are from 2010 and I extend the percentage estimate to the 2015 level of tax revenue, assuming there has not been an important change during that period.

In another estimate, I apply a methodology developed by Murphy (2009) and extended for the Czech Republic by Burianová (2013). This is a very rough methodological approach, relying very rough estimates of the illicit financial flows by Global Financial Integrity (2017). Also the assumptions by Murphy (2009) and Burianová (2013), that I use in my application of their methodology below, are very strong and the resulting estimates should thus be treated carefully. The same holds for the third, also illustrative, estimate, for which I rely on a survey of experts. Through questionnaires handed out at an expert workshop I ask my main research question directly and thus elicit their opinion, although I am aware of severe limitations of such questionnaire-based approach and it plays only supplementary role in this paper.

Second, I use estimates from six relevant cross-country studies with revenue loss estimates. I look for international studies with country-level results for the Czech Republic and, when these are not available, I extrapolate from these international studies' estimates. By extrapolations I mean an application of international parameter estimates to the Czech data. In contrast with earlier extrapolations, I make the extrapolations in a systematic way. I make the extrapolations on the basis of either a share of CIT or a share of GDP, depending on what the study presents as its main result. I now turn to discussing details of the six studies, that I rely on in this second methodological approach. In terms of recent corporate income tax revenue loss estimates due to international corporate tax avoidance, there are six recent studies in particular by influential international organisations that aim to estimate the scale of international corporate tax avoidance: OECD (2015b), International Monetary Fund's (IMF) Crivelli et al. (2015), United Nations Conference on Trade and Development (UNCTAD) (2015), IMF (2014), European Parliament Research Service (EPRS) (2015) and Cobham & Janský (2017). They all answer the question as to how much governments lose because of international corporate tax avoidance, although they differ in their methodology. Since these recent revenue estimates are most relevant for my research questions, I provide more details below and list these studies in an approximate order of methodological reliability. In part due to the continuing methodological and data limitations, there is also continuing disagreement on whether similar estimates, well represented by the six studies, should be considered small or large. Although the authors of the six studies consider the tax losses substantial, some other researchers are not convinced that the estimated scale is relatively large (Dharmapala, 2014; Forstater, 2015; J. Hines, 2014).

OECD (2015b) finds that tax planning is widespread among MNEs and entails tax revenue losses. It estimates revenue losses from BEPS conservatively at USD 100-240 billion annually, or anywhere from 4-10% of global corporate income tax (CIT) revenues. In its revenue estimates, OECD (2015b) combines estimates of revenue losses due to profit shifting related to differences in tax rates across countries and differences in average effective tax rates for large affiliates of MNEs and domestic companies. Exploiting the differences in tax rates similarly to OECD (2015b), IMF's Crivelli et al. (2015) estimate losses due to profit shifting related to tax havens by looking at the counterfactual if the tax havens' tax rates were not lower than for other countries. IMF's Crivelli et al. (2015) estimate worldwide losses of BEPS related to tax havens at approximately 600 billion US dollars. Their long-run approximate estimates are $400 billion for OECD countries, 1% of their GDP, and $200 billion for developing countries, 1.3% of their GDP.

UNCTAD (2015) estimates tax revenue losses related to inward investment stocks as directly linked to offshore hubs. UNCTAD (2015) estimates that some 30 per cent of cross-border corporate investment stocks have been routed through offshore hubs before reaching their destination and the estimated revenue losses are due to a lower reported rate of return for investment from offshore hubs. Their preferred estimate of annual global revenue losses is 8% of CIT or USD 200 billion in 2012. While UNCTAD's (2015) main methodological drawbacks might be that it only estimates losses related to a direct investment relationship, the methodology used by IMF (2014) and EPRS (2015) seems even less likely to capture the true costs of international corporate tax avoidance. IMF (2014) and EPRS (2015) estimate corporate income tax revenues related to differences in countries' corporate income tax efficiency ratio (using gross and net operating surplus, respectively) relative to the average ratio in the other countries. IMF (2014) estimates it at 5% of CIT in OECD and almost 13% in non-OECD countries in 2012 and EPRS (2015) estimates it at 50-70 billion euro or 160-190 billion euro for EU-28 in 2011. This methodology's results provide a comparatively very wide scope for other interpretations than international corporate tax avoidance.

Cobham & Janský (2017) use the Bureau of Economic Analysis survey on the international operations of US-headquartered multinational groups, the same data source as Clausing (2016). They estimate the total value of US MNEs' profits that would need to be declared in other countries in order for the profits to be perfectly aligned with their economic activity. They show major misalignments of profit with a small number of profit-haven jurisdictions seen to have captured a disproportionate share of total profits, resulting in serious disadvantages for most countries, regardless of income level. They estimate that as much as a quarter of the global profits of US multinationals may be shifted to locations other than where the underlying real activity takes place. This estimate amounts to some $660 billion in 2012, or almost 1 per cent of world GDP. They derive the implications for tax revenue losses for all the countries, for which data are available, including the Czech Republic.

7.4 Results

In this section I present the estimated results for the Czech Republic and how much tax revenue it might be losing due to international corporate tax avoidance, focusing on corporate income tax revenue loss estimates. I consider in turn a number of different methodological approaches to these estimates, which I explained above and provide some details along the way, from empirical evidence specific to the Czech Republic and a survey of experts' opinions to international country-level estimates from the six cross-country studies discussed above and estimates extrapolated from these for the Czech Republic. At the end I synthesise the various estimates and I discuss the possible scale of international corporate tax avoidance in the Czech Republic. As far as I am aware, there are no recent estimates specific to the Czech Republic of the scale of BEPS with regard to the size of revenue foregone that would be of comparable quality to the studies with international focus discussed above. Some of the possibly relevant research is still work in progress (such as a recent presentation by Moravec, Ječmínek, & Rohan (2017), who seem to apply a modified EPRS (2015) approach) and so there are likely only two studies that might be considered as such: illustrative revenue estimates by Janský & Kokeš (2016) for specific tax havens, and Burianová (2013) with a general, and not so rigorous, approach. Since their informative value and reliability is limited I discuss them here mostly for the sake of completeness and provide new estimates on the basis of the underlying methodology for illustrative purposes.

Janský & Kokeš (2016) study firm-level data from MNEs with links to the Czech Republic and one of the three important European tax havens. Their results suggest profit shifts through debt financing from the Czech Republic to the tax havens (Luxembourg, Switzerland and, to a lesser extent, the Netherlands). They proceed to estimate the potential revenue implications, for which they apply a number of important assumptions about interest rates as well as profit shifting actually taking place for the case of the Netherlands, for which (despite the earlier results not being statistically significant) they estimate the upper bounds of the corporate tax not paid at 2.2% of the paid taxes in 2010 (or 0.5% once they exclude one large and heavily indebted company). If all companies shifted debt in this way, they estimate that revenue loss due to this kind of profit shifting would stand at CZK 2 billion or around 70 million euro (compared with the total Czech corporate tax revenue of CZK 86 billion or 3 billion euro in 2010). This estimate is dependent on many assumptions and is relevant only for one tax haven and one type of profit shifting; I therefore consider it only illustrative. Still, in response to specific reviewers' comments, I use the same methodology here to apply it for the Czech Republic and a more inclusive list of tax havens.

Assuming that profit-shifting occurs via the debt-shifting channel as suggested by Janský & Kokeš (2015) and acknowledging that this exercise require a number of additional assumptions (Reuter, 2012), I provide rough estimates of its effect on tax revenues. I

estimate tax deductions of interest payments for the shifted debt, assuming that interest rates are at 5% and that companies would have the mean debt ratio of all other Czech companies if they did not shift debt. Applying the methodological approach of Janský & Kokeš (2016) to the list of tax havens and a sample of Czech firms in Janský & Kokeš (2015), I estimate the corporate tax gap at 4.8 % of the paid taxes (in comparison with Janský & Kokeš (2016) who applied this methodology for the case of Netherlands as a tax haven). If all companies shifted debt in this way, the tax gap would stand at CZK 4 billion in 2010 (compared with the total Czech corporate tax revenue of CZK 86 billion in 2010) and, assuming that the corporate income tax (CIT) revenue of the Czech Republic is 150 billion CZK as I do below for cross-country estiamtes, the gap would stand at CZK 7.2 billion in 2016 (270 million euro).

Another illustrative revenue estimate comes from Burianová (2013), who, in her student thesis, applies the methodology used by Murphy (2009) for the United Kingdom to the Czech Republic. She estimates that tax losses caused by the use of tax havens might be 11 billion CZK or 40 million euro from high net worth individuals resident in the Czech Republic, 5 billion CZK from large Czech companies and 5.15 billion CZK (or 190 million euro) as a result of illegal tax evasion by individuals. This comes to a total of 21 billion CZK of tax lost per annum due to tax haven activities by Czech subjects. From the point of view of international corporate tax avoidance the relevant part of this estimate is 5 billion CZK or 190 million euro, from what is called large Czech companies, which is based on an extrapolation of Kar & Freitas (2012), a source that is very unreliable as evidence of international corporate tax avoidance. Due to the assumptions and methods (such as the illicit financial flows estimates) involved, I consider this estimate to be illustrative at most. Nevertheless, in response to specific reviewers' comments, I do provide an updated application of the methodology as used by Murphy (2009) and first applied to the case of the Czech Republic by Burianová (2013). Combining the most recent estimates of the illicit financial flows by Global Financial Integrity (2017) with the assumptions by Murphy (2009) and Burianová (2013) about the corporate tax rates and Czech Republic's shares, the tax loss is estimated to be between 7 and 12.5 billion CZK (260 and 460 million euro), in comparison with Burianová's (2013) 5 billion CZK and in line with the increasing estimates of illicit financial flows.

In the absence of reliable estimates from the approaches discussed above, one alternative is to use experts' estimates from surveys of their opinions, a method, which is itself not known to provide very reliable results but might shed some additional light in this specific case. Although I do present these results, I would like to caution against putting too much weight on this questionnaire methodology's results. Here I present one such estimate, based on a survey of experts (tax experts from the Czech Ministry of Finance and General Financial Directorate, academics, and private sector and other professionals interested in

tax havens).[2] I asked them to fill in the questionnaire twice – once before, and once after telling them the preliminary extrapolation results from the international estimates presented in table 1 above. I received filled-in questionnaires from 35 participants (7 from the public sector, 20 from the private sector, 5 from academia, and 3 from other sectors, including one from a non-governmental organisation). Both the average and standard deviation decreased between the first and second round. The number of responses does not enable me to study differences across the sectors in a rigorous way, but these do not in any case appear substantial. Due to the relatively high standard deviations and outliers, I consider a median the most suitable descriptive statistic to consider as the main estimates from this survey. The median responses were 26 and 20 billion CZK (0.96-0.74 billion euro), the mean responses were 47 and 29 billion CZK (1.74-1.07 billion euro) and standard deviation of 74 and 31 billion CZK (2.74 and 1.15 billion euro) in the first and second rounds, respectively. Let me consider for further discussion the median from the second round of answers as the more conservative estimate, and that which is not out of line with the international extrapolations.

Since empirical evidence specific for the Czech Republic is scarce, an alternative is to examine the existing worldwide estimates, especially the six recent studies by international organisations reviewed above, and to look for any country-level estimates for the Czech Republic. Unfortunately, only Cobham & Janský (2017), IMF (2014) and EPRS (2015) provide country-level estimates (and the latter two with a similar and not so reliable methodology), whereas neither OECD (2015b) nor IMF's Crivelli et al. (2015) nor UNCTAD (2015) provide country-level estimates.

Let me start with the two methodologically similar studies with published estimates for the Czech Republic and I only then discuss Cobham & Janský (2017) and re-estimations of the other studies, when available. In terms of estimated revenue losses, IMF (2014) reports an unweighted average revenue loss across all countries in the sample of 5 percent of current CIT revenue, but almost 13 percent in the non-OECD countries. They do not include detailed country-level estimates and so the approximate relative results can be derived from country-level mean values of CIT-efficiency in their Appendix Figure 2 in IMF (2014). I derive from the graph, since no numbers for the country are presented, that the Czech

[2] More specifically, the sample consists of participants at a workshop on tax havens, organised in the Czech capital of Prague by the Czech branch of the International Fiscal Association on 10 May 2016. I conducted a survey among the participants asking them how much they think the Czech public finances lose annually due to BEPS and asking them to fill in their answers in paper questionnaire (the questionnaire was in Czech and the question read "Kolik miliard korun ročně tratí české veřejné rozpočty kvůli BEPS?", i.e. "How many billion CZK are the Czech Republic's annual revenue losses due to BEPS?" in English). The questionnaire asked them to fill in anonymously which sector they were from (public, private, academia, other) and their response to the question, in billion CZK.

Republic has one of the highest CIT-efficiencies. Since the estimated revenue impact can only be negative if the country's CIT-efficiency is lower than the weighted average, the Czech Republic is not likely to be losing any revenue according to these estimates. EPRS (2015) publishes its estimates in tables and the conclusion for the Czech Republic is similar to that of IMF (2014). At 79%, the Czech Republic has the eighth highest CIT-efficiency in the incomplete EU sample, which is higher than the unweighted average of 75%, and is, according to this methodology and results, not losing revenue due to profit shifting. Both these approaches thus flag the Czech Republic as a potential beneficiary of corporate income tax profit shifting.

These observations from IMF (2014) and EPRS (2015), together with the fact that their methodology provides a wide scope for interpretations other than international corporate tax avoidance, lowers the potential further use of these conclusions, but it does provide an opportunity to look at the question of whether the Czech Republic might actually be benefiting from profit shifting. So far I have discussed how the Czech Republic is negatively affected by international corporate tax avoidance; could it in fact be the case that the Czech Republic is itself a tax haven or otherwise benefits from international corporate tax avoidance? Some evidence suggests that the Czech Republic is potentially behaving as a tax haven, especially towards multinational corporations intending to invest. It has a relatively low nominal corporate tax rate and it has used tax incentives to attract foreign direct investment (Bellak & Leibrecht, 2009; Sedmihradsky & Klazar, 2002). If the Czech Republic was indeed in some instances a tax haven and if MNEs are shifting their profits into the country (potentially motivated either by relatively low nominal corporate tax rate or a tax holiday often associated with an FDI inflow), this should be lowering the estimates that examine the profit shifting out of the Czech Republic (Janský & Kokeš, 2015). However, evidence that the Czech Republic is not a tax haven, at least in most relevant areas, is more persuasive.

To that end, let me lay out some of the arguments against the proposition that the Czech Republic is a tax haven or, more precisely, a beneficiary of international corporate tax avoidance. First, it is usually not considered as such; this is documented by its absence on any of the 13 tax haven lists used by Janský & Prats (2015) as well as by its policy actions, such as when the Czech Republic was one of the first EU countries to endorse the intention to exchange FATCA-type information amongst themselves in addition to exchanging information with the United States. Although it has relatively low statutory corporate tax rates, its effective tax rates are relatively high (Spengel et al., 2014). There seems to be more MNE economic activity located in the Czech Republic than the MNEs report (Cobham & Janský, 2017; Cobham & Loretz, 2014). Similarly, Nerudová & Solilová (2015) simulate the impact of the Common Consolidated Corporate Tax Base's (CCCTB) introduction on the Czech Republic and show that Czech Republic could gain if the CCCTB were introduced in all EU members states (the share on the group tax base would increase by 1.22%). Firms with bearer shares, which were shown to achieve significantly higher

profit margins by tens of percentage points, participate in fewer competitive public procurement contracts and result in lower savings for the public authority (Chvalkovská, Janský, & Skuhrovec, 2012), were abolished in 2014. More generally, the Czech Republic is one of the smaller contributors to global financial secrecy in Europe (Cobham, Janský, & Meinzer, 2015). There are some policies that enable aggressive tax planning, but less so than in many other EU member states, and none of these are active (European Commission, 2015); for example, the Czech Republic currently has no plans to introduce a patent box regime and is thus not contributing to the EU-wide race to the bottom in this particular respect.

Overall, although the evidence is limited and a more definitive answer will be only provided by future research, the Czech Republic does not seem to be a standard tax haven, and in most respects it does not behave as one. I therefore do not consider the country-level estimates for the Czech Republic by IMF (2014) and EPRS (2015) to be relevant for the conclusions of this paper, mainly due to the methodology of these two studies, which allows for a number of other interpretations than international corporate tax avoidance. On the basis of this preliminary conclusion and to clarify the discussion, the revenue estimates for the Czech Republic considered in this paper do not take into account any potential gains from profit shifting (I do not estimate any potential gains nor do I subtract such gains from any potential losses); I focus on the potential losses only.

The third and final original paper with country-level estimates for the Czech Republic, Cobham & Janský (2017), seems also to support the case that Czech Republic is not a beneficiary of international corporate tax avoidance. They estimate that the Czech Republic in 2012 could benefit from the estimated USD 252 million in additional tax payments if reported profits were fully aligned with economic activity according to the formula for the Common Consolidated Corporate Tax Base (CCCTB), which is weighted one third tangible assets, one-third sales, and one-third split equally between compensation costs and (number of) employees. Assuming an exchange rate 22 CZK/USD, this translates into CZK 5.5 billion for this group of US-headquartered firms. Since US investors are responsible for approximately one fifth of global FDI, the estimated potential tax loss might be much higher if other companies behaved similarly to US-headquartered firms.

When country-level estimates are not available at all, one way to work around is to extrapolate from the cross-country estimates. I start by discussing extrapolations by others and then present my own extrapolations based on five of the six major studies discussed above (with the exception of Cobham & Janský (2017), who do provide country-level estimates and do not provide cross-country average estimates from which it would be natural to extrapolate for the Czech Republic). Following the discussion spurred by the publication of the Panama Papers, Glopolis (2016), a Czech non-governmental organisation, wanted to open a discussion about the scale for the Czech Republic. To that end it commissioned a public opinion poll on the Czechs' attitude towards taxes and tax

avoidance, and the results by Median (2015) suggest that people think that firms, and especially bigger firms, avoid paying taxes more than individuals. More importantly, Glopolis (2016) uses the ratio of the GDP of the Czech Republic to the EU (1% at current prices in 2014) to extrapolate the estimates of EPRS (2015) and arrives at a range of 15-21 (0.6-0.8 billion euro) and 48-57 billion CZK (1.8-2.1 billion euro) for the Czech Republic from profit shifting and from profit shifting and other practices, respectively.

In response, the Ministry of Finance of the Czech Republic (2016) argued that the Glopolis estimates are too high and unrealistic and published its own estimates for the Czech corporate tax revenues based on the OECD (2015b) estimates, which implied 6-15 billion CZK (0.2-0.6 billion euro) tax loss due to BEPS. Furthermore, the Ministry of Finance of the Czech Republic (2016) added that corporate tax is only the third biggest tax by revenue and annually accounts for 120-150 billion CZK (4.4-5.6 billion euro), which is less than half of the revenue generated through value added tax; the VAT gap is more than half of the corporate tax revenue. Relatedly, the Ministry of Finance of the Czech Republic (2016a) reported increased tax revenues of five hundred millions of CZK (around 19 million euro) as a result of additional measures (a part of this is arguably due to a new requirement for selected firms to report more information on transfer pricing and this might be evaluated more rigorously in the future, for example, by comparing the results with a control group of firms close to fulfilling the selection criteria for this requirement).

Below I make a number of similar extrapolations in a systematic way for the international studies, which attempt to estimate annual corporate income tax revenue loss due to international corporate tax avoidance. I make the extrapolations on the basis of either a share of CIT or a share of GDP, depending on what the study presents as its main result. I present the estimates for both shares of CIT and GDP as well as in billion CZK and billion euro in table 7.1. The estimates range from 6 to 57 billion CZK (0.2-2.1 billion euro). Perhaps not surprisingly, the lower estimate of OECD (2015b) is the lowest, whereas the higher estimate of EPRS (2015) is the highest extrapolated, which overlaps with the extrapolations made by the Ministry of Finance and Glopolis, mentioned above. The range is quite wide, although only two extrapolated estimates are higher than 15 billion CZK (0.6 billion euro).

Table 7.1: Existing international estimates extrapolated for the Czech Republic

Reference	Billion CZK	Billion euro	% of CIT	% of GDP	Extrapolated indicator
OECD (2015b) (lower)	6	0.2	4	0.1	CIT
OECD (2015b) (higher)	15	0.6	10	0.3	CIT
IMF's Crivelli et al. (2015)	45	1.7	30	1.0	GDP
UNCTAD (2015)	12	0.4	8	0.3	CIT
IMF (2014)	8	0.3	5	0.2	CIT
EPRS (2015) (lower)	15	0.6	10	0.3	GDP
EPRS (2015) (higher)	57	2.1	38	1.3	GDP

Source: Author on the basis of the cited literature

Notes: Extrapolations assume the corporate income tax (CIT) revenue of the Czech Republic is 150 billion CZK (5.6 billion euro; this is a forward-looking estimate, since the revenue was 140 billion CZK, 5.2 billion euro, in 2015 and has been increasing in recent years), the Gross Domestic Product (GDP) is 4472 billion CZK (166 billion euro), and the assumed CZK/EUR exchange rate is 27.

I consider these extrapolations only illustrative; nevertheless, in the absence of better estimates, they can be considered as one of the starting points in any related expert discussion. It should be interesting to compare these with new findings, which might come from new now non-existing estimates specific for the Czech Republic or re-estimations of new international estimates or new country-level results of international estimates for the Czech Republic, as discussed in the cases of IMF (2014) and EPRS (2015) above. It is already clear now that the estimates might crucially depend on assumptions such as whether the tax rate considered is the statutory or effective rate. The relatively low nominal corporate tax rate (19%) deems the Czech Republic estimates to be relatively low, although effective tax rate is more telling with regard to BEPS and is not as low, especially in comparison with some other countries (Spengel et al., 2014). The difference is even more striking according to one source of empirically estimated average effective tax rates by Cobham & Janský (2017), who estimate the misalignment of economic activity using US data for US-headquartered MNEs provided by the government Bureau of Economic Analysis, the Czech Republic has an effective rate of 18 % (in comparison with a statutory rate of 19 %), whereas, for example, Luxembourg and the Netherlands have effective rates of 1 and 2 % and statutory rates of 29 and 25 %, respectively.

Let me now briefly synthesise the results and discuss the various tax revenue estimates for the Czech Republic introduced above. To sum them up, I begin the discussion by listing the various approaches and their estimates of annual corporate income tax revenue losses for the Czech Republic due to international corporate tax avoidance. There are some estimates specific to the Czech Republic in terms of units of billion CZK that are, however, of limited relevance due to the limited quality of the methodology in the case of Burianová (2013) and limited statistical significance, country coverage and types of profit shifting in the case of Janský & Kokeš (2016). Also, not very usefully, the two of the cross-country studies with country-level estimates for the Czech Republic, IMF (2014) and EPRS (2015), use what appears to be the least credible methodology of the six recent international studies reviewed.

As far as I can establish, extrapolations from international studies and Czech experts' opinions in this case likely provide some the most relevant, albeit still only illustrative estimates. The seven extrapolated estimates range from 6 to 57 (6, 8, 12, 15, 15, 45, 57) billion CZK (from 0.2 to 2.1 billion CZK; 0.2, 0.3, 0.4, 0.6, 0.6, 1.7, 2.1 billion euro), although only two extrapolated estimates are higher than 15 billion CZK and the median is 15 (0.6 billion euro). The median values of experts' estimates, of 20 billion CZK (0.7

billion euro), is not far from these international extrapolations. Since the international estimates are often conservative or partial, as in the case of UNCTAD (2015), they might well be considered consistent with the somewhat higher expert estimates – but this comparative discussion likely puts too much confidence in both of these approaches than they deserve given their methodological drawbacks.

Table 7.2 summarises these and other estimates. New illustrative estimates derived for 2015 on the basis of methodology of Fuest & Riedel (2012) and Janský & Kokeš (2016) and data from Janský & Kokeš (2015) suggest a tax loss of 7 billion CZK (0.3 billion euro) due to debt-shifting alone. New illustrative estimates derived on the basis of Murphy (2009) and Burianová (2013) and latest estimates from Global Financial Integrity (2017) are in the range of 7-12 billion CZK (0.3-0.5 billion euro), but rely too heavily on imprecise illicit financial flows estimates. New illustrative estimates on the basis of a survey of experts in 2016 put the tax loss at around 20 billion CZK (0.7 billion euro). Estimates of 6 billion CZK (0.2 billion euro) from Cobham & Janský (2017) are only for US-headquartered firms and could be up to five times more if we assumed a perfect alignment and the same behaviour for non-US-headquartered MNEs.

Table 7.2: Summary of revenue loss estimates for the Czech Republic

Reference	Billion CZK	Billion euro
New illustrative estimates derived for 2015 on the basis of methodology of Fuest & Riedel (2012) and Janský & Kokeš (2016) and data from Janský & Kokeš (2015)	7	0.3
New illustrative estimates derived on the basis of Murphy (2009) and Burianová (2013) and latest estimates from Global Financial Integrity (2017)	7-12	0.3-0.5
New illustrative estimates on the basis of a survey of experts in 2016	20	0.7
Estimates from Cobham & Janský (2017) only for US-headquartered firms	6	0.2
Extrapolated estimates on the basis of OECD (2015b) (lower)	6	0.2
Extrapolated estimates on the basis of OECD (2015b) (higher)	15	0.6
Extrapolated estimates on the basis of IMF's Crivelli et al. (2015)	45	1.7
Extrapolated estimates on the basis of UNCTAD (2015)	12	0.4
Extrapolated estimates on the basis of IMF (2014)	8	0.3
Extrapolated estimates on the basis of EPRS (2015) (lower)	15	0.6
Extrapolated estimates on the basis of EPRS (2015) (higher)	57	2.1

Source: Author on the basis of the cited literature

Overall, on the basis of the discussed research I believe that, in the face of limited evidence and data, the honest answer is that we do not know the revenue impacts for the Czech Republic, although extrapolations of international studies and experts suggest that these impacts are above zero. Furthermore, on the basis of the reviewed research I consider it highly likely that the value of annual corporate income tax revenue losses for the Czech Republic due to international corporate tax avoidance is in the order of units of billions CZK and that it is likely to be in the lower tens of billions CZK (hundreds of billions euro). Together with the current corporate income tax revenue of the Czech Republic of around 150 billion CZK (5.6 billion euro), I consider the revenue implications highly likely to be at minimum in the region of 4-10% of corporate income tax revenue, which overlaps with

the estimates made by OECD (2015b), and likely at around 10-20% of current corporate income tax revenue or more, which is substantial.

Last, but not least, let me discuss a comparison with the VAT gap, which has become a topic of public debate in the Czech Republic following arguments by the Ministry of Finance of the Czech Republic (2016). Let me begin by clarifying the magnitude of the VAT gap. The European Commission (2016) observes that the Czech Ministry of Finance internally prepares estimates of the VAT gap, which are not officially published other than as part of a related academic paper by Stavjaňová (2014). Stavjaňová (2014) uses two different, but rather rough, methods to estimate the VAT gap in 2012 at 121-127 billion CZK (4.5-4.7 billion euro). Although she does not believe that the VAT gap can be completely eliminated, since it covers transactions and losses which tax administration is not able to detect, she argues that it would be a realistic target for the Czech Republic to decrease the VAT gap by 20-30 billion CZK (0.7-1.1 billion euro) to attain the average VAT gap in the EU. An alternative estimate by the Supreme Audit Office of the Czech Republic (2015) puts the VAT gap at 105 billion CZK in 2013 (3.9 billion euro), whereas another, from an EU-wide study by CASE (2015), puts it at 3.4 million euros or around 91 billion CZK.

So, at first sight, the revenue loss estimates for international corporate tax avoidance for the Czech Republic seem to be smaller than the VAT gap, but the potential revenues might in reality be of comparable order of magnitude. Of course, there are a number of differences between these taxes and their related gaps. For example, international policy cooperation might be more needed in the case of international corporate tax avoidance than when trying to close the VAT gap, although EU cooperation is also needed in the latter case. Naturally, some of the VAT gap is likely to be linked with cross-border activities, whereas a share of the VAT gap will be limited to the domestic economy - unfortunately, I cannot learn from the existing estimates what these respective shares are. In contrast, likely all of the tax gap related to international corporate tax avoidance is, by definition, related to the Czech Republic's interaction with other countries and its elimination is thus at least partially, and often fully, dependent on international coordination.

7.5 Conclusion

In the first part of this paper I reviewed both earlier and recent worldwide estimates of the government revenue costs of international corporate tax avoidance as well as other relevant recent research findings, including six recent influential revenue estimates. Based on this, in the second part of the paper I briefly reviewed existing research results relevant for the Czech Republic and discussed relevant estimates for the Czech Republic as well as presenting a few novel ones, albeit illustrative. In spite of the growing empirical evidence estimating the worldwide costs of international corporate tax avoidance, there are no reliable estimates of the related government tax revenue costs for the Czech Republic so

far. The absence of reliable evidence calls for further research that would improve the reliability of these estimates and enable a more effective policy response.

Further research should provide more detailed estimates of the scale of this behaviour for the Czech Republic and better estimates might be delivered, for example, by using the government's administrative tax return data. Future research should also explore the changing characteristics of international corporate tax avoidance and its mechanisms of variation in terms of sector of activity or location, going beyond the Czech Republic and nation states. Another area in which future research would be desirable would be to study which countries are most affected by international corporate tax avoidance and which countries, policies or perpetrators are responsible, as well as the likely wider impact on people, income inequality, governments and their policies. Some of the globally relevant research should come from extending the country-specific methodologies to worldwide data when they become available, as in the case of the implementation of country-by-country reporting.

However limited the existing evidence is, it points to the need to implement policy recommendations focused on limiting international corporate tax avoidance. Regardless of whether the revenue losses are big or small, these policy recommendations should lead to lowering them both in the Czech Republic and globally. Both Czech and global policy discussion on international corporate tax avoidance might be, albeit slowly, moving from black-and-white tax haven distinctions toward the same conditions for all economies participating in the global economy, so that no country is able to offer tax, regulatory or secrecy arbitrage. Indeed, the existing research is relatively more helpful in identifying which tax haven-like countries are relevant for the Czech Republic than estimating their revenue consequences. I have here reviewed and extended the evidence base for policy makers to assess the risk of international corporate tax avoidance and that brings me to discuss key relevant policy proposals. The four specific policy proposals aimed at reducing international corporate tax avoidance follows – they are all under discussion at the EU and other international levels, but the Czech Republic has not fully implemented them yet.

First, I stress the importance of introducing beneficial ownership information, ideally publicly, so that anybody can know the real, beneficial owner of any company. Second, I recommend the full implementation of global automatic exchange of tax information so that tax authorities are knowledgeable about their taxpayers' taxes in other countries. Third, I propose to implement public country-by-country reporting (CBCR) for MNEs so that companies have to report where they have their economic activities and where they report profits and pay taxes. The fourth proposal is the least implemented so far and addresses the flaws of the current system of international corporate taxation most substantially: the introduction of a common consolidated corporate tax base (CCCTB) in the EU or globally, a system in which each MNE would be considered a unitary business rather than a network of independent affiliates, as is the case under the current arms-length principle. The Czech

Republic should work towards international policy agreements that include these policy proposals and that would thus improve the system of international corporate taxation for its own benefit, as well as that of other countries.

7.6 References

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Chapter 8

Measuring Misalignment: the Location of US Multinationals' Economic Activity versus the Location of their Profits[1]

Abstract: A major international effort – the OECD Base Erosion and Profit Shifting initiative – aims to reduce the extent of misalignment between the profits of multinational groups, and the location of their real economic activity. This paper uses survey data on the international operations of US-headquartered multinational groups to show major misalignments of profit. A small number of 'profit-haven' jurisdictions are seen to have captured a disproportionate share of total profits, resulting in serious disadvantages for most countries, regardless of income level.

Keywords: corporate tax, tax avoidance, unitary taxation, base erosion, profit shifting, developing countries

JEL classification: F23, H25, H2

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8.1 Introduction

The issue of corporate tax avoidance and tax havens is of first-order importance for the world economy. As we show in this paper, as much as a quarter of the global profits of US multinationals may be shifted to locations other than where the underlying real activity takes place. This estimate amounts to some $660 billion in 2012, or almost 1 per cent of world GDP. Since US investors are responsible for approximately one fifth of global FDI, it is not inconceivable that the scale of profit shifting by all multinationals worldwide may result in a discrepancy in global economic data which is material in the accounting sense. The exact scale of tax losses remains uncertain due to gaps in the availability of relevant data, some of which are being addressed by the Base Erosion and Profit Shifting (BEPS) proposals by OECD (2015b). In this paper we use a long established data source – the annual survey of all US multinational groups carried out by the Bureau of Economic Analysis (BEA) – to examine this important topic in a novel way.

Corporate tax avoidance has been hampering development and lowering government tax revenues for decades, but only recently have policy makers and researchers began to seriously address it. Both policy and research advances have been mostly led by and focused on developed countries. However, developing countries seem to be at least as much affected by corporate tax avoidance and need to close the gap not only in the lost tax revenues, but also in terms of policy and research focus. A number of empirical studies use corporate balance sheet data for OECD countries, finding support for the hypothesis that international profit shifting in response to tax differentials is statistically and economically significant. Dharmapala (2014) reviews the literature on how the reported income changes with respect to tax rates differences across countries, represented by Hines Jr & Rice (1994), Huizinga & Laeven (2008) and Dharmapala & Riedel (2013). Grubert and Mutti (1991), as well as Clausing (2003) and Clausing (2016), provide evidence for the US; Huizinga and Laeven (2008), Weichenrieder (2009) and Loretz and Mokkas (2015) present more recent evidence for European multinationals. According to the consensus of the recent literature by Heckemeyer & Overesch (2013), who followed the earlier meta-analysis by Mooij & Ederveen (2008), a semi-elasticity of reported income with respect to the tax rate differential across countries amounts to 0.8.

Similar evidence for developing countries is mostly lacking, reflecting largely the scarcity of balance sheet data. Analysis of national-level data suggests some important differences between corporate tax in developing and developed countries (Abramovsky, Klemm, & Phillips, 2014; UNCTAD, 2015) and that developing countries may lose three times as much in revenue, relative to their GDP, as OECD countries (Crivelli, De Mooij, & Keen, 2016). Relatedly, Aizenman & Jinjarak (2009) find that countries embracing greater trade and financial integration shift their tax revenue from ‘easy to collect’ taxes (tariffs and seigniorage) towards ‘hard to collect’ taxes (value added and income taxes) and profit-

shifting is obviously one of the candidates why it is hard to collect corporate income taxes. One recent study (Cobham and Loretz 2014) used the leading global balance sheet database, Orbis, to assess the misalignment between profits and location of activity, and simultaneously to consider the tax base redistribution that would be associated with apportionment according to various formulae that reflect activity more closely. The results show a clear pattern of misalignment to the benefit of a small number of profit-haven jurisdictions, and to the detriment of lower-income countries in the sample. Coverage of balance sheet data is, however, very poor for developing countries: the lower income countries in the sample are, for most findings, only from Eastern and Central Europe. Once minimum coverage criteria are imposed, most developing countries drop out entirely. Although the coverage seems to be improving over time (Johannesen, Tørsløv, & Wier, 2016), the Orbis data are heavily over-weighted toward Europe compared to North America and Australasia (OECD 2015a). For that reason we present here a complementary approach. Where Cobham and Loretz (2014) provide results for globally-headquartered multinational groups but with limited host country coverage, the present study uses survey data with much broader host country coverage but for multinational groups from just a single country of headquarters: the United States. The choice of the US is due to the relative ease of data access, but also because of its importance for the global economy – including developing countries.

At the behest of the G8 and G20 groups of countries, the OECD launched its BEPS initiative in 2013, with the specific aim of reforming international corporate tax rules so that they 'better align rights to tax with economic activity' (OECD 2013: 11). The BEPS process reflects particular political pressures that arose after the 2008 financial crisis, from both public anger about perceived corporate tax avoidance, and policymaker concern over tax revenue. In addition, there are longstanding criticisms of the international rules for corporate taxation which date back to their inception in the inter-war years (Hampton & Christensen, 2002; S. Picciotto, 2013). Conceptually, the major criticism is that the 'separate accounting' approach flaunts basic economics by treating individual companies within a multinational group as if they were distinct, profit-maximising entities. Practically, the major concern is that a serious misalignment may have emerged between the locations of multinational groups' economic activity, and that of their declared profits. The BEPS Action Plan contains fifteen commitments that together may address some major flaws in the separate accounting approach. However, it has been criticised for failing to give appropriate space to alternatives: in particular, for the dismissal of further attention to profit apportionment methods that have the explicit aim of aligning profits with activity (see e.g. Durst, 2013; Sol Picciotto, 2012).

Perhaps the clearest failure within the fifteen BEPS action points occurred in Action 11. This committed the OECD to establish baseline findings for the extent of profit misalignment, in order to understand the scale of the problem and to be able to track the progress of the BEPS initiative over time (OECD 2015a). As the working group

established, such an effort would require the collation (and publication) of data on the global distribution of multinational groups' declared profit, and on the location of their broader economic activity. This would be a significant step forward from the current situation of fragmented data availability – and would also make possible for the first time a full, global analysis of the potential redistribution of the tax base that would be implied by various formulary apportionment approaches.

In practice, however, the OECD failed to negotiate agreement to achieve such transparency. The public comments received from both civil society and private sector respondents were (atypically) consistent on the need to collate and analyse the country-by-country reporting data (OECD 2015b); but, at the same time, work on Action 13 narrowed the intended provision of country-by-country reporting data to an extent that impeded any such collation.

The OECD is now seeking to collate aggregated data from willing member states, while civil society groups continue to push for full publication of reported data. The European Parliament has indicated preliminary support. As we discuss in our conclusions, individual countries and regional blocs may then decide to require publication over the coming years. At present however, researchers are left with the existing, limited data sources – and there remain important, open questions of the current extent, and the specific nature, of profit misalignment. How big are the misalignments that the BEPS initiative sought to address, and what are the distributional implications – that is to say, which jurisdictions are the main winners and losers in terms of tax base?

The paper is structured as follows. Section 2 presents the dataset and outlines the construction of variables. Effective average tax rates are derived and presented, showing both a powerful global trend downwards, but also persistent and substantial cross-country variation. Section 3 sets out the broad issue: what is the distribution of profit globally, to what extent is it misaligned with measures of economic activity, and has there been a substantial change over time? We construct measures of misalignment, of which the preferred measure shows that misalignment with economic activity of the profits of US-headquartered multinational groups amounts to more than 20 per cent of the total, and – with the exception of the 2008 financial crisis – has grown strongly over time, from a position of very little misalignment as recently as the mid-1990s. In Section 4 we present analysis of the country patterns of misalignment. We find that tax base losses due to misalignment with fixed factors of economic activity are not closely associated with per capita income levels (somewhat contrary to the suggestion from results for a sample of relatively higher-income countries in Cobham and Loretz (2014)). Instead, a small group of high-income jurisdictions have captured increasingly disproportionate shares of profit, while almost all other countries in the sample have lost out – including the majority of G20 members, both high- and lower-income countries.

8.2 Methodology

In this section we describe the data and measures of profit and economic activity used in the analysis. The data used come from the annual survey of (all) US multinational groups carried out since 1983 by the Bureau of Economic Analysis (BEA). This US Direct Investment Abroad survey (USDIA) includes ownership by a US investor of at least 10 per cent of a foreign business. Financial and operating data for US multinational companies cover the activities of foreign affiliates and, for some information and years, also their US parent companies. Some further characteristics and limitations of the data are discussed in the Appendix.

The data have been highlighted by OECD (2015b) as some of the current best practices in using available data for BEPS analysis and have been used previously for research. For example, Blonigen et al. (2014) use the confidential, firm-level data to estimate the impact of bilateral tax treaties on investment behaviour of US multinational firms, allowing for differential effects of treaties across sectors that use homogeneous versus differentiated inputs with varying intensity; while Stewart (2014) and Clausing (2012) use the aggregated data to compare the effective corporate rates, and shares of total foreign income and employment, respectively. Sullivan (2004) uses the BEA data to highlight a dramatic shift of profits to few jurisdictions, whereas Zucman (2014) employed different data sets to show the same. International Monetary Fund (2014) used the BEA data to identify spillover effects in international taxation. Furthermore, Keightley and Stupak (2015) used the BEA as one of their data sources to document the large problem of base erosion and profit shifting in the United States and elsewhere. More recently, Clausing (2016) uses the BEA aggregate data to study profit shifting with the focus on the US and finds that profit shifting is likely costing the US government between USD 77 and USD 111 billion in corporate tax revenue between 1983 and 2012 and that these revenue losses have increased substantially in recent years. The data and research approach are similar, but our focus is on non-US countries, including a range of developing countries.

8.2.1 Measures of profit and economic activity

In this section we discuss the most suitable indicators of profit and economic activity for measuring their misalignment. The BEA data provide us with two main indicators of profits: net income and 'profit-type return', which is available together with other value-added measures since 1997.[2] We also construct a third profit measure, gross profit, which

[2] The Bureau of Economic Analysis (2014) methodology describes the latter in the following way: Profit-type return is an economic accounting measure of profits from current production. Unlike net income, it is gross of U.S. income taxes, excluding capital gains and losses and income from equity investments, and reflects certain other adjustments needed to convert profits from a financial accounting basis to an economic accounting basis.

adds foreign income taxes to the net income measure.[3] This is our preferred measure, since we are interested in the distribution of declared (taxable) profits.

Economic activity is generally thought of as comprising some or all of the following: employment (indicated by employee numbers and/or costs); assets (tangible and/or intangible); and sales. The BEA survey captures each of these, to a more or less ideal extent. For employment, the data straightforwardly include compensation costs (wages) and number of employees. Recognising that intangible assets are commonly used to facilitate profit shifting, we are reluctant to use the BEA's 'total assets' series, since any misalignment here is likely to understate substantially that with respect to tangible assets. Future work with company-level data may shed further light on this point. The dataset contains information for net property, plant, and equipment. In the absence of a superior alternative, we consider this as tangible assets and call it so henceforth. This is similar to the approach of Government Accountability Office (2008), who refer to this series as 'physical assets'. Data for the US are available only in benchmark years (every five years between 1994 and 2009). In order to address this, we extrapolate the trend for periods in between the benchmark years, and in addition from the period 2004-2009 up to 2012.[4] There are a number of sales indicators in the data, with varying detail and coverage in terms of years, countries, and types of sales. While future work may explore further the potential to focus on ultimate location and to exclude related-party transactions, we use here the most basic measure: sales of foreign affiliates (sales recorded by the country of the foreign affiliates' locations), without limitation in terms of destinations or sales to affiliated firms (although limiting the sales to non-affiliated firms and reporting by the destination of sales might be more suitable for the purpose at hand). The inclusion here of related-party transactions is likely to bias downwards the eventual estimates of profit shifting, since some of these transactions will be artificially priced for that purpose.[5] Again, future work might usefully explore variations here.

[3] The profit measures, as well as other financial variables, are expressed in US dollars. We use the data from the BEA, reported in current, or nominal, prices. For each year the data are thus in the value of the dollar for that particular year and, for simplicity, we are neglecting inflation as well as exchange rate changes and using the BEA data as they are.

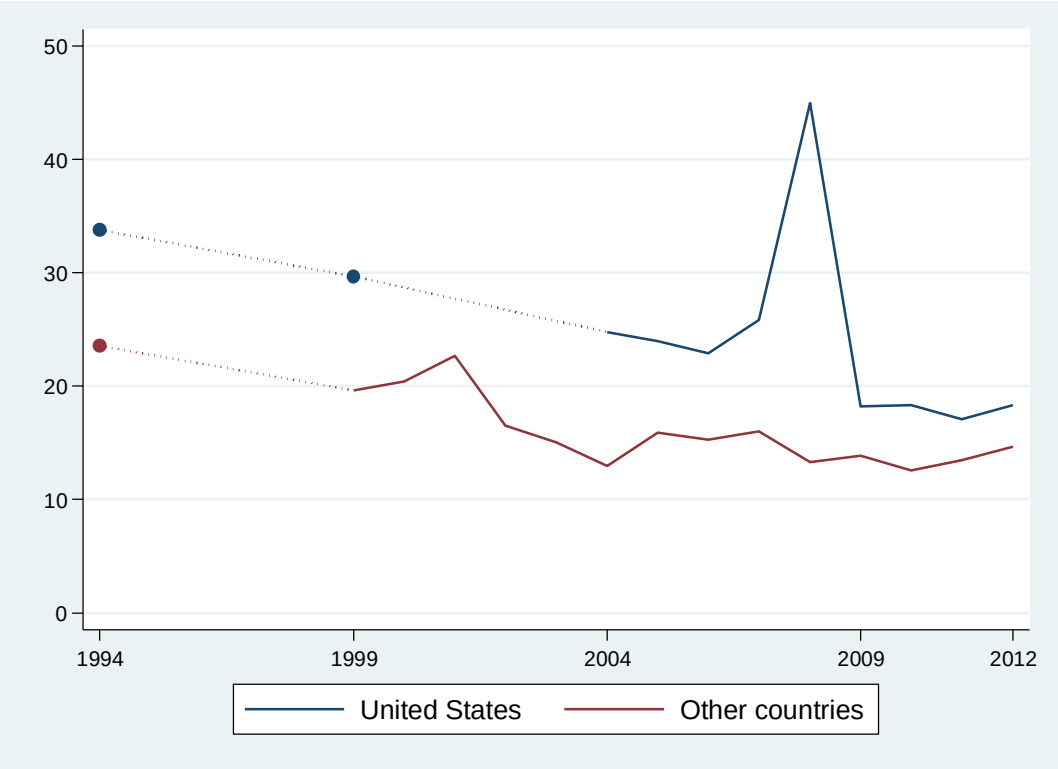
[4] NB. We use the Stata command ipolate. As with any other extrapolation, this rests on assumptions of stability in the trend. Here these may be relatively close to the reality, since the trend of tangible assets is quite consistently growing for both United States (when we have data), as well as for the sum of tangible assets by all affiliates in foreign countries.

[5] Consider, for example, an intra-group transaction chain in which coffee beans are exported from Kenya to the UK, where this is booked as an underpriced sale to a Swiss entity, and an overpriced resale to the UK retail arm. Including intra-group sales will capture the depressed sales value in Kenya, and the inflated one for Switzerland. Excluding them completely, however, would see (final) sales recorded only in the UK, which in this example would be accurate for Switzerland but would further artificially deflate the apparent profit shifting out of Kenya (if sales is used as a measure of economic activity).

8.2.2 Average effective tax rates and summary statistics

We construct average effective tax rates at the national level, as the ratio of foreign income tax to gross profit, an approach that we see being used recently in other research (Clausing, 2016; Stewart, 2014). Figure 8.1 shows the evolution of average effective tax rates for the United States, and for the average of all the other countries (weighted by gross profits). There is a clear downward trend for both, interrupted only briefly by the global financial crisis.

Figure 8.1: Average effective tax rates, US and all other countries (weighted by gross profits)



Source: Authors on the basis of the BEA data.

Note: We construct average effective tax rates at the national level, as the ratio of foreign income tax to gross profit.

Table 8.1A in the Appendix presents summary statistics showing the proportion of profits and of each measure of economic activity. In addition to individual indicators of economic activity, we include two combination measures drawn from formulary apportionment measures developed for use with unitary taxation. Unitary taxation is the main alternative to the separate accounting model promoted by the OECD. The latter model seeks to tax each affiliate as if they were separate (profit-maximising) entities, and so faces the technical challenge of seeking to recreate prices for intra-group transactions as if they occurred at arm's length.

The unitary approach starts instead from the view that profits are maximised at the unit of the multinational group, so takes this as the tax base. The technical challenge is then to allocate this base between the various taxing jurisdictions in which the group has operations. While individual US states apply a range of formulae, Canadian provinces have one agreed formula, and the European Commission has developed another for the potential application of unitary taxation among its member states.

The formula used to allocate taxable profit between Canadian provinces is an equally-weighted split between sales and wages. The European Commission (2011) proposes a formula for the Common Consolidated Corporate Tax Base (CCCTB), which is weighted one-third tangible assets, one-third sales, and one-third split equally between compensation costs and (number of) employees (this part stays the same in the later proposal by European Commission (2016)). In these ways, the two formulae provide broad measures of economic activity, appropriate for examining BEPS-type profit misalignment. For comparison, we include here a version of the CCCTB formula with all assets (i.e. including intangibles) – labelled CCCTBa, as opposed to CCCTBtg, which includes only tangible assets.

Table A1 also includes the average effective tax rates for individual countries in 2012. Tax rates exhibit a substantial cross-country variation. For example, within Europe in 2012, we observe countries such as Spain and Italy with rates as high as 50 per cent, alongside Luxembourg and the Netherlands with rates of around 1 per cent.

Throughout the paper, we limit our findings to individual countries where data are available at the country level, and to one residual group that contains the rest of the world. Unfortunately the data availability is skewed against lower-income and African countries. When we employ the World Bank's classification according to regions and income groups, valid as of July 2015,[6] there are no low-income countries, six lower-middle income countries (Egypt, Honduras, India, Indonesia, Nigeria and Philippines) and only Egypt, South Africa and Nigeria (with limited data) from Africa with data for 2012 to be included in the presented results. While the data in theory have global coverage, the limited range of US FDI in smaller and lower per capita income economies is likely to give rise to greater data suppression here. The resulting limited availability of data for some groups of countries leads us to present the results for individual countries only, rather than by groups.

[6] Each year the World Bank revises analytical classification of the world's economies based on estimates of gross national income (GNI) per capita for the previous year. As of 1 July 2015, low-income economies are defined as those with a GNI per capita, calculated using the World Bank Atlas method, of $1,045 or less in 2014; middle-income economies are those with a GNI per capita of more than $1,045 but less than $12,736; high-income economies are those with a GNI per capita of $12,736 or more. Lower-middle-income and upper-middle-income economies are separated at a GNI per capita of $4,125.

The sample covers activity generating gross profits of around $2.44 trillion, or 3.3 per cent of the recorded world GDP in 2012 of $74 trillion (World Bank's *World Development Indicators*).

It is already clear that profit is not well aligned with many measures of activity – for example, China's share of employees is nearly four times its share of gross profit; Italy's share of sales is three times its share of gross profit; Luxembourg's share of gross profit is nearly eighty times its share of employment costs. This misalignment is the focus of this paper.

8.3 Economic activity and global misalignment

Broadly, misalignment can be conceived of in two main ways: either the relative intensity of the distortion, or in terms of the absolute scale of what is misaligned.

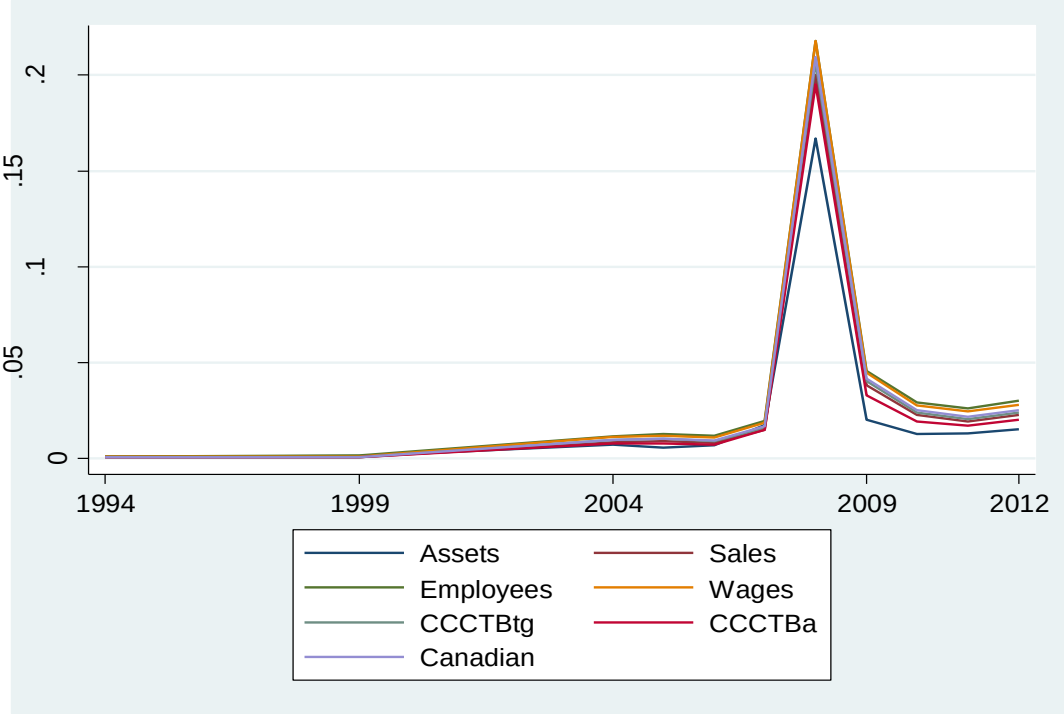
The simplest way to capture the relative intensity of distortion depends upon the knowledge that perfect alignment of profits with economic activity would give rise to a perfect correlation (that is, of 1) between the series. A correlation of -1 would, equivalently, imply perfect misalignment (e.g. all the activity in one jurisdiction, and all the taxable profit in another). Of course, we are aware that there are a number of theoretical as well as empirical reasons other than profit-shifting discussed above that likely lead to other than perfect alignment between the series. Indeed, we are here measuring misalignment, rather than profit-shifting (which might be one of the reasons for observed misalignments). We are interested in the relative intensity of the misalignment, and how far the correlation is from being perfect seems a simple and straightforward measure.

As such, we can show misalignment simply as the correlation of factors of economic activity with gross profit across countries, and over time. Figure 8.2 shows just this. As well as the correlations relating to profit misalignment with each individual factor of economic activity, we include two multiple-factor measures discussed above (the Canadian and CCCTB).

Figure 8.2 shows global profit misalignment of US MNEs over time, in terms of correlations between profit and activity measures. Since a value of 1 implies perfect correlation, we define misalignment as 1 minus correlation. Excluding negative values of either profits or economic activity lead us to a range of between 0 and 1 for this measure. At one extreme, perfect misalignment would result into this measure being equal to 1, whereas a perfect alignment would imply this measure being equal to 0. This can be also written for each country and year as:

$$Profit\ misalignment\ as\ relative\ intensity\ of\ distortion$$
$$= 1 - Correlation(Gross\ profit, One\ of\ the\ indicators\ of\ economic\ activity)$$

Figure 8.2: Profit misalignment as relative intensity of distortion (i.e. 1 - Correlation of gross profit and one of the indicators of economic activity)



Source: Authors on the basis of the BEA data.

Note: series 'CCCTBa' shows the value of 1 minus the correlation of profits with a CCCTB formula using total assets; whereas 'CCCTBtg' replaces this with tangible assets, per the Commission's (2011) proposal, and is used in the rest of the paper.

Figure 8.2 shows that misalignment as recently as the mid-1990s is near zero – suggesting that it is only in the last two decades that BEPS has become a significant problem. The extent of deviation from perfect correlation appears small, on any measure, even if the post-crisis level and trend are above those of the pre-crisis period (around 0.2 in 2008 and around 0.03 in the subsequent years). Co-movement across all the measures implies that misalignment has developed in much the same way in relation to any of the common indicators of economic activity. In addition, the relative ranking of misalignment among the various measures of economic activity is broadly consistent – although closer inspection reveals that misalignment with respect to sales has become a more important feature over time.

The financial crisis caused a spike in misalignment centred on 2008, although this presumably reflects the impact of widespread losses rather than a particular growth in BEPS activity. (Again, future research using company-level data should explore the precise impact on country-level results of individual company losses.) Aside from this spike, there is a common pattern since the mid-1990s of a growing trend towards misalignment. The post-crisis rebound has returned misalignment levels to roughly their pre-crisis level by

2012; more recent data will be needed to explore whether or not the trend of growing misalignment has since been reversed by greater public pressure and tax authority scrutiny.

The second type of misalignment measure reflects the scale of the distortion: in effect, how much taxable profit is in the 'wrong' place. The picture here shows that the relatively small reductions in correlation seen in Figure 8.2 are actually associated with large absolute misalignments (e.g. the correlation changed by about 0.2 in 2008, but this is associated with the near-doubling of the misalignment as estimated below).

This can be calculated as the sum of either the (positive) 'excess' profits recorded in jurisdictions where there is not concomitant economic activity; or equivalently the sum of the (negative) 'absent' profits from jurisdictions with activity.

The following formula shows how we estimate the profit for a jurisdiction – if the result is negative, we call it excess profit (since alignment would require its removal); if the result is positive, we call it missing profits.

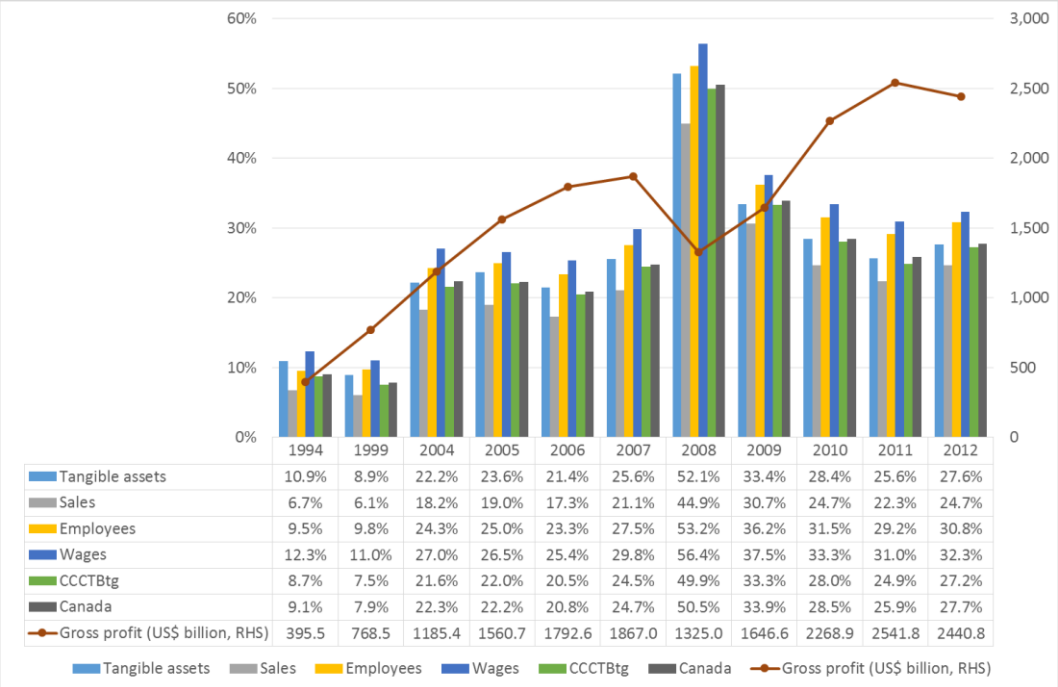
$$Estimated\ profit = Share\ of\ economic\ activity * Total\ global\ gross\ profit - Actual\ gross\ profit$$

Figure 8.3 shows the sum of excess profits, i.e. the profits estimated by the above formula for which a perfect alignment would require their transfer to another country. In other words, it shows the total value of US MNEs' profits that would need to be declared in other jurisdictions in order for the profits to be perfectly aligned with their economic activity (which would lead to the correlation discussed above to be 1). Figure 8.3 shows the sums by years and by various measures of economic activity.

Misalignment by this measure grows over the period from roughly 5-10 per cent of total gross profit in the 1990s, to around 15-25 per cent in the 2000s pre-crisis, through an artificial maximum of around 50 per cent during the sharp profit fall in 2008, and broadly in the range of 25-30 per cent since 2009. In other words, the crisis, and measures taken in the immediate years after it, does not appear to have reversed the sharp growth in misalignment since the 1990s.

As with the correlation-based misalignment measures, the ranking is broadly consistent over time: the greatest misalignment among the most fixed components of activity (wages and employees, followed by tangible assets); the least misalignment among the components with the most easily manipulable location – sales. (Tangible assets become less powerfully misaligned than employees over the sample period.) The roughly midway extent of misalignment by tangible assets, compared to other activity measures, is responsible for the consistently close values of the CCCTB and Canadian measures, despite their different formulae.

Figure 8.3: The extent of profit misalignment (% of gross profits) for a number of years and indicators of economic activity



	1994	1999	2004	2005	2006	2007	2008	2009	2010	2011	2012
Tangible assets	10.9%	8.9%	22.2%	23.6%	21.4%	25.6%	52.1%	33.4%	28.4%	25.6%	27.6%
Sales	6.7%	6.1%	18.2%	19.0%	17.3%	21.1%	44.9%	30.7%	24.7%	22.3%	24.7%
Employees	9.5%	9.8%	24.3%	25.0%	23.3%	27.5%	53.2%	36.2%	31.5%	29.2%	30.8%
Wages	12.3%	11.0%	27.0%	26.5%	25.4%	29.8%	56.4%	37.5%	33.3%	31.0%	32.3%
CCCTBtg	8.7%	7.5%	21.6%	22.0%	20.5%	24.5%	49.9%	33.3%	28.0%	24.9%	27.2%
Canada	9.1%	7.9%	22.3%	22.2%	20.8%	24.7%	50.5%	33.9%	28.5%	25.9%	27.7%
Gross profit (US$ billion, RHS)	395.5	768.5	1185.4	1560.7	1792.6	1867.0	1325.0	1646.6	2268.9	2541.8	2440.8

Source: Authors on the basis of the BEA data.

8.4 International distributional implications

Of particular interest is the extent to which there are systematic distributional implications from misalignment. Does it result in overall lower tax payments by US MNEs? Which jurisdictions lose out? Which jurisdictions 'win', and by how much? Among countries that lose out, are the effects broadly comparable at different levels of per capita income?

8.4.1 Tax payments and misalignment

We follow the second approach to misalignment from Section 8.3, since this allows us to assess the distributional implications of misalignment at national level. Full alignment with economic activity requires that gross profit shares (the proportion of all US MNE gross profit) in a given jurisdiction match the share of US MNE economic activity. We calculate the ratio of these shares and multiply it by actual gross profit in 2012 to arrive at potential gross profit implied by the misalignment, which could be higher (or lower) than the actual gross profit. From this we subtract the actual gross profit to arrive at the additional gross profit (positive or negative) that would be declared, in the presence of full alignment.

$$Additional\ gross\ profit = \frac{Share\ of\ economic\ activity}{Share\ of\ gross\ profit} * Actual\ gross\ profit - Actual\ gross\ profit$$

$$= Actual\ gross\ profit\left(\frac{Share\ of\ economic\ activity}{Share\ of\ gross\ profit} - 1\right)$$

Potential additional tax payments are calculated as the product of this additional gross profit and the average effective tax rate of the country in question. The latter is the ratio of actual tax payments to actual gross profit.

$$Additional\ tax\ payments = Additional\ gross\ profit * \frac{Actual\ tax\ payments}{Actual\ gross\ profit}$$

$$= Actual\ tax\ payments\left(\frac{Share\ of\ economic\ activity}{Share\ of\ gross\ profit} - 1\right)$$

Since the country-level data aggregate both profitable and loss-making operations, note that the average tax rate calculated need not equate precisely to the average rate paid by profitable businesses only (which would likely in reality have lower effective tax rates than those reported here because of the higher tax base due to the absence of the consolidation of losses of other companies – so that while the rates calculated and used here are below statutory rates in most cases, for weak economies such as that of Spain in 2012 the reverse holds). In addition, in cour analysis we cannot take account of behavioural changes were full alignment to occur – for example, in making more intense both the lobbying for lower tax rates, and the degree of competition for the location of investments or real economic activity. It is also important to note that real economic activity is likely to be substantially less elastic to changes in taxation than financial factors (Saez et al. 2012). Overall, these estimates should be treated as indicative rather than precise.

Additional gross profits and additional tax payments are then calculated for the six definitions of economic activity. Those countries that exhibit lower shares of economic activity than of gross profit, we label as 'excess-profit' countries; those with higher shares of economic activity than of gross profit, as 'missing-profit' countries.

Table 8.1 shows additional gross profits (the 'excess profit' measure), rising in absolute terms from around $25 bn-$50 bn in 1994, to around $600 bn-$800 bn in 2012, all expressed in current dollars.[7] The broader measures of the CCCTB and Canadian formula provide a core estimate of misaligned profit, rising from $35 bn in 1994 to $670 bn in 2012.

Table 8.1 also shows average effective tax rates of the two groups of countries, which are substantially lower for excess-profit countries. Note however that the difference in rates is lower post-crisis (6-8 percentage points, compared to 11-14 in the pre-crisis 2000s), while misalignment remains broadly stable after 2009.

A possible interpretation of these patterns is that the sharp rise in misalignment after the 1990s disciplined jurisdictions with high effective tax rates, driving down the differential. If such a response were intended to reduce the extent of misalignment (i.e. if 'high tax'

[7] Note that adjusting for inflation would reveal a flatter, real terms trend over time.

countries chose to cut rates in order to grow the base), it has been almost completely ineffectual – at least in aggregate.

The immediate impact of the crisis in 2008 is notably different too. In missing-profit jurisdictions, a higher proportion of losses among affiliates covered is presumed to result in artificial increase of the *national* average effective rate; while in excess-profit jurisdictions, no such effect on the rate is noted.

The two panels of Table 8.2 show estimates of, respectively, the difference in tax payments for excess-profit and for missing-profit countries, were gross profits to be fully aligned with one of the six measures of economic activity.

The estimate of excess tax revenue received in 2012 ranges from $25 bn to nearly $80 bn; the estimate of missing tax revenue is of course higher, ranging from around $80 bn to $160 bn. The difference between the two ranges – i.e. roughly $50 bn to $80 bn – is the implied revenue gain of US multinationals and their shareholders, at the expense primarily of missing-profit jurisdictions worldwide. The revenue gains of excess-profit jurisdictions can be thought of as providing an estimate of the cost of bribing these excess-profit jurisdictions by the other jurisdictions into cooperative behaviour. Note also that the different economic activity measures provide quite different implied revenue gains for missing-profit jurisdictions – including the CCCTB and Canadian formulae – because while the scale of misalignment is similar for the latter two options, the distributional implications are quite different (and differences in tax rates lead to this showing large differences in implied revenue effects.

The losses for missing-profit jurisdictions have not, in the aggregate, risen to the extent that misalignment has increased – because the fall in average effective tax rates means that the implied loss per dollar of gross profit shifted out has also fallen.

A simple comparison suggests that total losses are not inconsistent with the spot estimate by IMF researchers Crivelli et al. (2015), that base erosion and profit shifting by all multinationals (not only those headquartered in the US) might result in a worldwide 2012 loss of around $600 bn. The International Monetary Fund's (2015) *Coordinated Direct Investment Survey* records the US as the source, in 2012, of around 16 per cent of the outward FDI stock (roughly $4.4 trillion out of a global total of $27.8 trillion). Extrapolating crudely upwards on the assumption that non-US multinationals display the same propensity to shift profits, alignment with the CCCTB measure of economic activity would imply tax losses due to missing profits of roughly $650 bn.

Table 8.1: Additional gross profits in the case of perfect alignment, US$ m

	Excess profit, US$ m								**Excess profit**	**Missing profit**
	Tangible assets	Assets	Sales	Em-ployees	Wages	CCCTBtg	CCCTBa	Canada	Average tax rate	Average tax rate
1994	-42985	-33204	-26657	-37564	-48496	-34564	-31046	-35792	0.23	0.33
1999	-68187	-48977	-46516	-75032	-84596	-57944	-50087	-60339	0.18	0.29
2004	-262862	-189187	-216095	-287553	-320635	-255823	-226811	-264771	0.11	0.25
2005	-368345	-234593	-296021	-389837	-413684	-344078	-294958	-346553	0.11	0.24
2006	-383870	-242332	-309946	-418556	-455081	-367334	-315502	-373624	0.12	0.23
2007	-477370	-336532	-393963	-513618	-556056	-457235	-403267	-461661	0.11	0.25
2008	-690200	-544686	-595311	-705200	-747502	-660961	-611852	-668908	0.12	0.41
2009	-550349	-370018	-504802	-595767	-618240	-548290	-464671	-558388	0.11	0.19
2010	-645302	-456286	-559705	-714955	-756646	-636101	-558179	-645850	0.1	0.18
2011	-651489	-455850	-567095	-741386	-786824	-631768	-569084	-657281	0.11	0.17
2012	-673528	-460091	-602293	-752913	-788369	-663815	-585539	-676674	0.11	0.19

Source: Authors on the basis of the BEA data.

Table 8.2: Additional tax payments in the case of perfect alignment

a. Excess profit

	Tangible assets	Assets	Sales	Employees	Wages	CCCTBtg	CCCTBa	Canada	Average tax rate
1994	-8054	-8023	-5180	-7457	-10062	-6370	-6198	-7063	0.23
1999	-8468	-9059	-5688	-9993	-11774	-6404	-6239	-7526	0.18
2004	-17450	-24674	-18289	-25963	-31614	-20280	-21716	-24007	0.11
2005	-27286	-28922	-25657	-34413	-38564	-27181	-26933	-30571	0.11
2006	-30094	-33953	-30390	-39335	-47234	-31920	-32888	-37329	0.12
2007	-33260	-44473	-36652	-43696	-54233	-37431	-39809	-43464	0.11
2008	-71040	-76265	-69462	-76159	-87236	-72062	-73724	-78012	0.12
2009	-41973	-41715	-46542	-51827	-58493	-46436	-42746	-51812	0.11
2010	-43148	-46392	-49265	-58041	-66821	-50406	-48922	-56767	0.1
2011	-52048	-59245	-58662	-69601	-80378	-57777	-59406	-66864	0.11
2012	-51294	-59885	-60956	-68436	-78383	-59130	-60661	-67451	0.11

b. Missing profit

	Tangible assets	Assets	Sales	Employees	Wages	CCCTBtg	CCCTBa	Canada	Average tax rate
1994	14381	10390	9306	12590	16399	11767	10275	12296	0.33
1999	22519	14079	15194	25414	26237	19237	16062	19510	0.29
2004	65780	46007	55006	72001	79650	64309	56745	66383	0.25
2005	86458	59824	68977	87926	98085	80184	70513	81991	0.24
2006	85360	57278	70856	95193	104552	82694	73015	86221	0.23
2007	121592	102547	102808	129567	147193	118732	111024	123021	0.25
2008	311909	267771	272780	305309	342349	300834	286043	307227	0.41
2009	102307	63249	94387	124877	120333	104978	88353	106654	0.19
2010	116876	81956	106731	137699	146425	120681	106476	125302	0.18
2011	108992	82237	102675	143399	141978	113996	104308	119671	0.17
2012	126297	84048	119670	161215	158732	132558	117141	136982	0.19

Source: Authors on the basis of the BEA data.

8.4.2 Estimated revenue impact: the winners and losers

We turn, finally, to consider results at the level of individual countries. For simplicity we present results for a single measure of economic activity only at this stage, and we choose the CCCTB formula basis as the broadest combination of types of economic activity. Annex 1 contains the full results for 2012, so alternative bases can be compared.

Table 8.3 shows the relative scale of the major excess-profit and missing-profit jurisdictions. In the former, panel (a) shows that more than a fifth of excess profit cannot be disaggregated from the residual 'Rest of the World' category – jurisdictions which are not fully and individually accounted in the 2012 BEA data. Of the remainder, just four jurisdictions with tax rates of 2 per cent or below account for more than 90 per cent of the misaligned profit: the Netherlands, Ireland, Bermuda and Luxembourg. A further 10 per cent is due to Switzerland and Singapore, which have effective tax rates of around 4 per cent; and an additional 1 per cent of misaligned profits is due to Hong Kong, with an effective tax rate of 9 per cent. This is in line with the similar selection of profit shifting tax havens by Clausing (2016) and with the existing literature on international profit shifting, which indicates that the corporate tax base is sensitive to tax rate differences across countries (de Mooij and Ederveen 2008). Furthermore, most of these six countries are also important secrecy jurisdictions, providing financial secrecy to other countries (Cobham, Janský, & Meinzer, 2015).

Table 8.3: Top ten excess-profit and missing-profit jurisdictions

a. Excess profit

	Additional gross profits, $bn	Percentage of current gross profits	Additional tax payments, $bn	Average effective tax rate	Share of global excess profits	Share of global excess profits (individual countries only)
Rest of the world	-151.2	-78%	-35.5	23%	23%	
1 Netherlands	-151.8	-88%	-3.5	2%	23%	30%
2 Ireland	-93.6	-77%	-2.2	2%	14%	18%
3 Luxembourg	-93.6	-97%	-1.0	1%	14%	18%
4 Bermuda	-76.1	-95%	0.0	0%	11%	15%
5 Switzerland	-38.5	-67%	-1.7	4%	6%	8%
6 Norway	-22.0	-67%	-8.4	38%	3%	4%
7 Singapore	-13.7	-32%	-0.6	4%	2%	3%
8 Indonesia	-7.3	-51%	-2.4	33%	1%	1%
9 Hong Kong	-3.9	-28%	-0.3	9%	1%	1%
10 Denmark	-2.8	-50%	-1.4	51%	0%	1%
Memo: All other individual countries	-9.3	-31%	-2.1	20%	1%	2%

Source: Authors on the basis of the BEA data.

Memo refers to Venezuela, Egypt, Barbados, Israel, Malaysia, Peru and Sweden. Memo values are sums except for percentage of gross profits and tax rate, which are unweighted averages.

b. Missing profit

	Missing gross profits, $bn	Percentage of current gross profits	Missing tax payments,$bn	Average effective tax rate	Share of global missing profits	Share of global missing profits (ex. US)
United States	463.0	38%	84.8	18%	71%	
Germany	25.8	154%	7.1	28%	4%	14%
Canada	23.5	33%	3.0	13%	4%	13%
China	15.0	65%	2.6	17%	2%	8%
Brazil	14.3	98%	3.7	26%	2%	8%
France	13.9	110%	3.7	27%	2%	7%
Mexico	13.7	64%	3.3	24%	2%	7%
India	11.4	184%	3.6	32%	2%	6%
United Kingdom	9.2	12%	1.2	13%	1%	5%
Italy	8.6	187%	4.2	49%	1%	5%
Spain	8.2	496%	4.9	59%	1%	4%
Memo: All other individual countries	41.5	103%	10.4	24%	6%	22%

Source: Authors on the basis of the BEA data.

Notes: These are the top ten countries in absolute, dollar values.

Memo refers to Australia, Japan, Poland, Chile, Argentina, South Africa, Philippines, Korea Rep., Belgium, Russia, Czech Rep., New Zealand, Hungary, Panama, Thailand, Greece, Honduras, Taiwan, Costa Rica, Austria, Ecuador, Dominican Rep. and Colombia. Memo values are sums except for percentage of gross profits and tax rate, which are unweighted averages.

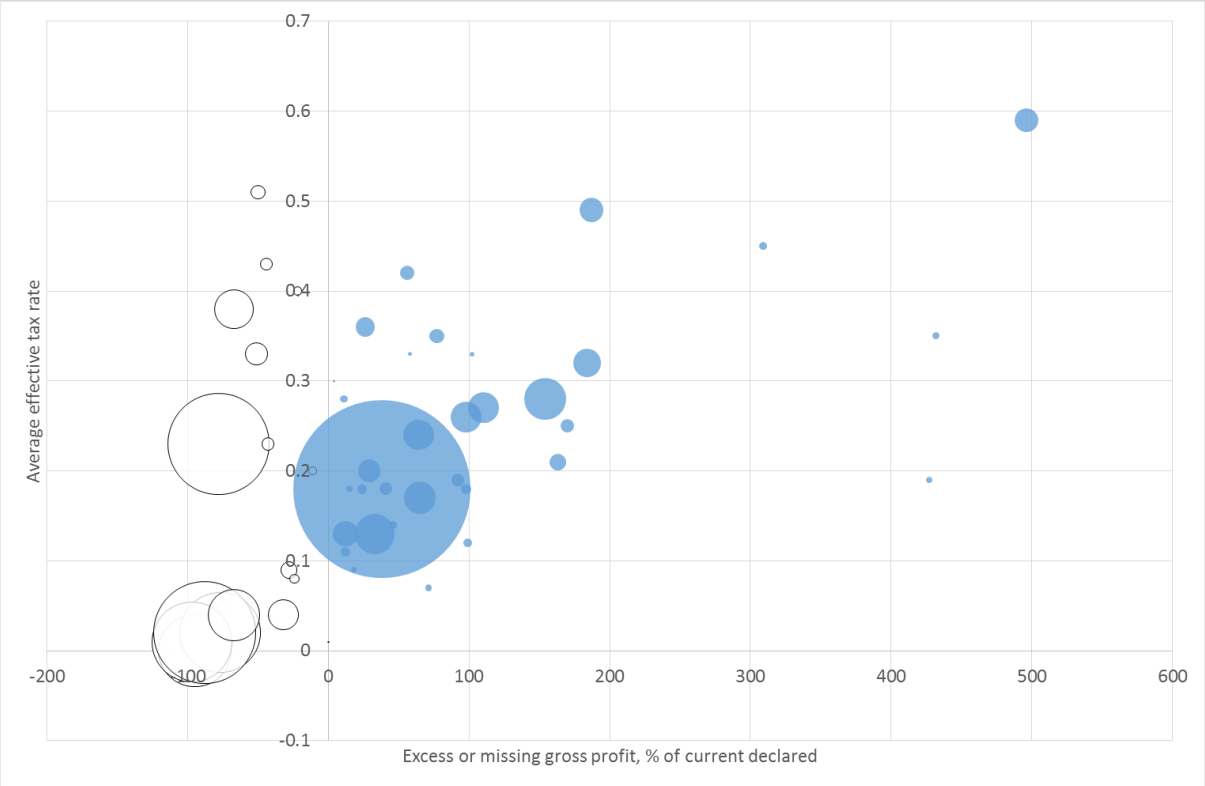
The other countries identified in the top ten are not recognised in the same category: Norway, Indonesia and Denmark each exhibit effective tax rates over 30 per cent. For the first two, it is possible that natural resource activity may play a part in inflating the apparent share of gross profit. In the case of Norway, which accounts for the major share, the year 2012 in particular is clearly anomalous with a major jump in gross profits. Further investigation is needed in this and the remaining cases, ideally with company-level data.

In panel (b), three features stand out.[8] First, as expected for US-headquartered MNEs, the US is the biggest loser by far, accounting for more than 70 per cent of the total gross profit that is misaligned away from the location of the real economic activity that gave rise to it. Second, the range of major economies is broadly represented – from the BRICs (Brazil, Russia, India and China) to leading OECD countries. Third, the missing profit is in some extreme cases greater than that which remains – by a smaller margin in the cases of India and Germany, for example, and by a factor of four in the case of Spain and some smaller economies. Overall, it appears that countries at all income levels are losing out to profit shifting, compared to the taxable profits they could expect, given the current pattern of economic activity and a scenario in which the OECD BEPS aim of aligning profits with economic activity were actually to be achieved. This is in contrast to some previous literature in related fields, such as when Blanco & Rogers (2014) find evidence of positive spillovers from tax havens to nearby developing countries, but not to nearby developed countries.

Finally, Figure 4 shows missing and excess profit against the average effective tax rate, where bubble size indicates the total value of gross profit misaligned in each case. Excess profits are shown as negative and missing profits as positive – that is, these are the directions of adjustment were alignment to be imposed on the current position. The dominance of a small number of excess-profit jurisdictions (those with tax rates near zero, and excess profit near -100 per cent, i.e. most of their declared profit) is confirmed. The US is the largest loser in dollar terms, but many countries are missing higher shares of reported profit.

[8] A different picture would emerge if we used additional gross profits (or additional tax payments) expressed as percentage of current gross profits (the full results are provided in the Annex I). Using this relative measure results in a top ten excess-profit jurisdictions (Luxembourg, Bermuda, Netherlands, Ireland, Barbados, Switzerland, Norway, Indonesia, Denmark, Egypt) and missing-profit jurisdictions (Spain, Greece, Honduras, Panama , Italy, India, South Africa, Poland, Germany, France) that only partly overlap with the results reported in Table 3. Both absolute and relative perspectives make good sense, but we focus on the absolute here due to the objective of the paper and a further technical reason. For the largest countries in dollar values we likely do have reported data and therefore Table 3, presenting absolute values, does contain the 'true' top ten. Many of the countries where data is not reported might have high relative values (indeed this may make suppression more likely), but we are not able to show this here and therefore the top ten countries presented in brackets above are likely to reflect bias in data availability.

Figure 8.4: Intensity of profit misalignment (% of current declared gross profits), and effective tax rates, 2012



Source: Authors on the basis of the BEA data.

Negative bubbles (indicated in white) show excess-profit jurisdictions where misalignment results in artificially high profits. Positive bubbles (in blue) show missing-profit jurisdictions where misalignment artificially reduces declared profits. Bubble size reflects dollar value of misaligned profit.

Annex II provides some data on total tax revenue and on major areas of public expenditure, to support comparisons of the relative importance of the tax revenue potentially at stake due to profit misalignment of US MNEs alone.

8.5 Conclusions

This first analysis of global misalignment patterns in the profits of US multinational groups is largely descriptive, but sheds new light on the picture. Three main findings stand out. First, in contrast to some previous literature, it appears that countries at all income levels are losing out to profit shifting, compared to the taxable profits they could expect, given the current pattern of economic activity and a scenario in which the OECD BEPS aim of aligning profits with economic activity were actually to be achieved. There is great variation among countries, however, both in terms of the absolute value of losses and their proportional importance.

Second, the majority of missing profit from jurisdictions where real activity takes place ends up in just a few jurisdictions with near-zero effective tax rates – the Netherlands, Ireland, Bermuda and Luxembourg are the most important by far, and with Singapore and Switzerland account for almost the entirety of profit shifting that can be allocated to individual jurisdictions.

Third, the issue is of first-order importance in terms of the world economy. The preferred spot estimate for shifted profit in 2012 uses the European Commission's proposed formula for economic activity, and amounts to $660 bn, 27 per cent of US multinationals' gross profit or approximately 0.9 per cent of world GDP. Depending on the relative scale of profit shifting among non-US multinationals, it is feasible that the issue reaches the accounting materiality threshold of 5 per cent in respect of global economic accounts.

In addition, the level of profit shifting by US multinationals has been broadly stable from 2010 to 2012 (post-crisis), and at a level notably higher than that which prevailed pre-crisis in the early 2000s (which was itself sharply higher than that of the 1990s). This is despite a substantial narrowing of the effective tax rate differential between missing-profit and excess-profit jurisdictions, although tax rates do appear to be closely correlated with the resulting misalignments of declared gross profit.

There are important caveats. Most obviously, the analysis relies on the public BEA data, which are aggregated at the national level and subject to varying suppressions. Further investigation of many specific points is needed by researchers with access to the full company-level data, and also on the general question of how aggregation of losses and profits within each country affects the findings. Additional work with balance sheet data may shed further light on the representativeness, or otherwise, of US MNEs for global FDI, which at this stage remains unclear. Finally, although the behavioural responses to full alignment are likely to be substantial (for example, both by MNEs in terms of locating their activities and by countries through setting of tax rates and other policies), we are not able to reflect them in our analysis, giving rise to a clear limitation.

Future research with the current data should explore in more detail the changing patterns over time (for example, the emergence of greater misalignment with respect to sales than

to assets; the industry-specific patterns, including around mining; the roles of specific individual jurisdictions; and falling average effective tax rates). Also, further research should examine the link between international corporate tax avoidance and misalignment. Specifically, we would like to see decomposition of the scale misalignment according to various reasons including the avoidance or a higher capital intensity of operations in some countries or industries.

This analysis also exposes, however, the paucity of high quality data with which to assess the scale of base erosion and profit shifting, and also the progress of the OECD BEPS initiative designed to curtail these corporate tax abuses. The imposition of country-by-country reporting on multinationals has not yet been followed by a process to collate and analyse the data required. Instead, OECD staff working under BEPS Action 11 are seeking to collate aggregated data aggregated from individual governments. While this would be a step forward, any outcome short of full publication represents a major missed opportunity to make good use of valuable data where the compliance costs have already been accepted. Individual governments must now consider whether to require publication.

In addition to preventing accountability for the OECD, its members, or the G20 and G8 groups of countries that provided the mandate, such a failure of transparency would also prevent policymakers from improving their understanding of the nature and extent of profit misalignment, and most likely also hinder effective policy progress at the national level.

The confirmation of the likely scale of misalignment here, and the extent to which most countries are losing out to a small number of jurisdictions, should focus minds on the importance of better data. Individual jurisdictions and economic blocs should seriously consider making country-by-country reporting public. The UK parliament has already voted to provide the government with this option; and discussions in the EU are ongoing. At the global level, there should be an urgent revisiting of the decision not to establish a repository which would allow analysis by trusted researchers, and the publication of aggregate data annually. This would most appropriately be managed by a globally representative, intergovernmental tax body.

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8.7 Appendix

8.7.1 Characteristics and limitations of the data

Although the data are gathered through surveys from individual firms, the publicly-available data are aggregated to country- and/or industry-level.[9] The survey-based data cover the period between 1983 and 2012, with some changes in variable definition and in other information collected. Importantly, data up to 2008 include all non-bank US parents and majority-owned foreign affiliates, whereas data for 2009 and forward include all US parents and majority-owned foreign affiliates. The data are provided not as a single dataset but in a range of tables, which again differ a little over time.[10] Some information is available only in some periods or years (often the benchmark surveys that take place every five years; the last one was 2009).[11] While merging the data across tables, variables, countries and years, some information is inevitably lost. For example, since selected data are available for around 200 countries and country groups, but income statement data are available only for less than 100 of these, after merging we continue working with the latter's less detailed country disaggregation. Finally, where there are negative values of some variables in some years, we input zeros for these observations.[12] Despite these inconsistencies, it is possible to create the longest possible time series from 1983 to 2012 (while recognising the possibility of an artificial breakpoint due to the introduction of banks). Data on US parents,

[9] We use the country-level aggregation to explore the pattern of tax at this level. The use of country-level data can lead to biases, for example from effective consolidation of underlying profits and losses, which unfortunately we cannot control for or even estimate the magnitude of. The use of country-level data results in consolidation of underlying profits and losses across companies in a given country. This overall sum hides the underlying heterogeneity. In general, the consolidation of loss-making companies will depress total reported profit, biasing the average effective tax rate upwards, but with the current data we are unable to control for this or even estimate its likely magnitude. Future work by researchers with access to the company-level data should pursue this question. Access to firm-level data (currently only provided for approved researchers who are US citizens) could allow future research to assess the implications of these partial aggregations.

[10] In the cases of sales and net income, for which we have two separate tables as sources, the information is identical in the two sources - with the exception of some tens of cases for each year between 1983 and 1988. The differences are generally small, and we opt to use the information for net income from income statement tables, because the foreign income tax variable is obtained from the same source; while for sales we take from selected data tables where the other factors of economic activity such as assets are also drawn.

[11] For example, data on various types of assets by countries are available only in the most recent period since 2009, and value added-related measures only since 1997; data on US parents (necessary for a full picture of profit alignment) are also more limited than that for foreign affiliates. Also, for some years (such as 1998), there is an addenda with information for additional variables or countries (such as in 1993 in table TAB30, the addenda includes data on taxes other than income and payroll taxes). We make no or only limited use of the information available only for particular years or countries, but this often very detailed information provides opportunities for further research.

[12] These observations represent, of the final sample, 7% of observations for net income and for profit-type return; and 3% of observations for foreign income tax. In practice the global results do not differ greatly if we retain the negative values.

however, are only available for 1994, 1999, and from 2004 to 2012. In order to examine the complete global pattern, therefore, these are the years of data used in our final sample.

The BEA survey data have some advantages to alternative data sets that have been used for the study of US MNEs. For example, Clausing (2016) uses this data to study profit shifting and considers it for this purpose better than many data sources. Also, Zucman (2014) uses national accounts data, but acknowledges that it is hard to know which governments, US or of the other countries, lose most due to tax avoidance by US firms. In contrast, the BEA survey, with country-by-country information for profits, taxes as well as indicators of economic activity, does enable this type of analysis. It is a similar case with balance of payments statistics, also available from the BEA, and used by Zucman (2014).

Although it does not contain much of the detail available in the BEA survey data, the balance of payments data does have an important feature in contrast with the BEA survey data: they are not likely to suffer from double-counting issues. Profits that pass through chains of entities in various countries might be counted more than once in the BEA survey data, whereas they are consolidated and counted only once in the balance of payments data. Hines (2010) even expects that we are likely to observe misalignment since most of the income reported in tax havens arises because multinational firms commonly use tax haven affiliates as conduits for investment in other foreign affiliates. He thus argues that a sizable fraction of the income reported in tax havens is in fact income earned by other foreign affiliates that US parents invest in indirectly through tax haven operations. A drawback of this balance of payments data is that, as discussed by Zucman (2014), they do not reveal the real source of profits, but mainly the location of the holding companies involved in tax planning. In comparison, the BEA survey data might reveal the real source of profits as well as the location of the holding and be thus double-counted. In any case, unfortunately, it is not possible to account for any double-counting in the BEA survey data accurately, in which we agree with Clausing (2016).[13]

[13] Additionally, we have attempted to reconcile these two sources by comparing their information on profits made abroad. For the BEA Survey data we use net income. For the balance of payments data we use U.S. Direct Investment Abroad: Balance of Payments and Direct Investment Position Data - Income without current-cost adjustment (http://www.bea.gov/international/xls/USDIA%20Income.xlsx). Indeed for most countries the BEA survey's net income is substantially higher than income from balance of payments data. On the hand, some of the tax havens do have low values in the balance of payments data relative to the survey (values of this ratio in brackets), for example, Bahamas (0.2-0.4), Ireland, Luxembourg, Switzerland (0.3), Netherlands, Hong Kong, Singapore not so low (0.4-7). On the other hand, other countries especially in Europe also exhibit relatively low values: Belgium, Denmark, Finland, Hungary (around 0.2-3 in the last decade) or even France, Germany, Italy, Poland in some of the recent years. Overall, we do not observe a clear systematic pattern in how the two data sources differ and therefore find it hard to adjust the survey data to not to suffer from double-counting. Instead of eliminating double-counties, we thus make the following two conclusions. We focus on relative results across countries or over time rather (which should not be distorted substantially if the double-counting is relatively constant) than absolute levels of misalignment in terms of dollars (which might be higher than in reality due to this double-counting). Furthermore, Clausing (2016) uses both sources of the data to

A further alternative to three indicators of profit discussed in the main text would be to use the gross profit measure, but to follow the construction of profit-type return in excluding income from equity investments – since these are typically returns on investments in other jurisdictions. This approach is of interest to understand the derivation of profitability for US multinational enterprises (MNEs) operating in particular jurisdictions (such as the Netherlands), where much profit is derived from equity investments elsewhere. As Lipsey (2010) noted, however, in an important assessment of the weaknesses of existing foreign direct investment (FDI) data for understanding the real patterns of global economic activity: 'That definition leads to an understatement of the degree of distortion by excluding income from equity investments, one of the mechanisms for transferring income' (Lipsey 2010: S104). As such, we do not feel the picture shown by profit-type return is more accurate for the current purpose: ultimately, the income *has* been shifted to, for example, the Netherlands, and so we prefer the gross profit measure which captures this. Future work might usefully explore this point further.

The gross profit measure includes income from equity investments, with the associated drawback that some of the income from equity investments might be counted more than once if there are more layers of ownership in one country, as is common when a company is structured as a holding company. Unfortunately the BEA data do not enable us to allow for this double-counting; the alternative series which excludes equity investment income will substantially understate profit shifting. Again, future research with company-level data might shed some light on the potential magnitude of this issue. A particular concern is around jurisdictions with greater holding company activity, such as the Netherlands, where the profit shifting role may be relatively overstated if equity income is included.

8.7.2 Contemplating the exclusion of 'mining' affiliates

Data on foreign income taxes do not distinguish between standard income taxes, and payments that reflect natural resource rents. As such, these rents, i.e. profits from fossil fuels and mineral extraction, have the potential to skew the analysis – artificially suggesting that resource-rich countries receive a share of (gross) profit that is disproportionate to their actual economic activity. For this reason, we explored taking advantage of the country-by-industry disaggregation to eliminate from national averages the data relating to affiliates operating in the BEA's 'mining' category, which covers oil and gas extraction, coal mining, metal ore mining, non-metallic mineral mining and quarrying, as well as support activities for mining. Below we describe our contemplation, which we supported with results from the BEA data and weighted both the benefits and costs of the exclusion. In the end, we decided that on balance, the full sample is preferred and is used in the remainder of the paper.

estimate semi-elasticities, finding that the estimates are quite similar and noting that balance of payments data avoids double-counting as well as eliminates some types of income shifting.

For the sake of transparency of our reasoning, let us lay out our contemplation here. From the BEA data, we know that the sub-category of oil and gas extraction is responsible for most of the mining category in 2012 in terms of affiliates' net income and sales. There are data available at this level of detail for years 1994, 1999, and 2004-2012.[14] The mining category is available between 1999 and 2012, but not for 1994. In 1994 the petroleum category is available, but does not include mining (which stands as a separate category for parents, with no data for affiliates). Since the petroleum industry is responsible for a large share of the mining category, and no better alternative is available, we were required to treat the petroleum category in 1994 in the analysis below identically to the mining category since 1999. Overall we differentiated between eight industries, namely mining; manufacturing; wholesale trade; retail trade; information; finance and insurance; professional, scientific, and technical services; and other industries. In 1994 the data did not distinguish the two industries of retail trade and information, and so we worked with only six industries.

An important complication here relates to data suppression. Since the reported data are suppressed when it might be possible to identify an individual multinational group, there are inevitably more suppressions when dealing with country-industry data than with country aggregates alone. As a result, the mining category is sometimes suppressed when national-level data are available. Where possible, we generated national aggregates, net of mining. Where mining data are suppressed, we created the broadest possible national aggregate which excludes mining, by eliminating the total of all suppressed industries (i.e. mining plus other suppressed industries).[15] For each country and year observation, we eliminated the value for the suppressed industries across all variables for consistency, although this results in a small number of additional observations where estimates are not possible.[16] For countries where data are suppressed, and only reported in (e.g. regional) aggregates, this additional industry suppression is not possible, and so the 'residual' reported in the results below does including mining – and so for the reasons above may show an artificially high level of positive profit misalignment.

Table 8.2A shows the proportion of the full sample that would be retained after performing the necessary exclusions, across the main variables. Across the sample years, this results in excluding around 20 per cent of the total, by profit; less in terms of variables reflecting

[14] From 2000 to 2003, data are absent for US income taxes paid by parent companies, and therefore it is not possible to include these years in the analysis.

[15] Again, we input zeros where negative values of some variables were implied by this elimination of suppressed values (this is the case for four observations only).

[16] Specifically, 9 observations in the case of net income, of which 5 relate to Nigeria; 45observations for foreign income taxes, with the most frequently unavailable countries being Nigeria, Saudi Arabia and United Arab Emirates; 6 observations for assets (half of these for Barbados); 8 observations for sales (half of these for Egypt and Nigeria); 3 observations for employees (2 of these for Barbados); and 2 observations for wages (Barbados and United Arab Emirates).

activity. In 2012, the remaining sample relates to $2.013 trillion of gross profit, 82 per cent of the recorded total of $2.440 trillion.

Table 8.2A: Sample coverage (% of full sample, 2012) after mining sector exclusion

	Net income (%, $US m)	**Foreign income tax (%, $US m)**	**Gross profit (%, $US m)**	**Total assets (%, $US m)**	**Sales (%, $US m)**	**Employees (%, thousands)**	**Wages (%, $US m)**
1994	93	92	92	91	89	97	95
1999	92	92	92	95	93	93	94
2004	85	87	85	93	95	95	97
2005	79	87	80	91	93	94	95
2006	80	86	81	89	92	92	95
2007	76	87	78	90	91	92	95
2008	71	79	73	88	89	91	92
2009	79	89	81	91	96	95	97
2010	78	87	80	91	96	96	96
2011	82	86	83	90	96	94	96
2012	81	89	82	91	96	96	97
Totals after exclusion	1667439	338810	2013160	49136152	16223026	33850	2253733
Memo: Full sample totals	2059986	380860	2440846	53725972	16884396	35226	2322307

Source: Authors on the basis of the BEA data.

As the shares of tax relative to gross profit demonstrate, including mining – rather than performing this exclusion process - can result in substantial distortion, in particular in creating a possibly artificial appearance of profit shifting into major resource-rich economies, since the resource rents in question tend to be large in relation to the standard corporate income tax seen elsewhere.

On the other side of the scales, however, we weigh the very large loss of data; the fact that our exclusions necessarily include industries beyond mining, in an inconsistent way across countries, making direct comparison problematic; and the additional issue that our residual category includes mining, and so cannot be compared equivalently to the country-specific results. Finally, genuine profit shifting does occur in the resource sector – anecdotally, it may be the most widely abusive sector – so the overall argument for excluding this sector from a study of profit misalignment, *even if it could be done perfectly,* is unsatisfactory at best.

On balance, as we stated at the beginning of this section, the full sample is preferred and this forms the basis for the remainder of the paper.[17]

[17] We are grateful to Kim Clausing for valuable discussion on this point.

Table 8.1A: Summary statistics, 2012

	Share (%) of net income	Share (%) of foreign income tax	Share (%) of gross profit	Share (%) of profit-type return	Share (%) of tangible assets	Share (%) of assets	Share (%) of sales	Share (%) of em-ployees	Share (%) of wages	Share (%) of CCCTBtg	Share (%) of CCCTBa	Average effective tax rate
Rest of the world	6.7	11.9	7.9	4.4	3	3.6	1.3	1.2	0.5	1.7	1.9	23.5
Argentina	0.1	0.6	0.2	0.3	0.4	0.1	0.3	0.4	0.2	0.3	0.2	42.1
Australia	1	1.3	1	1.2	1.9	1.1	1.1	0.9	1.2	1.3	1.1	19.6
Austria	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1	0.2	0.1	0.1	8.6
Barbados	0.1	0	0.1	0.1	0	0.1	0	0	0	0	0	4.9
Belgium	0.5	0.3	0.5	0.5	0.4	0.8	0.8	0.4	0.5	0.5	0.7	11.3
Bermuda	3.9	0	3.3	0.8	0.2	1.9	0.3	0	0	0.2	0.7	0
Brazil	0.5	1	0.6	0.7	1	0.5	1.2	1.7	1	1.2	1	25.9
Canada	3	2.4	2.9	2.9	4.7	2.4	3.9	3.2	2.7	3.9	3.1	12.8
Chile	0.1	0.4	0.2	0.3	0.4	0.1	0.2	0.4	0.2	0.3	0.2	35
China	0.9	1.1	0.9	1.3	1	0.5	1.4	3.8	0.8	1.6	1.4	17.5
Colombia	0.1	0.3	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	29.8
Costa Rica	0	0	0	0.1	0	0.1	0.1	0.1	0	0.1	0.1	7.5
Czech Republic	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	17.8
Denmark	0.1	0.7	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	50.6
Dominican Republic	0	0	0	0	0	0	0	0.1	0	0	0	33.2
Ecuador	0	0	0	0	0	0	0	0	0	0	0	32.8
Egypt	0.1	0.5	0.2	0.4	0.2	0	0.1	0.1	0	0.1	0.1	42.6
Finland	0			0	0	0	0.1	0.1	0.1	0.1	0.1	
France	0.4	0.9	0.5	0.4	0.6	0.7	1.2	1.3	1.5	1.1	1.1	26.5
Germany	0.6	1.2	0.7	0.9	1.3	1.3	2	1.8	2.2	1.7	1.8	27.6
Greece	0	0	0	0	0	0	0	0	0	0	0	34.9
Honduras	0	0	0	0	0	0	0	0.1	0	0	0	18.8
Hong Kong	0.6	0.3	0.6	0.5	0.2	0.6	0.7	0.3	0.3	0.4	0.5	8.8

Hungary	0.1	0.1	0.1	0	0.1	0.1	0.1	0.2	0.1	0.1	0.1	13.9
India	0.2	0.5	0.3	0.4	0.3	0.2	0.4	2.4	0.6	0.7	0.7	31.7
Indonesia	0.5	1.2	0.6	0.8	0.5	0.1	0.2	0.3	0.1	0.3	0.2	33
Ireland	5.8	0.8	5	5	1.3	2.2	1.9	0.3	0.3	1.2	1.5	2.4
Israel	0.2	0.1	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.2	0.1	7.5
Italy	0.1	0.6	0.2	0.3	0.3	0.3	0.7	0.6	0.6	0.5	0.5	48.8
Japan	0.6	2	0.8	1.5	0.6	1.9	1.5	0.9	1.4	1.1	1.5	36.4
Korea, Republic of	0.2	0.3	0.2	0.4	0.2	0.3	0.4	0.4	0.3	0.3	0.3	18.3
Luxembourg	4.6	0.3	3.9	0.3	0	3.2	0.2	0	0.1	0.1	1.1	1.1
Malaysia	0.3	0.4	0.3	0.5	0.3	0.1	0.3	0.4	0.1	0.3	0.2	19.9
Mexico	0.8	1.4	0.9	1.2	1.1	0.7	1.3	3.1	0.7	1.4	1.3	24.1
Netherlands	8.2	1	7.1	1.1	0.5	3.6	1.4	0.6	0.7	0.8	1.9	2.3
New Zealand	0	0	0	0.1	0.1	0	0.1	0.1	0.1	0.1	0.1	12.4
Nigeria				1.2	0.6	0.2	0.2	0	0	0.3	0.1	
Norway	1	3.3	1.4	1.3	0.8	0.3	0.3	0.1	0.2	0.4	0.3	38
Panama	0	0	0	0	0	0	0.1	0.1	0	0	0	45.5
Peru	0.1	0.5	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	39.6
Philippines	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.6	0.1	0.2	0.2	18.6
Poland	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.4	0.2	0.3	0.2	21.3
Portugal	0.3			0	0	0.1	0.1	0.1	0.1	0.1	0.1	
Russia	0.2	0.3	0.2	0.4	0.3	0.1	0.3	0.4	0.2	0.3	0.2	17.7
Saudi Arabia	0.1			0.2	0.1	0	0.1	0	0	0.1	0	
Singapore	2	0.5	1.7	1.7	0.7	1	2.4	0.5	0.5	1.2	1.3	4.2
South Africa	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.1	0.2	0.2	25.3
Spain	0	0.3	0.1	0	0.3	0.3	0.4	0.5	0.4	0.4	0.4	59.2
Sweden	0.2	0	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	1.4
Switzerland	2.7	0.7	2.4	1.7	0.3	1.3	1.7	0.3	0.5	0.8	1.1	4.4
Taiwan	0.2	0.2	0.2	0.3	0.2	0.1	0.2	0.2	0.1	0.2	0.2	17.9

Thailand	0.2	0.5	0.3	0.5	0.3	0.1	0.4	0.5	0.1	0.3	0.3	28.2
Turkey	0			0	0	0	0.1	0.1	0.1	0.1	0.1	
United Arab Emirates	0.1			0.8	0.1	0.1	0.2	0.1	0.1	0.1	0.1	
United Kingdom	3.1	2.6	3	2.6	2.7	8.9	3.9	3.5	3.7	3.4	5.5	13.4
United States	48.4	58.7	50	60.7	71.4	59.8	64.7	65.6	76.2	69	65.1	18.3
Venezuela	0.2	0.3	0.2	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.1	22.7
Total (USD millions, thousands of employees)	2059986	380860	2440846	1397359	4483430	537259 72	168843 96	35226	2322307			

Source: Authors on the basis of the BEA data.

Note: The shares columns show the proportion of profits and of each measure of economic activity of a given country in the global total. Series 'CCCTBa' shows the correlation of profits with a CCCTB formula using total assets; whereas 'CCCTBtg' replaces this with tangible assets, per the Commission's (2011) proposal. We construct average effective tax rates at the national level, as the ratio of foreign income tax to gross profit.

8.8 Annexes

There are two annexes: Annex I (Detailed results, 2012: Additional gross profits and additional tax payments under full alignment of profits with economic activity, various bases) and Annex II (Scale comparisons, 2012: Relative importance of implied revenue changes (compared to overall tax revenues and to health and education spending), CCCTBtg basis). In both cases some countries that feature in the full sample are absent, due to data suppressions in 2012.

In addition to tangible assets, assets, sales, number of employees, wages, we use the following three economic activity measures as bases for alignment of profits:

CCCTBtg - Our preferred measure: European Commission's proposed apportionment formula to operate with the Common Consolidated Corporate Tax Base: one third tangible assets, one third sales, and one third equally weighted between employment costs and employee numbers.

CCCTBa - For comparison: European Commission's proposed apportionment formula, but with total assets (i.e. including intangible assets) replacing tangible assets.

Canada - Apportionment formula used between Canadian provinces: one half sales, one half wages.

Annex I: Detailed results, 2012 (additional gross profits; additional tax payments)

A. Additional gross profits, US$m

NB. Preferred estimates in **bold**	Additional gross profits, US$m	Additional gross profits, US$m	Additional gross profits, US$m	Additional gross profits, US$m	Additional gross profits, US$m	**Additional gross profits, US$m**	Additional gross profits, US$m	Additional gross profits, US$m	Additional gross profits, US$m
	Tangible assets	Assets	Sales	Number of employees	Wages	**CCCTBtg**	CCCTBa	Canada	Average
Rest of the world	-119988	-105215	-160802	-163617	-181906	**-151184**	-146259	-171354	-150040
Argentina	4424	-2450	2033	4163	276	**2892**	601	1154	1637
Australia	20877	989	1802	-3988	3094	**7410**	781	2448	4177
Austria	-153	-591	516	670	1326	**454**	308	921	432
Barbados	-1840	-162	-1375	-2434	-2479	**-1890**	-1331	-1927	-1680
Belgium	-2988	7494	8239	-2715	797	**1431**	4925	4518	2713
Bermuda	-75715	-34072	-72953	-79730	-79545	**-76102**	-62221	-76249	-69573
Brazil	10168	-1665	14600	26945	9331	**14302**	10357	11965	12000
Canada	44159	-11839	24716	7746	-4772	**23454**	4788	9972	12278
Chile	5975	-506	1303	4765	-420	**3150**	990	442	1963
China	1407	-11113	10795	69682	-4257	**14972**	10798	3269	11944
Colombia	15	-1959	247	1084	-818	**131**	-527	-286	-264
Costa Rica	-75	589	425	2800	104	**601**	822	264	691
Czech Republic	638	-145	995	4383	836	**1414**	1153	915	1274
Denmark	-3009	-2890	-2655	-3184	-2096	**-2768**	-2728	-2375	-2713
Dominican Republic	142	-241	151	1118	-195	**252**	124	-22	166
Ecuador	101	-117	464	800	49	**330**	257	256	267
Egypt	-154	-3574	-2620	-2894	-3957	**-2067**	-3206	-3289	-2720
France	2877	4521	17862	18710	22999	**13865**	14413	20431	14460
Germany	14278	15591	31197	27091	36619	**25777**	26215	33908	26335
Greece	476	288	767	1009	882	**729**	667	825	705
Honduras	61	-20	373	2558	263	**615**	588	318	595
Hong Kong	-9415	642	3512	-5481	-6126	**-3902**	-550	-1307	-2828
Hungary	156	466	1095	2550	-54	**833**	936	520	813
India	1232	-1525	3033	51900	7862	**11382**	10463	5447	11224

Indonesia	-3023	-11390	-9682	-6686	-11915	**-7335**	-10124	-10798	-8869
Ireland	-90570	-69011	-75841	-115025	-113951	**-93633**	-86447	-94896	-92422
Israel	-920	-2673	-2368	-158	-645	**-1230**	-1814	-1507	-1414
Italy	3821	3244	11620	9759	11155	**8633**	8440	11387	8507
Japan	-6316	25617	14904	1543	13294	**5335**	15980	14099	10557
Korea, Republic of	462	832	4041	3173	1581	**2293**	2417	2811	2201
Luxembourg	-95162	-18770	-90530	-95130	-94795	**-93552**	-68088	-92663	-81086
Malaysia	-576	-5396	-888	2514	-5400	**-969**	-2575	-3144	-2054
Mexico	4356	-4413	10903	55130	-3360	**13715**	10791	3771	11362
Netherlands	-160976	-83838	-138933	-156687	-154388	**-151815**	-126103	-146660	-139925
New Zealand	1455	-146	1090	1189	432	**1118**	585	761	811
Norway	-12725	-26216	-24466	-29864	-27644	**-21981**	-26478	-26055	-24429
Panama	733	243	1056	1129	190	**816**	653	623	680
Peru	1588	-3096	-2061	-1788	-3064	**-966**	-2528	-2563	-1810
Philippines	774	-1067	516	11685	-212	**2342**	1728	152	1990
Poland	3323	426	3316	8540	1830	**3941**	2976	2573	3366
Russia	1119	-2670	1501	4736	-1427	**1425**	162	37	610
Singapore	-26454	-17886	15982	-30435	-31062	**-13740**	-10884	-7540	-15252
South Africa	477	376	3763	5320	1653	**2576**	2542	2708	2427
Spain	5661	4779	9304	10168	9303	**8234**	7940	9304	8087
Sweden	-1777	1386	739	583	1413	**-13**	1041	1076	556
Switzerland	-51179	-27100	-15477	-51798	-46032	**-38524**	-30497	-30755	-36420
Taiwan	13	-334	1332	2014	-1021	**614**	498	156	409
Thailand	390	-4814	1900	4544	-4292	**805**	-929	-1196	-449
United Kingdom	-7643	144185	21089	12349	16226	**9244**	59854	18657	34245
United States	520995	238516	358647	380430	638175	**462982**	368822	498411	433372
Venezuela	-2868	-3186	-1643	-1299	-2535	**-2143**	-2249	-2089	-2252

Source: Authors on the basis of the BEA data.

Annex I: Detailed results, 2012 (additional gross profits; additional tax payments)

B. Additional gross profits, % of current

NB. Preferred estimates in **bold**	Additional gross profits, % of current Tangible assets	Additional gross profits, % of current Assets	Additional gross profits, % of current Sales	Additional gross profits, % of current Number of employees	Additional gross profits, % of current Wages	**Additional gross profits, % of current CCCTBtg**	Additional gross profits, % of current CCCTBa	Additional gross profits, % of current Canada	Additional gross profits, % of current Average
Rest of the world	-62	-54	-83	-85	-94	**-78**	-76	-89	-78
Argentina	86	-48	40	81	5	**56**	12	22	32
Australia	82	4	7	-16	12	**29**	3	10	16
Austria	-6	-24	21	27	53	**18**	12	37	17
Barbados	-73	-6	-55	-97	-98	**-75**	-53	-77	-67
Belgium	-26	64	70	-23	7	**12**	42	39	23
Bermuda	-95	-43	-91	-100	-99	**-95**	-78	-95	-87
Brazil	70	-11	101	185	64	**98**	71	82	83
Canada	62	-17	35	11	-7	**33**	7	14	17
Chile	146	-12	32	116	-10	**77**	24	11	48
China	6	-48	47	302	-18	**65**	47	14	52
Colombia	0	-59	7	33	-25	**4**	-16	-9	-8
Costa Rica	-9	70	50	331	12	**71**	97	31	82
Czech Republic	44	-10	69	304	58	**98**	80	63	88
Denmark	-54	-52	-48	-57	-38	**-50**	-49	-43	-49
Dominican Republic	33	-56	35	258	-45	**58**	29	-5	38
Ecuador	31	-36	144	248	15	**102**	80	79	83
Egypt	-3	-75	-55	-61	-84	**-44**	-68	-69	-57
France	23	36	142	148	182	**110**	114	162	115
Germany	85	93	187	162	219	**154**	157	203	158
Greece	281	170	454	597	522	**432**	395	488	417
Honduras	43	-14	259	1777	182	**427**	408	221	413
Hong Kong	-69	5	26	-40	-45	**-28**	-4	-10	-21
Hungary	9	26	61	141	-3	**46**	52	29	45

India	20	-25	49	838	127	**184**	169	88	181
Indonesia	-21	-79	-68	-47	-83	**-51**	-71	-75	-62
Ireland	-74	-56	-62	-94	-93	**-77**	-71	-78	-76
Israel	-18	-52	-46	-3	-13	**-24**	-35	-29	-27
Italy	83	70	252	212	242	**187**	183	247	184
Japan	-31	124	72	7	64	**26**	77	68	51
Korea, Republic of	8	15	72	56	28	**41**	43	50	39
Luxembourg	-99	-20	-94	-99	-99	**-97**	-71	-96	-84
Malaysia	-7	-64	-11	30	-64	**-11**	-31	-37	-24
Mexico	20	-20	51	256	-16	**64**	50	17	53
Netherlands	-93	-49	-81	-91	-90	**-88**	-73	-85	-81
New Zealand	129	-13	97	106	38	**99**	52	68	72
Norway	-39	-80	-74	-91	-84	**-67**	-80	-79	-74
Panama	278	92	400	428	72	**309**	247	236	258
Peru	37	-71	-48	-41	-71	**-22**	-58	-59	-42
Philippines	30	-42	20	460	-8	**92**	68	6	78
Poland	138	18	137	354	76	**163**	123	107	139
Russia	19	-45	25	80	-24	**24**	3	1	10
Singapore	-62	-42	38	-72	-73	**-32**	-26	-18	-36
South Africa	32	25	249	352	109	**170**	168	179	161
Spain	341	288	561	613	560	**496**	478	560	487
Sweden	-41	32	17	13	33	**0**	24	25	13
Switzerland	-88	-47	-27	-89	-79	**-67**	-53	-53	-63
Taiwan	0	-8	33	50	-26	**15**	12	4	10
Thailand	5	-67	26	63	-60	**11**	-13	-17	-6
United Kingdom	-10	194	28	17	22	**12**	81	25	46
United States	43	20	29	31	52	**38**	30	41	35
Venezuela	-58	-64	-33	-26	-51	**-43**	-45	-42	-45

Source: Authors on the basis of the BEA data.

Annex I: Detailed results, 2012 (additional gross profits; additional tax payments)

C. Additional tax payments, US$m

NB. Preferred estimates in bold	Additional tax payments, US$m	Additional tax payments, US$m	Additional tax payments, US$m	Additional tax payments, US$m	Additional tax payments, US$m	Additional tax payments, US$m	Additional tax payments, US$m	Additional tax payments, US$m	Additional tax payments, US$m	Average effective tax rate, %
	Tangible assets	Assets	Sales	Number of employees	Wages	CCCTBtg	CCCTBa	Canada	Average	Average
Rest of the world	-28152	-24686	-37727	-38388	-42679	-35471	-34316	-40203	-35203	0.23
Argentina	1863	-1032	856	1753	116	1218	253	486	689	0.42
Australia	4088	194	353	-781	606	1451	153	479	818	0.2
Austria	-13	-51	44	58	114	39	27	79	37	0.09
Barbados	-91	-8	-68	-120	-122	-93	-66	-95	-83	0.05
Belgium	-338	849	933	-307	90	162	558	512	307	0.11
Bermuda	0	0	0	0	0	0	0	0	0	0
Brazil	2634	-431	3782	6980	2417	3705	2683	3100	3109	0.26
Canada	5641	-1512	3157	990	-610	2996	612	1274	1568	0.13
Chile	2089	-177	456	1666	-147	1102	346	154	686	0.35
China	246	-1943	1887	12183	-744	2618	1888	572	2088	0.17
Colombia	4	-584	74	323	-244	39	-157	-85	-79	0.3
Costa Rica	-6	44	32	209	8	45	61	20	52	0.07
Czech Republic	114	-26	177	780	149	252	205	163	227	0.18
Denmark	-1522	-1461	-1343	-1610	-1060	-1400	-1380	-1201	-1372	0.51
Dominican Republic	47	-80	50	371	-65	83	41	-7	55	0.33
Ecuador	33	-38	152	262	16	108	84	84	88	0.33
Egypt	-66	-1524	-1117	-1234	-1687	-881	-1367	-1402	-1160	0.43
France	763	1199	4738	4963	6101	3678	3823	5419	3836	0.27
Germany	3942	4305	8614	7480	10111	7117	7238	9362	7271	0.28
Greece	166	100	268	352	308	255	233	288	246	0.35
Honduras	11	-4	70	480	49	115	110	60	111	0.19
Hong Kong	-824	56	307	-480	-536	-342	-48	-114	-248	0.09
Hungary	22	65	152	355	-8	116	130	72	113	0.14

India	391	-484	962	16457	2493	3609	3318	1727	3559	0.32
Indonesia	-996	-3755	-3191	-2204	-3928	-2418	-3337	-3560	-2924	0.33
Ireland	-2140	-1631	-1792	-2718	-2693	-2213	-2043	-2243	-2184	0.02
Israel	-69	-202	-179	-12	-49	-93	-137	-114	-107	0.08
Italy	1864	1582	5669	4761	5442	4212	4118	5555	4150	0.49
Japan	-2296	9313	5418	561	4833	1940	5809	5125	3838	0.36
Korea, Republic of	85	153	741	582	290	421	443	516	404	0.18
Luxembourg	-1033	-204	-983	-1033	-1029	-1016	-739	-1006	-880	0.01
Malaysia	-115	-1075	-177	501	-1076	-193	-513	-626	-409	0.2
Mexico	1049	-1063	2626	13277	-809	3303	2599	908	2736	0.24
Netherlands	-3711	-1933	-3203	-3612	-3559	-3500	-2907	-3381	-3226	0.02
New Zealand	180	-18	135	147	53	138	72	94	100	0.12
Norway	-4839	-9968	-9303	-11355	-10511	-8358	-10068	-9907	-9289	0.38
Panama	333	110	480	513	86	371	297	283	309	0.45
Peru	630	-1228	-817	-709	-1215	-383	-1002	-1016	-718	0.4
Philippines	144	-198	96	2170	-39	435	321	28	370	0.19
Poland	709	91	707	1821	390	841	635	549	718	0.21
Russia	198	-472	265	837	-252	252	29	7	108	0.18
Singapore	-1123	-759	678	-1291	-1318	-583	-462	-320	-647	0.04
South Africa	121	95	953	1348	419	652	644	686	615	0.25
Spain	3349	2827	5504	6015	5504	4871	4697	5504	4784	0.59
Sweden	-24	19	10	8	19	0	14	15	8	0.01
Switzerland	-2258	-1196	-683	-2285	-2031	-1700	-1346	-1357	-1607	0.04
Taiwan	2	-60	239	360	-183	110	89	28	73	0.18
Thailand	110	-1359	536	1283	-1212	227	-262	-338	-127	0.28
United Kingdom	-1025	19339	2828	1656	2176	1240	8028	2502	4593	0.13
United States	95469	43707	65720	69712	116942	84839	67584	91331	79413	0.18
Venezuela	-652	-725	-374	-295	-577	-487	-511	-475	-512	0.23

Source: Authors on the basis of the BEA data.

Annex II: Scale comparisons: Relative importance of implied revenue changes

	Gross profits	Average effective tax rate	Additional gross profits, CCCTBtg	Potential additional tax revenue, CCCTBtg			
	US$m	%	US$m	US$m	% of health expenditure	% of education expenditure	% of tax revenue
Argentina	5143	0.42%	2892	1218	3.44%		
Australia	25365	0.20%	7410	1451	1.55%		0.44%
Austria	2510	0.09%	454	39	0.11%		0.05%
Barbados	2517	0.05%	-1890	-93	-53.46%	-39.29%	
Belgium	11702	0.11%	1431	162	0.40%		0.13%
Bermuda	80042	0.00%	-76102	0			
Brazil	14526	0.26%	14302	3705	3.81%		1.07%
Canada	70782	0.13%	23454	2996	2.15%		1.41%
Chile	4104	0.35%	3150	1102	11.86%	9.15%	2.17%
China	23079	0.17%	14972	2618	1.05%		
Colombia	3330	0.30%	131	39	0.20%	0.24%	0.08%
Costa Rica	845	0.07%	601	45	1.31%		0.72%
Czech Republic	1444	0.18%	1414	252	1.87%		0.91%
Denmark	5554	0.51%	-2768	-1400	-4.54%		-1.30%
Dominican Republic	434	0.33%	252	83	5.02%	6.23%	
Ecuador	323	0.33%	330	108	4.31%	2.83%	
Egypt	4737	0.43%	-2067	-881	-17.19%		-2.55%
France	12603	0.27%	13865	3678	1.51%		0.64%
Germany	16715	0.28%	25777	7117	2.34%		1.75%
Greece	169	0.35%	729	255	1.63%		0.46%
Honduras	144	0.19%	615	115	14.36%		4.22%
Hong Kong	13706	0.09%	-3902	-342		-3.71%	
Hungary	1802	0.14%	833	116	1.84%		0.40%
India	6194	0.32%	11382	3609	14.50%	5.79%	1.82%
Indonesia	14343	0.33%	-7335	-2418	-22.99%	-7.74%	
Ireland	122328	0.02%	-93633	-2213	-19.13%		-4.53%
Israel	5147	0.08%	-1230	-93	-0.78%		-0.16%
Italy	4612	0.49%	8633	4212	2.81%		0.90%
Japan	20658	0.36%	5335	1940	0.39%	0.84%	0.32%
Korea, Republic of	5620	0.18%	2293	421	0.84%		

Luxembourg	96079	0.01%	-93552	-1016	-31.17%		-7.07%
Malaysia	8427	0.20%	-969	-193	-2.92%		-0.39%
Mexico	21555	0.24%	13715	3303	8.74%		
Netherlands	172250	0.02%	-151815	-3500	-4.28%	-7.17%	-2.16%
New Zealand	1125	0.12%	1118	138	0.95%	1.09%	0.28%
Norway	32961	0.38%	-21981	-8358	-21.81%		-6.13%
Panama	264	0.45%	816	371	18.77%		
Peru	4331	0.40%	-966	-383	-6.66%	-7.21%	-1.20%
Philippines	2541	0.19%	2342	435	10.03%		1.35%
Poland	2415	0.21%	3941	841	3.60%		1.06%
Russia	5921	0.18%	1425	252	0.33%		0.08%
Singapore	42395	0.04%	-13740	-583	-11.62%	-6.29%	-1.45%
South Africa	1512	0.25%	2576	652	4.05%	2.58%	0.64%
Spain	1660	0.59%	8234	4871	5.08%		5.08%
Sweden	4344	0.01%	-13	0	0.00%		0.00%
Switzerland	57930	0.04%	-38524	-1700	-3.66%		
Taiwan	3994	0.18%	614	110			
Thailand	7173	0.28%	805	227	2.07%	0.82%	0.38%
United Kingdom	74141	0.13%	9244	1240	0.61%		0.19%
United States	1220890	0.18%	462982	84839	6.32%		5.14%
Venezuela	4978	0.23%	-2143	-487	-8.16%		

Source: Authors on the basis of the BEA data.

Chapter 9

Global distribution of revenue loss from corporate tax avoidance: re-estimation and country results[1]

Abstract: International corporate tax is an important source of government revenue, especially in lower-income countries. An innovative study of the scale of this problem was carried out by International Monetary Fund researchers (Crivelli et al. 2016). We first re-estimate their model, and then explore the effects of introducing higher-quality revenue data from the ICTD–WIDER Government Revenue Database. Whereas Crivelli et al. (2016) report results for two country groups only, we present country-level results to make the most detailed estimates available. Our findings support a somewhat lower estimate of global revenue losses of around US$500 billion annually, and indicate that the greatest intensity of losses occurs in low- and lower middle-income countries, and across sub-Saharan Africa, Latin America and the Caribbean, and South Asia.

Keywords: international taxation; corporate income tax; tax avoidance; tax havens; base erosion; profit shifting; income inequality; developing countries
JEL classification: F21, F23, H25

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9.1 Introduction

International corporate tax is an important source of government finance in all regions of the world and is responsible for a larger share of total tax revenues on average in lower-income countries. At present, the most comprehensive study of the global losses is that of International Monetary Fund (IMF) researchers Crivelli et al. (2016). The authors use panel data for 173 countries over 33 years to explore the magnitude and nature of international fiscal externalities—specifically, the spillovers from tax policy decisions in individual jurisdictions onto others. They develop and apply a new method enabling a distinction between spillover effects through real investment decisions and through avoidance techniques and quantify the revenue impact of the latter. In particular, they estimate an equation with corporate tax base as the dependent variable with 'tax haven' corporate tax rates as one of the independent variables, in order to evaluate the scale of the spillover. As Crivelli et al. (2016) argue, the avoidance associated with tax havens can in principle be assessed by simply 'turning off' in their model the effects on tax bases operating through that channel.

Using this approach, Crivelli et al. (2016) estimate global revenue losses at around US$650 billion annually, of which around one-third relate to developing countries. The intensity as a share of gross domestic product (GDP) is somewhat higher in the latter compared to Organisation for Economic Co-operation and Development (OECD) economies. (Cobham and Gibson 2016) combine this finding with data on the relatively greater reliance on corporate tax revenue in developing countries to show that the estimated losses are around 2–3 per cent of total tax revenue in OECD countries, but 6–13 per cent in developing countries. Even bringing this additional data to bear, however, the published findings of Crivelli et al. (2016) do not allow for a more granular understanding of the pattern of revenue losses.

There are also concerns over the revenue statistics which make up a central part of the dataset. Crivelli et al. (2016) use data on corporate income tax (CIT) revenues and statutory tax rates from the private dataset of the IMF's Fiscal Affairs Department. The recent creation of the ICTD–WIDER Government Revenue Database (GRD), which combines data from several major international databases and a new compilation from IMF Article IV and country staff reports, provides a potential alternative—and has also provided the basis for powerful criticism of the IMF dataset. A further data issue relates to the definition and treatment of 'tax havens', upon which the main results rest.

There are therefore three main issues with which the current paper is concerned. First, we set out to re-estimate the original findings, and then to test their robustness to the introduction of higher-quality revenue data and alternative series of effective tax rates. Our headline estimate is of revenue losses of around US$500 billion globally, compared to nearly US$650 billion in Crivelli et al. (2016). The majority of the reduction in the total

estimate relates to OECD countries, however, meaning that we also find an even greater differential in the intensity of losses suffered by lower-income countries. Secondly, we experiment with an alternative approach to defining 'tax havens', which enables us to check the robustness of their results in this regard—although a number of avenues remain for future research to explore here.

Finally, we offer a disaggregation of our results. Crivelli et al. (2016) provide results for two groups of countries only: OECD and non-OECD countries. Following re-estimation, we disaggregate to country level and demonstrate the underlying heterogeneity within these groups. Our research is thus not only a re-estimation of an earlier econometric study, but also an extension of global and regional comparative analysis that, through the presentation and regrouping of country-level estimates, allows for new insights into the geography of international corporate tax avoidance. These new insights might shed new light on the political economy of international corporate tax and, for example, why some countries may be more or less likely to support reforms of international tax rules.

The remainder of the paper is structured as follows. The next section presents briefly some additional findings from the literature, focusing on revenue loss estimates and the methodology of Crivelli et al. (2016). The third section presents the data used and a comparison to that employed in the original work. The fourth and fifth sections present the results of our re-estimation of the baseline regressions and revenue estimates, followed by a more detailed breakdown of revenue estimates for our preferred model. The final section concludes with a discussion of questions for further research.

9.2 Literature on revenue loss estimates

In this brief literature review, we focus on the revenue loss estimates of base erosion and profit shifting (BEPS) for lower-income countries. While the literature on international tax avoidance extends far wider, our focus here is on the narrow question of revenue losses—which is both the most high-profile aspect of research findings and, typically, the most controversial. As Crivelli et al. (2016) note, persuasive quantification of the revenue at stake through cross-border tax avoidance has proved elusive. Fuest and Riedel (2012) provide a critique of many of the estimates that had been made to that point.

In the aftermath of the global financial crisis, and the fiscal problems that followed in many countries, the public and policy makers alike focused greater attention on the tax avoidance of multinational companies. Researchers, too, addressed greater efforts to estimating the scale and nature of the associated tax losses.

Clausing (2016) finds that profit shifting by US-headquartered multinationals is likely to have cost that country alone between US$77 billion and US$111 billion by 2012, having

increased substantially over time. That trend and the overall scale of losses is supported by Cobham and Janský (2017) who use the same dataset to estimate global revenue losses in a range from US$130 billion to around US$200 billion. Both papers highlight the limitations of using data on activities of multinationals from one major economy only, but argue that this is preferable to current alternatives. In particular, Orbis, the leading database of company balance sheets has been shown to have such severe and systematic limitations through the under-representation of both lower-income countries and major profit-shifting hubs, that its use for global analysis cannot be supported (a finding supported by Cobham and Loretz (2014)).

Both Dharmapala (2014) and Hines (2014) discuss the relatively low values of estimated sensitivities of reported profits to tax rate differences, but without addressing the possibility of bias due to the Orbis data that underlies most of the studies they examine. Hines (2014) goes as far as to argue that estimates of 2 or 4 percent probably overstate the potential tax revenue to be had by eradicating BEPS, although this is focused on developed rather than developing countries. Earlier estimates focused on developed countries and not reliant on Orbis data do not appear consistent with this. Zucman (2014) estimates that profit-shifting to low-tax jurisdictions reduces the tax bill of US-owned companies by about 20 percent; and that US-owned companies would have paid $200 billion in additional taxes in 2013 if the effective tax rate paid had not fallen from 30 to 20 percent between 1998 and 2013. Clausing (2009) estimates that USD 60 billion was lost to profit shifting by United States MNEs in 2004, which represented 35 per cent of United States federal corporate income tax collections.

Some of the existing literature suggests that revenue costs might be particularly high for developing countries, with an overview of historical efforts stretching decades provided by Reuter (2012) and, more recently, Johannesen and Pirttilä (2016). This is supported by Fuest et al. (2011), who find evidence of larger profit shifting for developing countries. Specifically, they find that the effect of the host country corporate tax rate on the debt ratio of multinational affiliates in developing economies is positive and larger than the same effect for affiliates in developed economies. Answering a similar research question and arguing that Orbis has recently increased its coverage considerably in less developed countries, Johannesen et al. (2017) use it to find that profit shifting is more prevalent in less developed countries. They argue that this may explain why many developing countries opt for low corporate tax rates in spite of urgent revenue needs and severe constraints on the use of other tax bases. However, neither of the two studies extend their results to provide tax revenue loss estimates. Reynolds and Wier (2016) do extend their estimates to revenue but only for one country, South Africa, finding that profit-shifting lowers the tax–GDP ratio by 0.05 percentage points. If accurate, that would suggest South Africa is more successful than the United States, for example, in preventing abuse – or alternatively, it could indicate that South Africa operates as a hub for profit-shifting from elsewhere, reducing net losses to a negligible level. In contrast, we find in this paper that South Africa suffers losses of

between 1.6 and 1.9 per cent of GDP – substantial, although not near the top of the range we find for all countries.

Recent estimates have focused on estimating the revenue implications of a related phenomenon—the misalignment of profits and economic activity. Using the limited balance-sheet firm-level data for the developing countries, Cobham and Loretz (2014) showed a clear pattern of misalignment to the benefit of a small number of profit-haven jurisdictions, and to the detriment of lower-income countries in the sample. Cobham and Janský (2017) used the same data as Zucman (2014) – a comprehensive survey of the international operations of US-headquartered multinational groups – to reveal major misalignments for middle-income and other countries, with a number of small jurisdictions capturing a tax base disproportionate to their economic activity. They also found that a number of developing countries have a low share of US multinationals' profits relative to the economic activity located in them and that this has substantial revenue costs.

Researchers at international organizations have also made important recent contributions to the literature. UNCTAD (2015) used national-level data on returns to foreign direct investment to estimate the scale of revenue losses due to profit shifting through investment conduit jurisdiction. Lower-income countries were found to lose around US$100 billion a year to this one channel. Using firm-level Orbis data, OECD (2015) estimated a global loss of US$100 billion to US$240 billion in 2014, or 4 to 10 per cent of all CIT revenues (and up to US$2.1 trillion over 2005–2014). Hypothetically, a 'full' balance sheet dataset with equivalent coverage in lower-income countries and 'tax havens', might be expected to yield sharply higher estimates under this approach.

It is in this context that the estimates of long-run revenue costs of the IMF's Crivelli et al. (2016) have provided an important point of reference and, for that reason, it is the re-estimation and extension of their work to which this paper is addressed. The authors estimate spillover equations of the following form:

$$b_{it} = \lambda b_{i,t-1} + \varphi \tau_{it} + \gamma W_{-it} \tau_{-it} + \xi X_{it} + \alpha_i + \mu_t + \varepsilon_{it} \qquad (9.1)$$

where b_{it} denotes the corporate tax base in country i in time t, τ_{it} the domestic tax rate, W_{-it} a weighted average of the tax rates in countries $j \neq i$ (a number of versions are defined below), X_{it} a vector of controls, while α_i and μ_t are, respectively, country-specific and time-specific effects. Equation (1) is extended in this paper to consider, more specifically, spillovers by country size, using a measure of 'GDP-weighted' statutory tax rates (weighting tax rates by GDP); by the tax haven list, with 'haven-weighted' rates (an unweighted average of tax rates only in those countries that are included in the list of tax havens); by geographic proximity to obtain 'distance-weighted' rates (weighting tax rates by the inverse distance between capitals); and alternatively with average effective tax rates.

Those estimations allow, in turn, revenue loss estimates to be made at the country level. For profit-shifting losses, this is achieved by 'turning off' the effects on tax bases of

avoidance via havens, and calculating the revenue effect as the implied change in tax base multiplied by the applicable tax rate. The *short-run* revenue (in per cent of GDP) lost by country *i* in period *t* as a consequence of profit shifting through tax havens can be estimated as:

$$L_{it} = \tau_{it}\hat{\varphi}(\tau_{it} - W^h\tau_{-it}) \tag{9.2}$$

where, per equation (1), $\hat{\varphi}$ is the estimated coefficient on the tax term (imposing equality of coefficients on own and spillover effects, separately for OECD and non-OECD groups, the restricted coefficients from Table 3) and $W^h\tau_{-it}$ denotes the haven-weighted average tax rate. Long-run estimates are obtained as:

$$LL_{it} = \tau_{it}\hat{\varphi}(\tau_{it} - W^h\tau_{-it})/(1 - \hat{\lambda}) \tag{9.3}$$

where $\hat{\lambda}$ is the estimated coefficient on the lagged corporate tax base.

According to Crivelli et al. (2016), thus defined, the loss can be thought of as answering the question: How much revenue would country *i* gain, if opportunities for profit shifting were to be eliminated by raising the average rate in tax havens to the level of its own?

The empirical answer by Crivelli et al. (2016), and thus by us in this paper, relies on a number of assumptions, some of which are tested by Crivelli et al. (2016) and discussed here. For example, most variables in the model might be endogenous, but Crivelli et al. (2016) find that allowing all controls to be potentially endogenous yields broadly similar results. Also, various assumptions are inherent in the different weightings of rates. In the case of haven-weighted rates, the assumption is implicit that it is equally easy to use any haven for profit-shifting (highlighting a weakness of using a relatively long list with many havens of various importance), but impossible to use other countries for it (in contrast, highlighting a weakness of using a relatively short list of havens and thus excluding some other havens). In this and other cases such as the quality of revenue data and average effective tax rates, we empirically investigate the assumptions and provide robustness checks.

9.3 Data

We are grateful to the IMF researchers for providing us with their dataset and code, and for discussing freely their approach. Crivelli et al. (2016) report 173 countries over the 1980–2013 period; with alternative data, detailed below, we arrive at an unbalanced dataset of 49 to 120 countries over the same period. We make equivalent changes to the data, including interpolation of the tax rate series for years with missing tax rates, for the construction of weighted average tax rates, and we update the data on distances and GDP.[2]

We follow Crivelli et al. (2016) in excluding resource-rich countries from the exercise in the sense that their tax bases are not treated as dependent variables, since they will likely have distinct drivers and reflect a variety of distinct tax design choices; the tax rates set by these countries are, however, included in constructing the various average tax rates used as explanatory variables. We follow this approach and use the same group of resource-rich countries.[3]

Our data differ in three areas. Most importantly, we introduce revenue data from the ICTD–WIDER Government Revenue Database (GRD). The GRD was created in response to the absence of a consistent, high quality, public data source for revenues. As the creators at the International Centre for Tax and Development (ICTD) set out (Prichard et al. 2014), no pre-existing source met these criteria. The set of papers published at the launch of the GRD confirmed both issues with the quality of data in IMF studies and the failure of multiple researchers to replicate the results of a number of papers by researchers in the IMF Fiscal Affairs Department. The subsequent publication of a version of the IMF dataset marked an important step towards transparency, although it also confirmed that crucial issues remain—such as inconsistent GDP series (McNabb 2016).

[2] We use CEPII data on distances to construct the inverse-distance-weighted average CIT rates. However, some countries' distances are not available and in those cases we assigned one of the neighbouring countries with the closest capitals instead: Montenegro (Bosnia and Herzegovina), Kosovo (Macedonia), and San Marino (Italy). Furthermore, instead of using data on GDP from the IMF World Economic Outlook (WEO), we use the World Bank's World Development Indicators data when we extend the sample because of incomplete WEO data (specifically its series on GDP per capita in constant 2005 USD).

[3] These are defined as: Bahrain, Chad, Republic of Congo, The Islamic Republic of Iran, Kazakhstan, Kuwait, Libya, Mexico, Nigeria, Norway, Oman, Russian Federation, Saudi Arabia, Syrian Arab Republic, Trinidad and Tobago, United Arab Emirates, Venezuela, and Yemen. However, the grounds for using this specific group of resource-rich countries is not clear. For example, Algeria, Angola, Australia, Brunei Darussalam, Ecuador, Equatorial Guinea, and Mongolia are not included in the resource-rich country list, despite having substantial natural resources. We leave robustness checks in this area to future research, which might use various definitions of resource-rich countries for their exclusion, or could include them in the regression analysis but with a dummy variable for the group, to enable them to vary (although this does not fully allow for distinct drivers and tax design choices as argued by the authors).

The drawbacks of the IMF's revenue data are not the only reasons to use the GRD. One of the GRD's strengths is a better coverage for some countries and years. The GRD also explicitly states a hierarchy for its country-specific data sources with preferences given to sources with more years and more detailed disaggregation of revenues. Furthermore, the GRD explicitly informs its users when some estimates seem problematic, due to their credibility or other issues. As long as there is a sufficient attention given to the ongoing updates of the GRD, it should remain a valuable source of revenue data for developing countries, either on its own or in combination with the IMF's data – a strategy we follow here.

In addition, we introduce alternative data on average effective tax rates (AETR) and on the definition of 'tax havens'. Crivelli et al. (2016) use AETR data from Abbas and Klemm (2013) that are available only for 43 countries over the period 1996–2007.[4] We consider other estimates, from the Orbis data used by Cobham and Loretz (2014) and the Bureau of Economic Analysis data on US-headquartered multinationals used by Cobham and Janský (2017).

For 'tax haven' definitions, the IMF authors rely on a list created by Gravelle (2013), on the basis of observed phenomena from a US perspective. In a similar line, we consider the alternative list of the six major profit misalignment jurisdictions of the Netherlands, Ireland, Luxembourg, Bermuda, Switzerland, and Singapore, identified for US-headquartered multinationals by Cobham and Janský (2017). This alternative data-driven list has its disadvantages (e.g. it excludes a number of countries often considered tax havens such as Cayman Islands)[5] as well as advantages (included are only six of some of the tax havens most important for multinationals, which might account for most corporate activities by tax havens globally, in contrast with longer tax haven lists which might give unwarranted weight to small unimportant havens). In short, we use the two lists, based on Gravelle (2013) and Cobham and Janský (2017), as two alternatives and robustness checks for each other, rather than preferring one strongly over the other.

Additional alternatives for future research could include measures based on the secrecy score component of the Tax Justice Network's Financial Secrecy Index. The index and its approach are detailed in Cobham et al. (2015), which also sets out the risks of systematic biases in 'tax haven' lists and the related problem of there being no accepted definition or objectively verifiable criteria for tax havenry. As both Ireland and the Netherlands demonstrate, however, there are jurisdictions with a fair degree of financial transparency

[4] Argentina, Botswana, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Czech Republic, Ecuador, Egypt, Estonia, Ghana, Hong Kong SAR, Hungary, India, Indonesia, Israel, Kenya, Korea, Latvia, Lithuania, Malaysia, Mauritius, Morocco, Namibia, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Senegal, Singapore, South Africa, Sri Lanka, Tanzania, Thailand, Turkey, Uganda, Ukraine, Uruguay, and Zambia.

[5] (Dowd et al. 2017) use IRS firm-level filings to identify a near-identical list of key profit-shifting jurisdictions for the US: Bermuda, the Cayman Islands, Ireland, Luxembourg, the Netherlands, and Switzerland. Unfortunately, Cayman data is not provided in the BEA's public disaggregation.

in other areas, which offer relatively targeted means to achieve effective tax rates much lower than their statutorily determined level. A more specific definition may eventually be needed, such as a specific ranking based on objectively verifiable criteria for corporate profit-shifting havens. Average effective rates may offer a way in, to determine the 'haven' list, or alternatively aggregated data from multinationals' country-by-country reporting if this is eventually required to be made public.

Table 9.1 displays the descriptive statistics for the original sample and our own, which appear broadly similar in many cases. However, there are important differences which are more easily seen in Figures 9.1A–9.4A in the Appendix. Table 9.2 summarizes the three alternatives to the original approach.

Figure 9.1A displays revenue from the CIT in per cent of GDP and Figure 9.2A shows CIT rates, both across the period from 1980–2013 for various groups of countries. Figure 9.3A shows values of AETRs, estimated as the ratio of corporate tax to gross profit, based on the Bureau of Economic Analysis data used by Cobham and Janský (2017). Figure 9.4A shows estimates of haven-weighted AETRs using data from various sources. Crivelli et al. (2016) use two versions of AETRs and we estimate a haven-weighted average for each of them (i.e. AETR1 and AETR2 in Figure 9.4A).[6] We create two averages using the Bureau of Economic Analysis data used by Cobham and Janský (2017): one standard and one 5-year moving average to smooth out some sharp changes over the time (i.e. AETR3 and AETR4 in Figure 9.4A). The final two are based on the Orbis data used by (Cobham and Loretz 2014)—the first one is based on averages of companies in a given country in a given year, whereas the second one is estimated as the total of taxes reported by the total of profits reported in a given country in a given year (i.e. AETR5 and AETR5 in Figure 9.4A).

[6] One likely minor issue is that in the Stata do file kindly provided, 28 is used as the number of tax havens, but in the data there are up to 31 such jurisdictions (with two of them, Montserrat and San Marino, having data for only 2012 and 2013). The denominator does not appear to vary accordingly by year.

Table 9.1: Descriptive statistics

	Observations	Mean	Max.	Min.	Std. Dev.
Crivelli et al. (2016)					
Statutory CIT rate, in per cent	2185	33.33	61.80	2.00	9.65
GDP-weighted average tax rate, in per cent	2185	38.56	48.04	29.16	4.82
Haven-weighted average CIT rate, in per cent	2185	28.24	35.39	21.34	4.20
Inverse-distance-weighted average CIT rate, in per cent	2185	31.32	41.21	18.60	4.64
CIT revenue, per cent of GDP	2185	2.73	16.54	0.00	1.73
OECD countries	893	2.80	8.02	0.26	1.26
Non-OECD countries	1292	2.68	16.54	0.01	1.98
CIT base, per cent of GDP	2185	9.03	70.97	0.00	6.75
OECD countries	893	8.75	29.99	1.06	4.61
Non-OECD countries	1292	9.22	70.97	0.00	7.89
AETR, in per cent	391	22.86	40.27	-11.61	9.19
GDP-weighted AETR, in per cent	391	21.26	23.74	19.00	1.49
Agricultural value-added, per cent of GDP	1847	11.74	64.05	0.04	10.74
GDP per capita, 2000 USD	1995	13235	87717	127	15298
Trade openness, per cent of GDP	1999	78.87	436.95	6.32	45.03
Inflation, in per cent	1950	36.10	11749.64	-4.47	366.03
Additional data					
CIT revenue, per cent of GDP (GRD)	2129	2.57	11.20	0	1.48
OECD countries (GRD)	962	2.76	7.87	0	1.29
Non-OECD countries (GRD)	1167	2.41	11.20	0.01	1.61
CIT base, per cent of GDP (GRD)	2129	8.60	64.88	0	6.08
OECD countries (GRD)	962	8.74	29.11	0	4.68
Non-OECD countries (GRD)	1167	8.49	64.88	0.02	7.02

Notes: Showing observations for non-resource-rich countries.

Source: Authors' calculations based on data from Crivelli et al. (2016) and the GRD.

Table 9.2: The versions of estimates

Model component	Alternatives
Tax revenue data	IMF or GRD
Average effective tax rates	Six versions in all, two versions from each of the three following sources: data from Crivelli et al. (2016) using estimates by (Abbas and Klemm 2013); the Orbis data used by (Cobham and Loretz 2014); and the Bureau of Economic Analysis data used by Cobham and Janský (2017).
Tax haven list	(Gravelle 2013) or Cobham and Janský (2017)

Source: Authors.

9.4 Results

This section presents our regression estimates. The results below show the estimated parameters of equation 9.1 discussed in section 9.2 above.

Table 9.3 presents the main regression results. Table 9.3 corresponds to its counterpart in the paper of Crivelli et al. (2016), presenting the baseline spillover regressions for various versions. The six estimated regressions differ in the tax revenue and rate data used, as summed up in Table 9.2, with only the tax haven list being the same one for all six specifications. In all results in Table 9.3, we use the tax haven list of Gravelle, i.e. in line with Crivelli et al. (2016).[7] Table 9.3 shows two sets of regressions—the first three re-estimated using the data provided by the authors, and the second three using GRD revenue data. The results across the two revenue data sets are quite similar. In each case, the results are presented in sets of three regressions—one for all countries, one for OECD members, and one for other countries.

A comprehensive set of results for all of the various versions outlined in Table 9.2, including the average effective tax rates and a different list of tax havens, is given in Appendix Table 9.1A. The results based on those various approaches differ to some extent, as would be expected, from those reported in Crivelli et al. (2016). In addition, they are generally less likely to obtain statistical significance. The own rate effects are often statistically insignificant (and in some cases positive). The haven-weighted rate is often insignificant. For the sake of consistency with Crivelli et al. (2016), we use the sets of results presented in Table 3 to re-estimate the revenue cost of BEPS below.

[7] The reason for the use of agriculture in only certain models is not clear, but we replicate the original approach here in order to allow full comparison of the results.

Table 9.3: Base spillovers by income level, 'haven'-weighted tax rates

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Base	Base	Base	Base	Base	Base
Data for base	IMF	IMF	IMF	GRD	GRD	GRD
CIT base, lagged	0.906***	0.768***	0.873***	0.971***	0.770***	0.840***
	(.0623)	(0.0552)	(0.0692)	(0.0599)	(0.0522)	(0.0680)
CIT rate	-0.0918**	-0.0596	-0.123*	-0.0926**	-0.0673	-0.135*
	(0.0193)	(0.108)	(0.0525)	(0.0345)	(0.133)	(0.0572)
CIT rate, haven weighted	0.352**	0.342*	0.515*	0.289*	0.254	-0.00734
	(0.0300)	(0.0528)	(0.0684)	(0.0832)	(0.158)	(0.983)
Inflation (log)	0.144	-0.0625	0.136	0.725*	-0.102	0.293
	(0.688)	(0.793)	(0.732)	(0.0936)	(0.650)	(0.521)
Trade openness	0.0403**	-0.0211	0.00758	0.0120	-0.0246**	0.00860
	(0.0373)	(0.137)	(0.651)	(0.441)	(0.0181)	(0.606)
GDP per capita (log)	0.0924	0.448	1.334	0.394	0.574	2.114*
	(0.945)	(0.711)	(0.403)	(0.705)	(0.633)	(0.0510)
Agriculture		-0.134			-0.113	
		(0.311)			(0.400)	
Time trend	0.165**	0.157*	0.267**	0.131*	0.0893	0.0842
	(0.0325)	(0.0615)	(0.0430)	(0.0987)	(0.222)	(0.591)
Constant	-339.5**	-321.5*	-554.5**	-271.4	-184.4	-179.8
	(0.0349)	(0.0712)	(0.0407)	(0.101)	(0.225)	(0.577)
Observations	1,687	624	949	1,602	649	829
Number of countries	103	28	72	101	29	69

Source: Authors' calculations based on data from Crivelli et al. (2016) and the GRD.

Notes: We tested, similarly to Crivelli et al. (2016), the restriction that $\hat{\varphi} = -\gamma$ with the null hypothesis that the base spillover and the own-tax effects are identical but with opposite sign. P-values from the testing for the six specifications are: 0.0977, 0.0939, 0.1734, 0.8138, 0.5983, 0.9825. The null hypothesis is not rejected for any of the regressions in Table 3 at the 0.05 significance level, and only barely in two cases at the 0.10 significance level. Imposing the restriction, which should then lead to an improvement in efficiency in most cases and is significant at the 0.05 level for four out of the six specifications.

In estimating the revenue costs of BEPS, we follow the approach explained in equations 9.2 and 9.3 in section 9.2 and, in line with Crivelli et al. (2016), we use two sets of estimates parameters, one for OECD members and the other for non-members, and use the country- and year-specific values of tax rates. We start with restricted coefficient estimates (not reported in Table 9.3 since these are obtained by an additional estimation). These coefficients are reported in Table 9.4 (and later used in Tables 9.5 and 9.6, plugged in as described in equations 9.2 and 9.3 in section 9.2) for combinations of OECD and non-OECD groups and three sets of estimates: (i) the published estimates of Crivelli et al. (2016); (ii) our re-estimations of Crivelli et al. (2016) using their data, which are close but not precise; and (iii) our re-estimations of Crivelli et al. (2016) using the GRD data, which show wider differences. For these combinations, we then present the re-estimated illustrative short-run and long-run revenue loss calculations for 2013 in Tables 5 and 6,

respectively, and corresponding to equations 9.2 and 9.3 in section 9.2, respectively. The GRD-based estimates for OECD countries are somewhat lower due to its estimate of $\hat{\varphi}$, the estimated coefficient on the tax term in Table 9.3, being only two-thirds of the estimates based on IMF revenue data. It follows that non-OECD countries are affected twice as much as OECD countries in terms of GDP, according to these GRD-based revenue estimates.

Table 9.4: Restricted coefficient estimates derived from results in Table 3, 2013

	$\hat{\lambda}$ OECD	$\hat{\varphi}$ OECD	$\hat{\lambda}$ Non-OECD	$\hat{\varphi}$ Non-OECD
Published estimates	0.784	0.053	0.864	0.148
Re-estimations, same data	0.786	0.053	0.874	0.140
Re-estimations, GRD data	0.797	0.034	0.851	0.143

Source :Authors' calculations based on data from Crivelli et al. (2016) and the GRD.

Table 9.5: Re-estimating the illustrative short-run revenue loss calculations for 2013

	% of GDP OECD	Billion USD OECD	% of GDP Non-OECD	Billion USD Non-OECD
Published estimates	0.207	95	0.178	28
Re-estimations, same data	0.208	95	0.183	28
Re-estimations, GRD data	0.134	61	0.189	29

Source :Authors' calculations based on data from Crivelli et al. (2016) and the GRD.

Table 9.6: Re-estimating the illustrative long-run revenue loss calculations for 2013

	% of GDP OECD	Billion USD OECD	% of GDP Non-OECD	Billion USD Non-OECD
Published estimates	0.960	439	1.316	208
Re-estimations, same data	0.971	443	1.458	223
Re-estimations, GRD data	0.660	301	1.264	193

Source: Authors' calculations based on data from Crivelli et al. (2016) and the GRD.

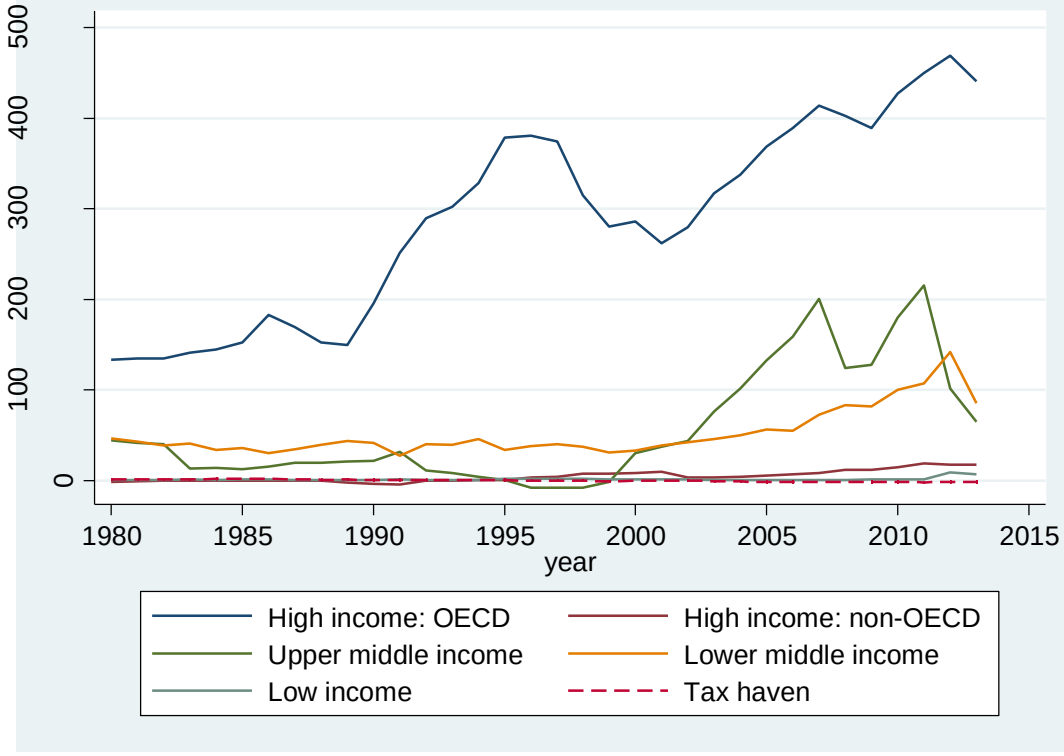
9.5 Disaggregated revenue loss estimates

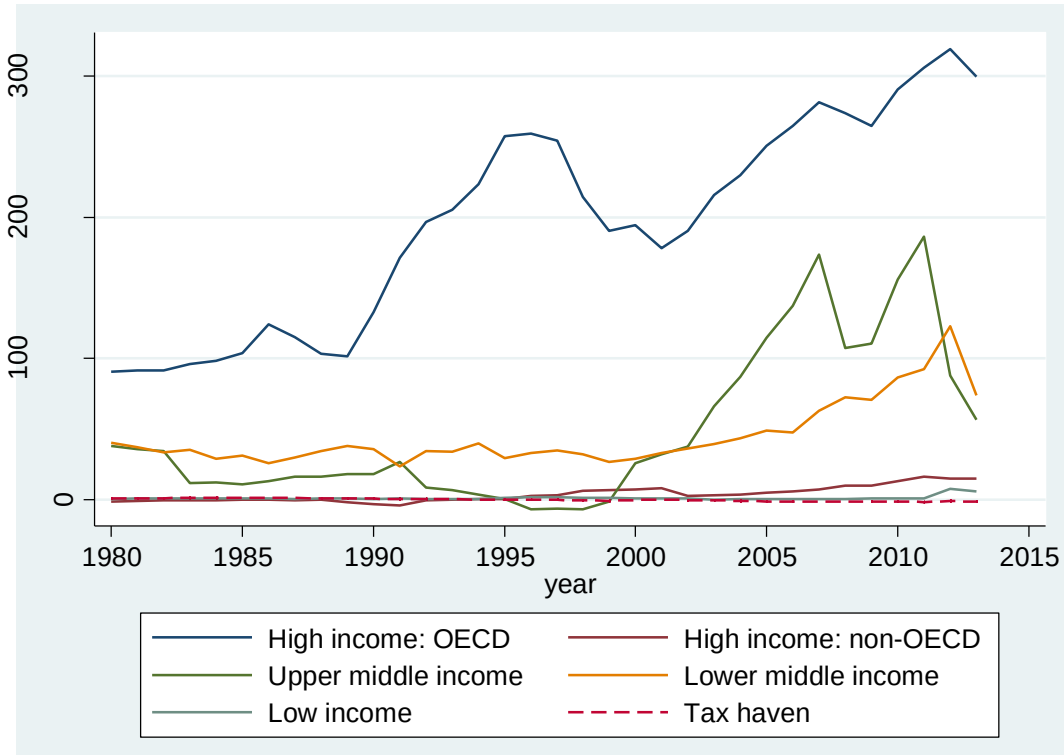
We focus now on the long-term estimates of the revenue (in per cent of GDP) lost by each country *i* in period *t* as a consequence of profit shifting through tax havens in 2013, i.e. LL_{it}. We show various graphs by regions, income groups, and over time for both relative values in per cent of GDP and absolute values in US dollars (after multiplying the former with GDP in US dollars). In each case, we provide the comparison of our re-estimation of Crivelli et al. (2016) (referred to in graphs as IMF) and their re-estimation with the GRD data (referred to as GRD).

Consider first the broad patterns over time, using the original division into OECD and non-OECD groups (the label 'o' refers to OECD, 'n' to non-OECD countries). Figure 9.5A in the Appendix demonstrates the rise of profit shifting over time. The IMF and GRD estimates for non-OECD countries are much more closely aligned than those for OECD countries, although the trends are similar in both. Also at the country level, the IMF- and GRD-based estimates do not differ much. Indeed, the correlation coefficient of the two revenue estimates based on different data is indeed very high, above 0.99 – even though individual outlying differences, where for example there are discrepancies in underlying GDP source, can be large indeed. As we see below, these differences can have substantial effects on the eventual findings.

Figure 9.1 below provides a more detailed breakdown of the same results, still in terms of dollars. The OECD countries are the biggest absolute losers, but low and lower middle-income countries see strong growth in losses during the commodity boom of the 2000s. Figure 9.2 shows the strikingly different pattern in terms of shares of GDP. Low- and lower middle-income countries face consistently the heaviest losses, but these are less extreme, and less volatile, moving from each decade to the next.

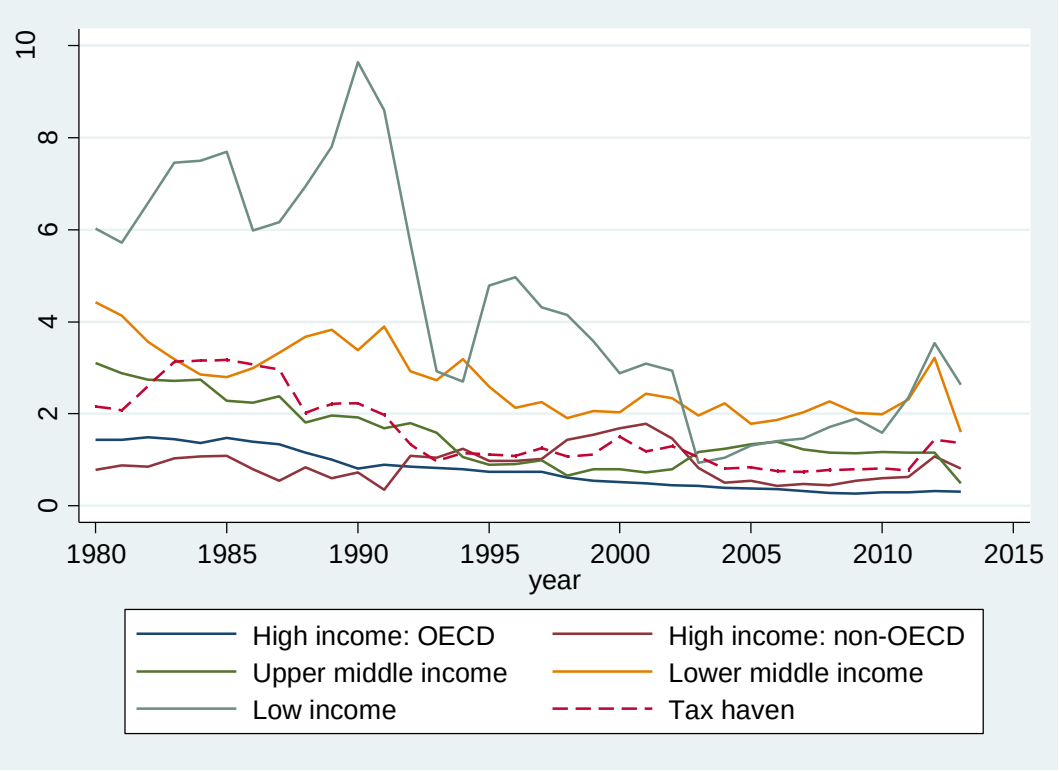
Figure 9.1: Revenue loss estimates over time, US$ billion, by income group (first IMF, second GRD)

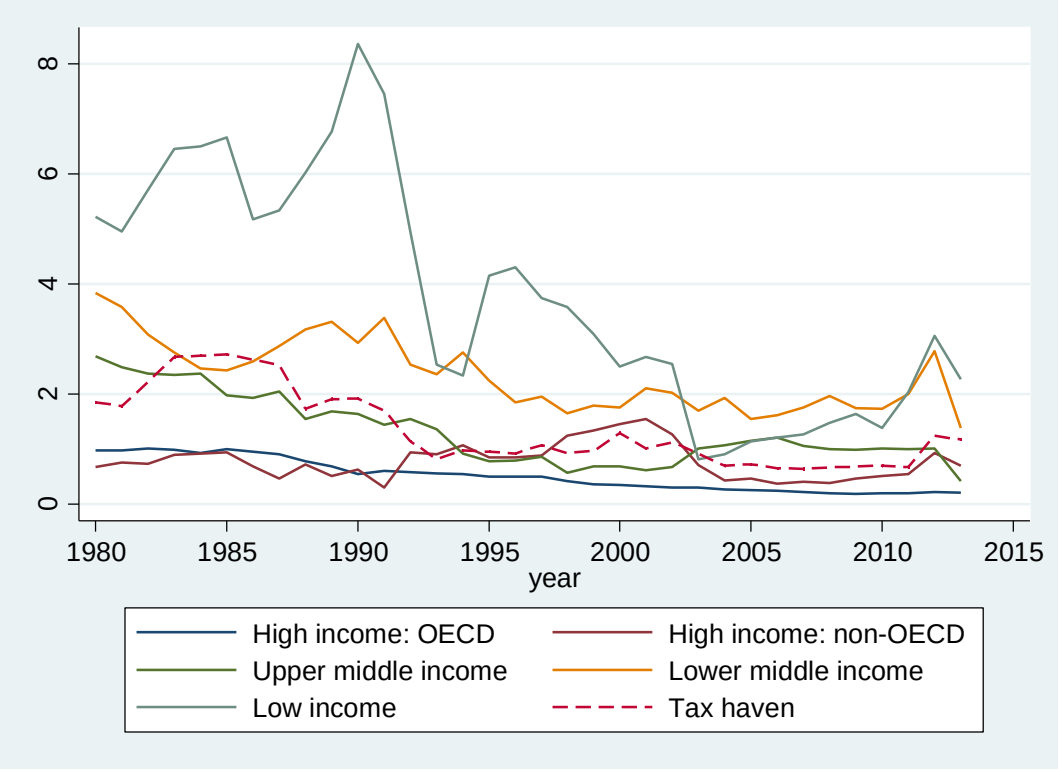




Source: Authors' calculations based on data from Crivelli et al. (2016) and the GRD.

Figure 9.2: Revenue loss estimates over time, % of GDP, by income group (first IMF, second GRD)





Source: Authors' calculations based on data from Crivelli et al. (2016) and the GRD.

Recall that the basic logic behind the estimate of the revenue cost of BEPS is that it is the implied change in corporate tax bases from 'turning off' the haven channel, multiplied by the applicable CIT rate to produce an estimate in per cent of GDP. Interestingly, this is independent of the CIT revenue of a given country in a given year—it depends only on the CIT rate (and on the level of GDP, if we wish to consider absolute values in currency terms). The implied change in corporate tax bases depends for each country and year on the value of CIT rate relative to the haven-weighted average.

This difference, shown in Figure 9.3, is also what seems to be driving most of the results over time, i.e. the decreasing cost of BEPS as a share of GDP. When considered in US dollar terms, the steady rise of world GDP over the past three decades acts as a counterweight to the decreasing difference between the 'haven' and 'non-haven' tax rates, resulting in a degree of stability in the estimated costs of BEPS over time.

This might be viewed as evidence that lowering corporate tax rates is an effective tool against avoidance. Narrower studies, however, such as Cobham and Janský (2017) and Clausing (2016) provide evidence that profit shifting has grown strongly—even as effective tax rates have fallen sharply. Cobham and Janský (2017) document effective tax rates for US-headquartered multinationals of 0–5 per cent in the major misalignment jurisdictions to which most profit is shifted, compared to 15–20 per cent in the USA and other economies on average. The issue may then be an artefact of the methodology, relying on differentials in statutory rates while incentives are driven instead by *effective* rates. Future research might go further in exploring whether other data sources for effective rates can generate regressions with stronger results than we found in section 3. Similarly, future research should go further in exploring how this approach might be adjusted so that the CIT rate is less important and the currently observed CIT revenue is given more prominence.

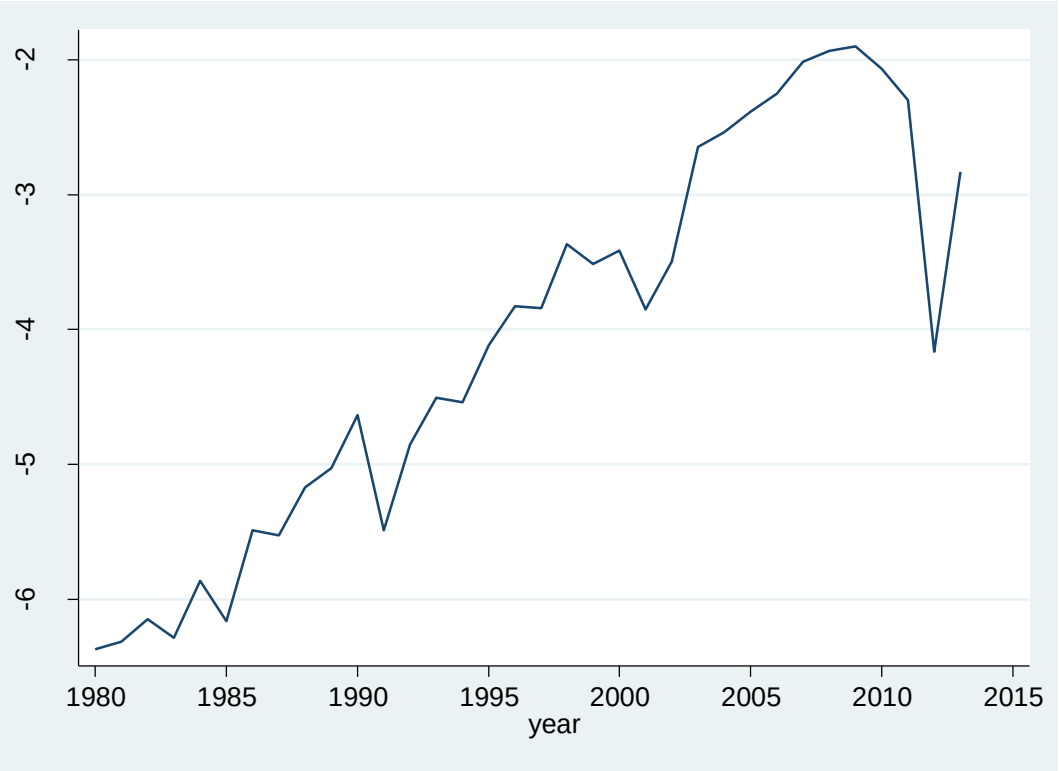
As noted, one strength of the approach here is that more disaggregated results can be obtained, and we present some of these now. Figure 9.4 shows the pattern of losses by region and by income group, as a share of GDP. Despite the differences in underlying IMF and GRD revenue data, the rankings are relatively consistent. Sub-Saharan Africa, Latin America and the Caribbean, and South Asia suffer relatively intense losses, and lower middle-income and, above all, low-income countries.

Table A2 in Appendix shows the detailed country-level findings for revenue losses for 2013. Using the more conservative GRD results, 14 countries from Argentina to Zambia face losses of between 3 per cent and 7 per cent of their GDP. A further 38 countries, from Bhutan to the USA, face losses of between 1 per cent and 3 per cent of their GDP. At the same time, 22 countries appear to make revenue gains greater than 1 per cent of GDP from profit shifting—from the more likely (e.g. Cyprus and Lebanon) to the less so (e.g. Iraq and Brazil). The consistency of the IMF and GRD-based estimates is noticeable. So too is the somewhat mechanical nature of the estimate, with groups of countries with the same statutory rate showing the same estimated losses as a share of their GDP. In addition, the

detail of the figure reveals many unexpected placings in the overall ranking. Those that gain include more than 40 countries—most not generally considered to benefit from profit shifting, nor to actively seek it. Those that lose most are generally lower-income countries, including notable commodity exporters, but also a curiosity in the European secrecy jurisdiction of Malta.

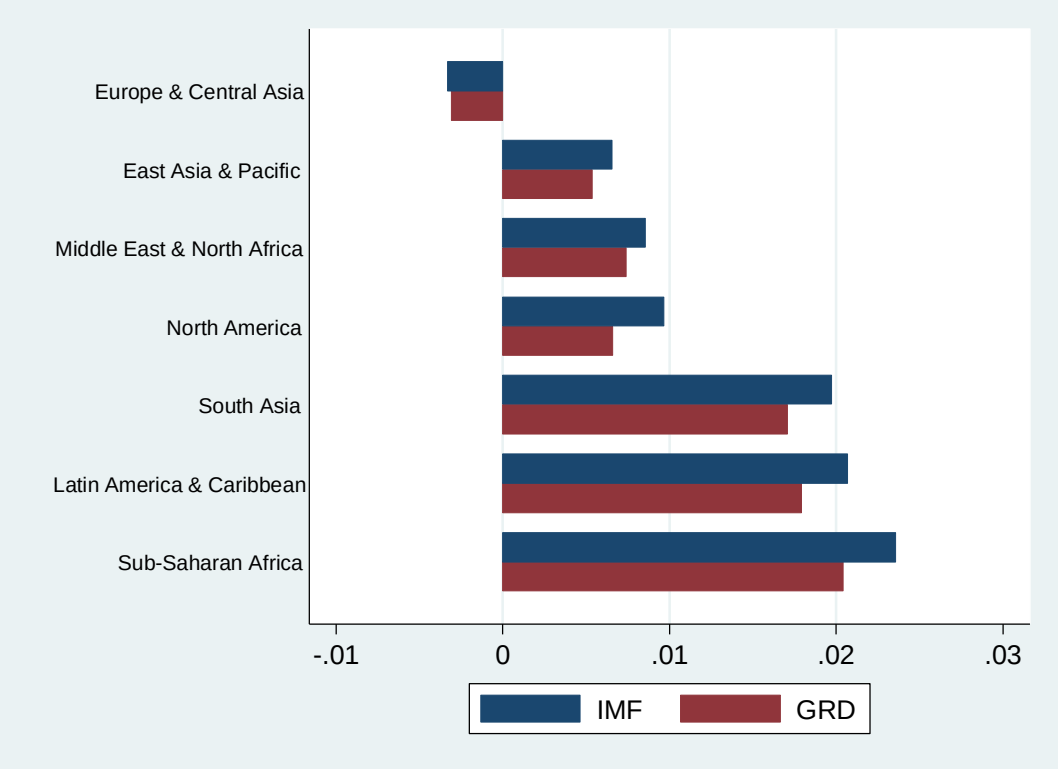
Regarding the uncertainty in the results, it is possible to approximate the standard errors underlying the country-specific revenue estimates. In line with Crivelli et al. (2016), we estimate the one standard deviation range. For this, we need the standard errors of the estimated parameters employed in the estimation of revenue costs. Evaluating the uncertainty in the short-run estimates, we suffice with the standard error of $\hat{\varphi}$ from the relevant GRD-based constrained regression. For OECD countries, the one-standard deviation range for the short-run revenue estimates is thus between -0.0019465 and 0.0700503, around the actual point estimate of 0.0340519. For non-OECD countries the range is between 0.074475 and 0.2123252, around the actual point estimate of 0.1434001. To evaluate the uncertainty in the long-run estimates, we further need the standard error of $\hat{\lambda}$ from the same regression and we use the equation 3 above ($\hat{\varphi}/(1-\hat{\lambda})$) to obtain the approximations of standard errors. In this approximation, we assume that there is no relationship between $\hat{\varphi}$ and $\hat{\lambda}$ (for a more complex estimates, the covariance matrix from the restricted regression coupled with bootstrap could be used). Using this assumption, we obtain that the one-standard deviation range for the long-run revenue estimates between -0.007891781 and 0.43713845, around the point estimate of 0.167373808, for OECD countries and a range between 0.326959651 and 3.033407814, around the point estimate of 0.96314075, for non-OECD countries. All in all, the ranges are quite wide and especially so for long-term estimates and OECD countries. Nevertheless, wide confidence bands are standard in the literature and the intervals that we obtained are in line with confidence intervals in Crivelli et al. (2016). In other words, even with these relatively rigorous estimates, there is substantial uncertainty regarding the estimates of revenue cost.

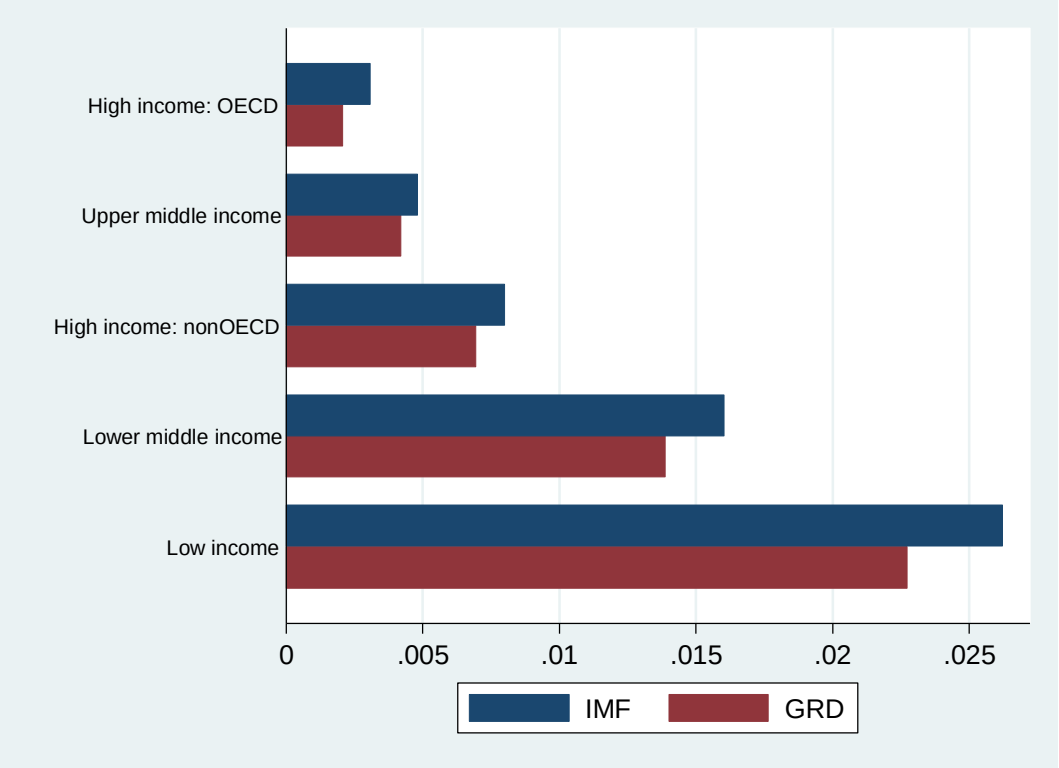
Figure 8.3: Average difference between corporate tax rate and haven-weighted average (in percentage points)



Source: Authors' calculations based on data from Crivelli et al. (2016) and other sources described in the text.

Figure 8.4: Average losses/GDP by region and by income





Note: IMF and GRD refer to the mean values of revenue loss estimates using IMF and GRD data, respectively.

Source: Authors' calculations based on data from Crivelli et al. (2016) and the GRD.

9.6 Conclusion

In this paper, we re-estimate the work of Crivelli et al. (2016) and, to a large extent, confirm their findings. We establish their broad robustness to the use of alternative government revenue data and explored, with less success, changes to the definition of 'tax havens' used and to average effective tax rates. In addition to contributing to the academic research on this important subject, our contribution can be considered an open-source robustness check of Crivelli et al. (2016), using the widely available GRD. In addition, we publish with this paper the full detail of country-level revenue loss estimates for our preferred model, as a contribution to more granular policy analysis and to further research.

There is clearly space to develop a methodological approach which goes beyond statutory tax rates, and responds more closely to the actual incentives that multinationals face for profit shifting. But the central findings of this leading analysis of global tax avoidance by multinational companies appear broadly solid. The estimated tax loss with the preferred GRD data is around US$500 billion, compared to US$650 billion in the original paper.

In addition, and especially strongly with our preferred revenue data, the intensity of losses is substantially greater in low- and lower middle-income countries; and in sub-Saharan Africa, Latin America and the Caribbean, and in South Asia compared to other regions. Notwithstanding the scope for further challenges and improvement to the methodology and data over time, this appears to offer broadly compelling evidence of two important points: that lower-income countries in general suffer more intense corporate tax avoidance (even before considering their greater reliance on tax revenues from CIT); and that there are substantial variations among countries by income and by region, such that policy makers should pay close attention to their specific situation.

At the global level, policy makers such as those at the G77 should consider whether to pursue an internationally representative tax body to allow consideration of rule changes that would benefit those who suffer the greatest losses. The immediate research agenda points to working more effectively with existing data, as indicated above. The real breakthrough, however, is likely to come only when multinationals' country-by-country reporting data is made public, and the full extent and nature of the misalignment between profits and the location of real economic activity is laid bare. While there is scope to refine further estimates of the type presented here, the substantial uncertainty associated will only be diminished when this comprehensive data is made available.

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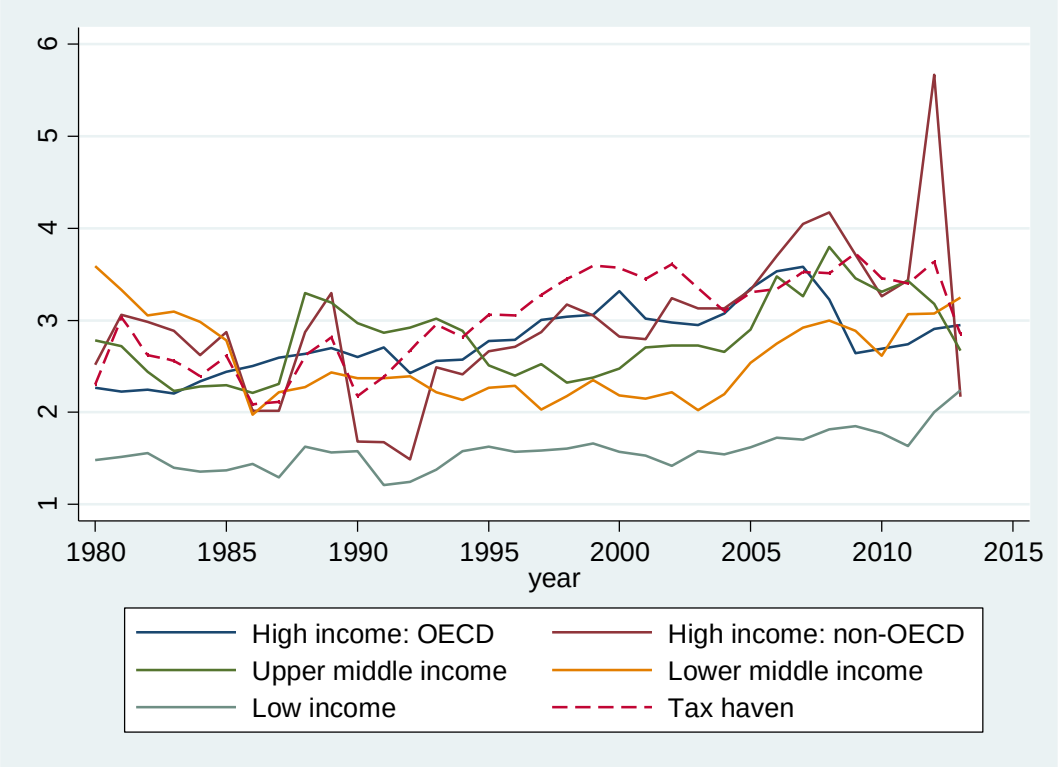
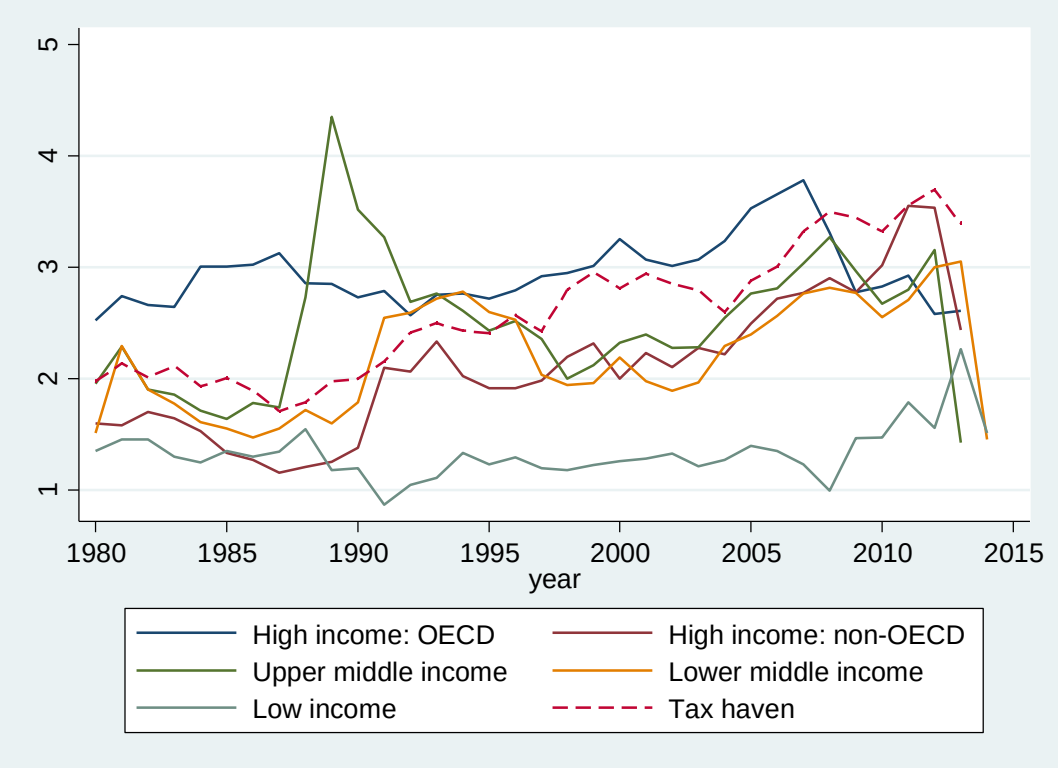
9.8 Appendix

Figure 9.1A: Revenue from corporate income tax, in per cent of GDP

(a) IMF data

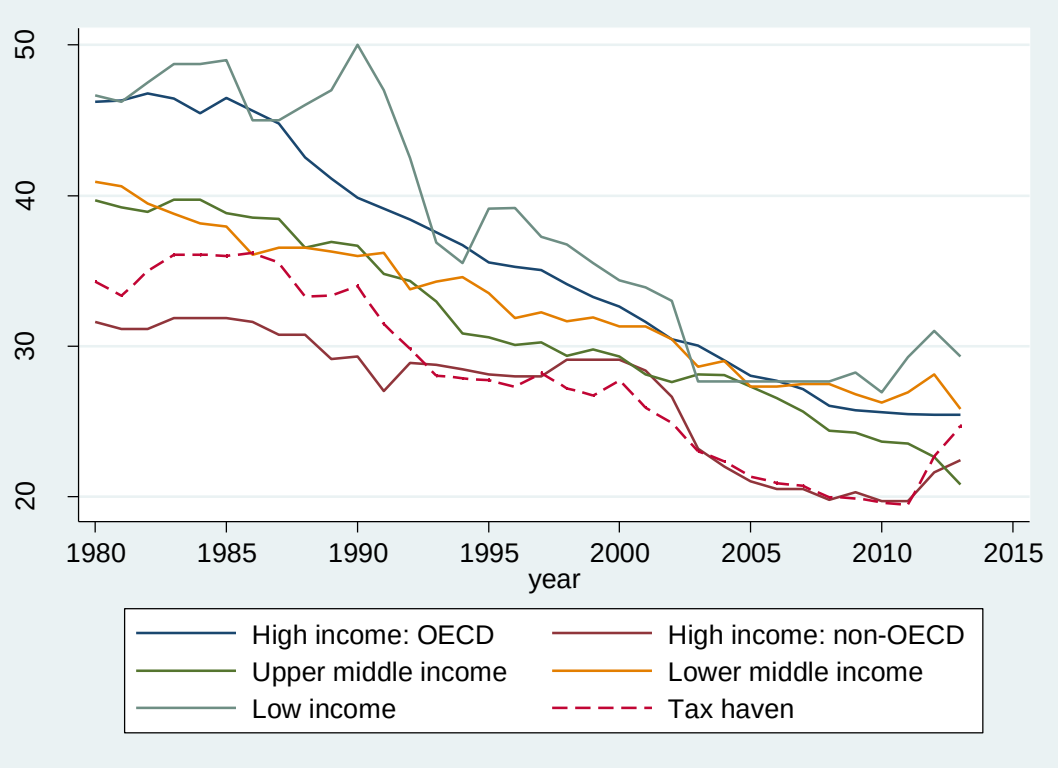


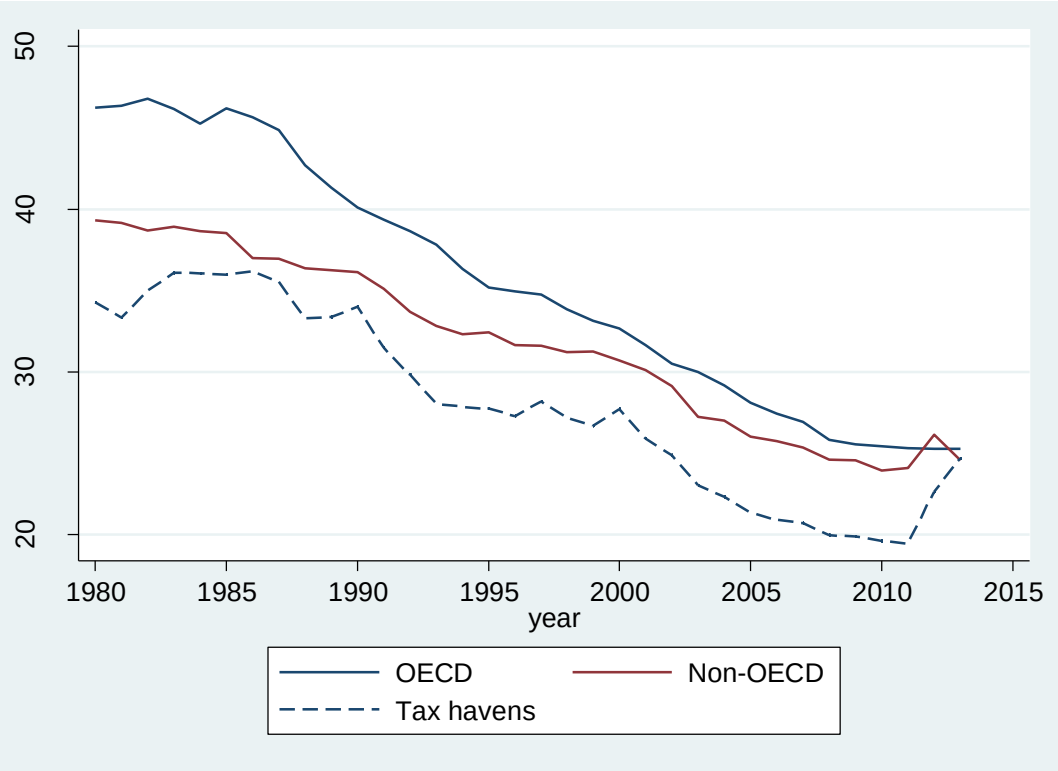
(b) GRD data



Source: Authors' calculations based on data from Crivelli et al. (2016) and the GRD.

Figure 9.2A: Corporate income tax rates, 1980–2013

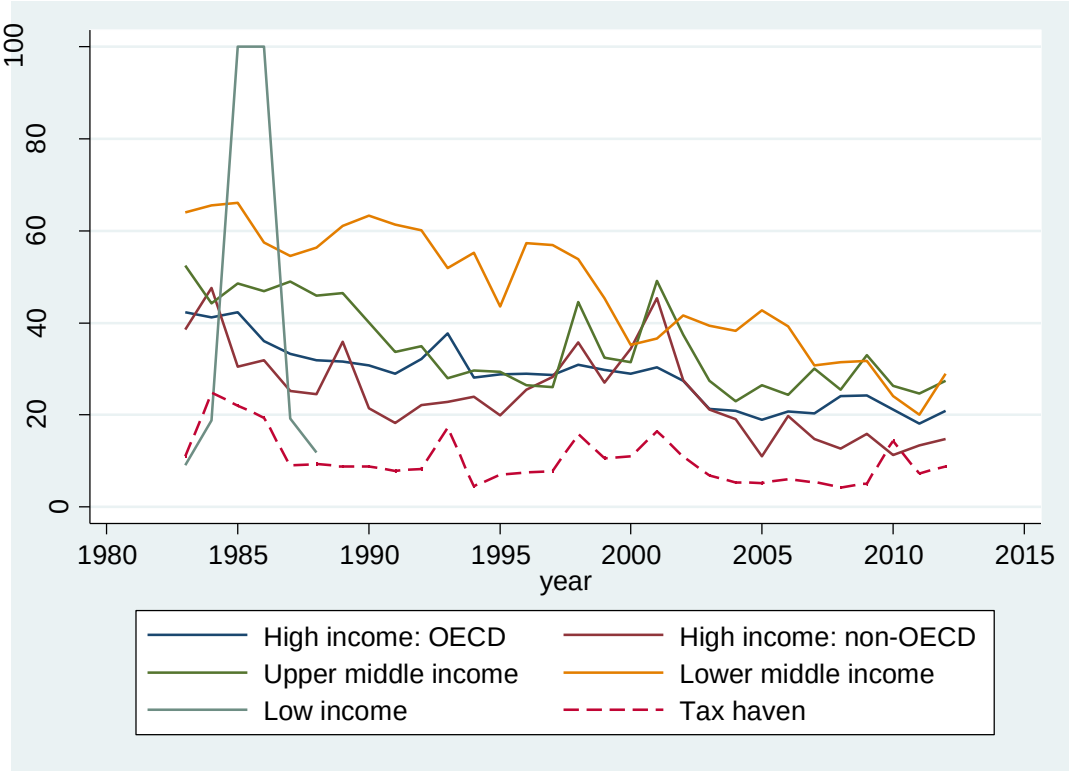




Note: The data are presented here without the extrapolated tax rates.

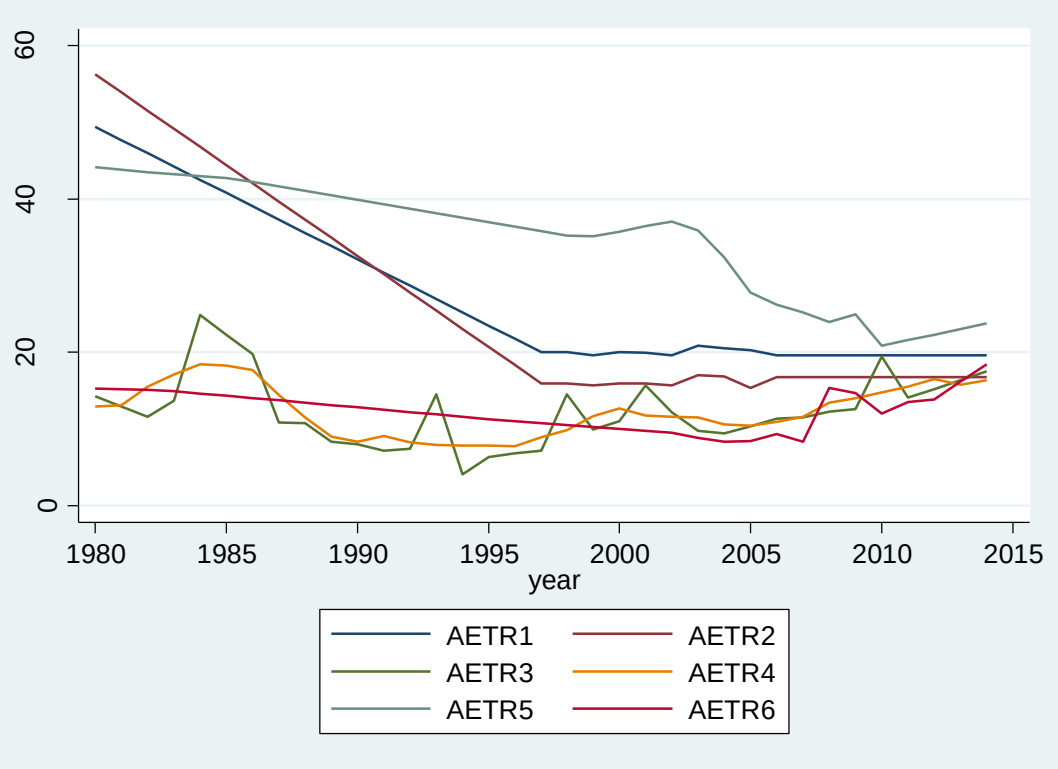
Source: Authors' calculations based on data from Crivelli et al. (2016).

Figure 9.3A: Average effective corporate income tax rates, 1980–2013



Source: Authors' calculations based on data from the Bureau of Economic Analysis used by Cobham and Janský (2017).

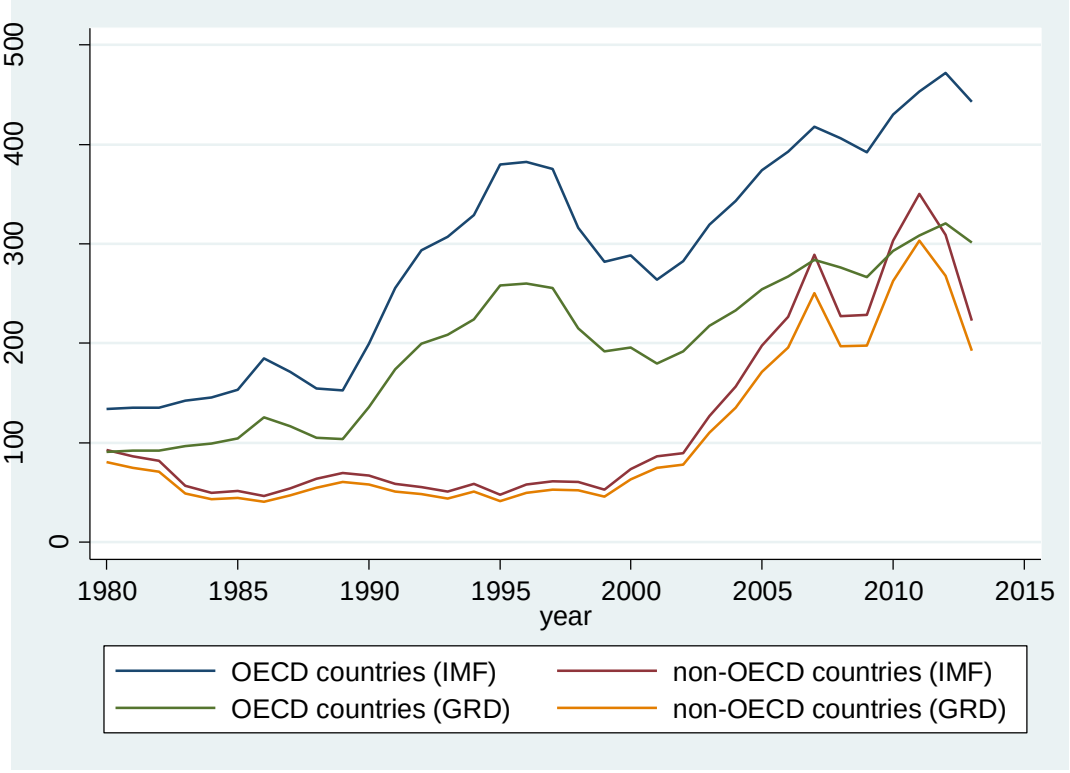
Figure 9.4A: Haven-weighted average effective corporate income tax rates, 1980–2013



Note: The data show also the extrapolated tax rates.

Source: Authors' calculations based on data from Crivelli et al. (2016), (Cobham and Loretz 2014), and Cobham and Janský (2017).

Figure 9.5A: Revenue losses, US$ billion, OECD vs non-OECD



Source: Authors' calculations based on data from Crivelli et al. (2016) and the GRD.

Table 9.1A: Additional regression results

	(7)	(8)	(9)	(10)	(11)	(12)
Data for base	IMF	IMF	IMF	GRD	GRD	GRD
Tax haven list	Cobham & Janský	Cobham & Janský	Cobham & Janský	Cobham & Janský	Cobham & Janský	Cobham & Janský
Tax rate	Statutory	Statutory	Statutory	Statutory	Statutory	Statutory
CIT base, lagged	0.918***	0.797***	0.882***			
	(0)	(0)	(0)			
CIT rate	-0.0773**	-0.0611	-0.104	-0.0826**	-0.0705	-0.132**
	(0.0373)	(0.102)	(0.100)	(0.0478)	(0.132)	(0.0495)
Inflation (log)	0.0931	-0.0796	0.123	0.646	-0.0884	0.295
	(0.803)	(0.735)	(0.755)	(0.119)	(0.702)	(0.486)
Trade openness	0.0366*	-0.0182	0.00165	0.00942	-0.0241**	0.0143
	(0.0635)	(0.207)	(0.924)	(0.553)	(0.0170)	(0.450)
GDP per capita (log)	0.139	0.226	1.524	0.350	0.473	2.420**
	(0.918)	(0.844)	(0.321)	(0.744)	(0.694)	(0.0390)
Agriculture		-0.100			-0.0883	
		(0.403)			(0.503)	
Time trend	0.0799	0.0689	0.116	0.0914	0.0506	-0.0515
	(0.189)	(0.292)	(0.242)	(0.178)	(0.345)	(0.677)
CIT rate, haven weighted	0.0966	0.106	0.107	0.123	0.115	-0.190
	(0.182)	(0.252)	(0.374)	(0.172)	(0.209)	(0.281)
CIT base, lagged				0.982***	0.798***	0.818***
				(0)	(0)	(0)
Constant	-163.2	-137.0	-241.2	-188.2	-102.5	93.94
	(0.206)	(0.317)	(0.237)	(0.180)	(0.367)	(0.708)
Observations	1,687	624	949	1,602	649	829
Number of countries	103	28	72	101	29	69

Table 9.1A: Additional regression results (continued)

	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Data for base	GRD	GRD	GRD	GRD	GRD	GRD	GRD	GRD	GRD
Tax haven list	Gravelle	Gravelle	Gravelle	Gravelle	Gravelle	Gravelle	Gravelle	Gravelle	Gravelle
Tax rate	AETR1	AETR1	AETR1	AETR2	AETR2	AETR2	AETR3	AETR3	AETR3
Inflation (log)	0.135	0.119	0.153	-0.115	0.108	-0.0570	-0.216	-0.417	-0.211
	(0.587)	(0.634)	(0.599)	(0.560)	(0.657)	(0.755)	(0.375)	(0.198)	(0.123)
Trade openness	0.00179	-0.00500	-0.00411	-0.00562	-0.00969*	-0.0104	0.00917	0.000608	-0.0114
	(0.935)	(0.402)	(0.897)	(0.765)	(0.0940)	(0.687)	(0.390)	(0.970)	(0.314)
GDP per capita (log)	0.869	0.327	1.572	0.283	0.396	1.114	-0.441	-5.185**	0.288
	(0.332)	(0.767)	(0.198)	(0.755)	(0.788)	(0.319)	(0.641)	(0.0178)	(0.741)
Agriculture		-0.0825			-0.106			-0.464*	
		(0.422)			(0.410)			(0.0705)	
Time trend	0.148***	0.202*	0.129**	0.166***	0.177*	0.149***	0.0730*	0.00398	0.155***
	(8.43e-05)	(0.0672)	(0.0112)	(3.24e-07)	(0.0969)	(0.00173)	(0.0504)	(0.947)	(0.00428)
CIT base, lagged	0.910***	0.775***	0.886***	0.908***	0.766***	0.857***	0.795***	0.685***	0.821***
	(0)	(7.48e-06)	(0)	(0)	(0.000138)	(0)	(0)	(6.48e-11)	(0)
AETR1–6	-0.00211*	0.000343	-0.0585	-0.0610	-0.0204	-0.147**	-0.0210	-0.0242	-0.000357
	(0.0547)	(0.747)	(0.116)	(0.153)	(0.324)	(0.0395)	(0.121)	(0.190)	(0.981)
AETR1–6, haven weighted	0.121	-0.00527	0.262	0.337*	-0.0588	0.541**	-0.0204	-0.0306	-0.0204
	(0.331)	(0.956)	(0.185)	(0.0575)	(0.773)	(0.0271)	(0.368)	(0.241)	(0.612)
Constant	-304.7***	-404.8*	-272.6***	-338.6***	-352.8*	-311.9***	-139.4*	50.93	-309.1***
	(3.90e-05)	(0.0626)	(0.00694)	(1.70e-07)	(0.0896)	(0.00110)	(0.0537)	(0.658)	(0.00357)
Observations	308	52	242	308	52	242	971	517	340
Number of countries	37	7	29	37	7	29	47	25	19

Table 9.1A: Additional regression results (continued)

	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
Data for base	GRD	GRD	GRD	GRD	GRD	GRD	GRD	GRD	GRD
Tax haven list	Gravelle	Gravelle	Gravelle	Gravelle	Gravelle	Gravelle	Gravelle	Gravelle	Gravelle
Tax rate	AETR4	AETR4	AETR4	AETR5	AETR5	AETR5	AETR6	AETR6	AETR6
Inflation (log)	-0.185	-0.296	-0.142	0.690	-0.0932	0.322	0.844	-0.165	0.568
	(0.466)	(0.325)	(0.307)	(0.195)	(0.798)	(0.450)	(0.170)	(0.695)	(0.266)
Trade openness	0.0114	-0.0100	-0.000909	-0.0439	-0.0430	-0.0742*	-0.00664	0.0323**	0.0459
	(0.260)	(0.630)	(0.943)	(0.169)	(0.330)	(0.0639)	(0.841)	(0.0372)	(0.203)
GDP per capita (log)	-1.075	-4.393**	-0.308	2.284*	-2.314	5.476**	2.187	-1.193	0.860
	(0.283)	(0.0497)	(0.742)	(0.0628)	(0.254)	(0.0120)	(0.274)	(0.602)	(0.505)
Agriculture		-0.527**			-0.201			0.204	
		(0.0463)			(0.482)			(0.293)	
Time trend	0.0749**	0.0337	0.137**	-0.832***	-1.011***	-0.776	0.159	0.107	0.0182
	(0.0135)	(0.521)	(0.0202)	(7.28e-05)	(1.10e-08)	(0.113)	(0.167)	(0.213)	(0.935)
CIT base, lagged	0.793***	0.709***	0.807***	0.890***	0.526***	0.854***	1.067***	0.707***	1.014***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(2.76e-10)	(0)
AETR1–6	-0.0181	-0.0188	-0.00709	-0.366***	0.159	-0.277***	0.0166	0.0118	0.0209
	(0.142)	(0.188)	(0.552)	(0.00973)	(0.270)	(0.00346)	(0.261)	(0.270)	(0.356)
AETR1–6, haven weighted	-0.0788***	-0.0802*	-0.0874	-0.307***	-0.555***	-0.391	-0.561***	-0.473***	-0.542**
	(0.00329)	(0.0776)	(0.253)	(0.000770)	(5.63e-06)	(0.133)	(2.80e-05)	(8.88e-08)	(0.0245)
Constant	-136.8**	-15.28	-267.5**	1,670***	2,072***	1,537	-334.8	-196.9	-42.01
	(0.0191)	(0.887)	(0.0213)	(6.05e-05)	(8.30e-09)	(0.120)	(0.149)	(0.266)	(0.925)
Observations	971	517	340	361	192	140	373	194	150
Number of countries	47	25	19	55	28	25	57	28	27

Source: Authors' calculations based on data from Crivelli et al. (2016) and other sources described in the text.

Table 9.2A: Country-level revenue loss estimates, 2013

	IMF billion	GRD billion	IMF % GDP	GRD % GDP
Guyana	0.24	0.21	8.05	6.97
Chad	1.09	0.95	8.05	6.97
Malta	0.49	0.43	5.30	4.59
Comoros	0.03	0.03	5.10	4.42
Guinea	0.33	0.29	5.10	4.42
Zambia	1.13	0.98	5.10	4.42
Pakistan	12.06	10.45	5.10	4.42
Argentina	24.71	21.41	5.10	4.42
Eritrea	0.16	0.14	4.58	3.96
Namibia	0.56	0.49	4.58	3.96
St. Lucia	0.06	0.05	4.40	3.81
St. Kitts and Nevis	0.03	0.03	4.23	3.66
St. Vincent and the Grenadines	0.03	0.03	3.98	3.45
Mozambique	0.53	0.46	3.60	3.11
Guatemala	1.69	1.47	3.14	2.72
Dominica	0.01	0.01	2.81	2.43
Grenada	0.02	0.02	2.81	2.43
Costa Rica	1.36	1.18	2.81	2.43
Gambia, The	0.02	0.02	2.70	2.34
Solomon Islands	0.03	0.03	2.70	2.34
Central African Republic	0.06	0.05	2.70	2.34
Bhutan	0.06	0.05	2.70	2.34
Burundi	0.07	0.06	2.70	2.34
Malawi	0.10	0.09	2.70	2.34
Swaziland	0.10	0.09	2.70	2.34
Sierra Leone	0.12	0.11	2.70	2.34
Niger	0.20	0.17	2.70	2.34
Rwanda	0.21	0.18	2.70	2.34
Haiti	0.22	0.19	2.70	2.34
Benin	0.23	0.20	2.70	2.34
Nicaragua	0.31	0.26	2.70	2.34
Mali	0.31	0.27	2.70	2.34
Senegal	0.42	0.36	2.70	2.34
Uganda	0.61	0.53	2.70	2.34
El Salvador	0.67	0.58	2.70	2.34
Tanzania	0.86	0.75	2.70	2.34
Kenya	1.22	1.06	2.70	2.34
Ethiopia	1.28	1.11	2.70	2.34
Tunisia	1.31	1.13	2.70	2.34
Morocco	2.83	2.45	2.70	2.34
Peru	5.69	4.93	2.70	2.34
Philippines	7.36	6.37	2.70	2.34
India	47.53	41.17	2.70	2.34
Togo	0.10	0.09	2.29	1.98
Dominican Republic	1.36	1.18	2.29	1.98
Fiji	0.08	0.07	1.90	1.65
Lao People’s Dem. Rep.	0.19	0.17	1.90	1.65
Sri Lanka	1.24	1.07	1.90	1.65
South Africa	6.73	5.83	1.90	1.65

Burkina Faso	0.21	0.18	1.71	1.48
Bangladesh	2.40	2.08	1.71	1.48
United States	277.61	188.83	1.66	1.13
Japan	68.79	46.79	1.37	0.93
Antigua and Barbuda	0.01	0.01	0.90	0.78
Seychelles	0.01	0.01	0.90	0.78
Belize	0.01	0.01	0.90	0.78
Liberia	0.02	0.02	0.90	0.78
Barbados	0.04	0.03	0.90	0.78
Panama	0.36	0.32	0.90	0.78
Sao Tome and Principe	0.00	0.00	0.86	0.75
Guinea-Bissau	0.01	0.01	0.86	0.75
Djibouti	0.01	0.01	0.86	0.75
Cape Verde	0.02	0.01	0.86	0.75
Lesotho	0.02	0.02	0.86	0.75
Mauritania	0.04	0.03	0.86	0.75
Tajikistan	0.07	0.06	0.86	0.75
Zimbabwe	0.09	0.08	0.86	0.75
Jamaica	0.12	0.11	0.86	0.75
Honduras	0.16	0.14	0.86	0.75
Nepal	0.17	0.14	0.86	0.75
Côte d'Ivoire	0.24	0.21	0.86	0.75
Bolivia	0.26	0.22	0.86	0.75
Ghana	0.39	0.34	0.86	0.75
Uruguay	0.49	0.43	0.86	0.75
Myanmar	0.51	0.44	0.86	0.75
Malaysia	2.70	2.33	0.86	0.75
Colombia	3.19	2.76	0.86	0.75
Indonesia	7.48	6.48	0.86	0.75
China, P.R.: Mainland	77.13	66.81	0.86	0.75
France	29.08	19.78	1.06	0.72
Belgium	5.13	3.49	1.01	0.69
Portugal	1.63	1.11	0.74	0.51
Belarus	0.39	0.34	0.56	0.49
Germany	22.09	15.02	0.61	0.42
Spain	8.11	5.52	0.60	0.41
Australia	8.90	6.05	0.60	0.41
Luxembourg	0.33	0.23	0.55	0.37
New Zealand	0.76	0.52	0.42	0.29
Italy	7.84	5.33	0.38	0.26
Canada	4.98	3.39	0.27	0.19
Greece	0.64	0.43	0.26	0.18
Israel	0.52	0.35	0.19	0.13
Denmark	0.62	0.42	0.19	0.13
Austria	0.80	0.54	0.19	0.13
Netherlands	1.53	1.04	0.19	0.13
Finland	0.41	0.28	0.16	0.11
Korea, Republic	1.64	1.12	0.14	0.09
Slovak Republic	0.06	0.04	0.06	0.04
United Kingdom	1.56	1.06	0.06	0.04
Botswana	0.00	0.00	0.03	0.02
Ecuador	0.02	0.02	0.03	0.02

Sweden	0.03	0.02	0.01	0.00
Switzerland	-0.26	-0.18	-0.04	-0.03
Estonia	-0.01	-0.01	-0.05	-0.03
Turkey	-0.77	-0.52	-0.09	-0.06
Chile	-0.26	-0.18	-0.09	-0.06
Iceland	-0.01	-0.01	-0.09	-0.06
Poland	-0.70	-0.47	-0.14	-0.09
Czech Republic	-0.27	-0.18	-0.14	-0.09
Hungary	-0.18	-0.12	-0.14	-0.09
Slovenia	-0.10	-0.07	-0.20	-0.14
Ireland	-0.66	-0.45	-0.30	-0.20
Thailand	-1.69	-1.46	-0.42	-0.37
Egypt	-1.10	-0.96	-0.42	-0.37
Croatia	-0.25	-0.21	-0.42	-0.37
Cambodia	-0.07	-0.06	-0.42	-0.37
Madagascar	-0.04	-0.04	-0.42	-0.37
Armenia	-0.04	-0.04	-0.42	-0.37
Ukraine	-1.07	-0.93	-0.61	-0.53
Taiwan Province of China	-4.49	-3.89	-0.93	-0.80
Singapore	-2.76	-2.39	-0.96	-0.83
San Marino	-0.02	-0.02	-0.96	-0.83
Romania	-1.93	-1.67	-1.05	-0.91
Brazil	-25.19	-21.82	-1.15	-1.00
Iraq	-2.55	-2.21	-1.15	-1.00
Lithuania	-0.54	-0.47	-1.15	-1.00
Serbia	-0.50	-0.44	-1.15	-1.00
Latvia	-0.35	-0.30	-1.15	-1.00
Georgia	-0.18	-0.16	-1.15	-1.00
Lebanon	-0.52	-0.45	-1.19	-1.03
Mauritius	-0.14	-0.12	-1.19	-1.03
Maldives	-0.03	-0.02	-1.19	-1.03
Turkmenistan	-0.50	-0.43	-1.24	-1.07
Jordan	-0.43	-0.38	-1.28	-1.11
Uzbekistan	-0.71	-0.62	-1.29	-1.12
Montenegro	-0.06	-0.05	-1.29	-1.12
Moldova	-0.10	-0.09	-1.32	-1.14
Bulgaria	-0.71	-0.62	-1.32	-1.15
Paraguay	-0.40	-0.35	-1.32	-1.15
Bosnia and Herzegovina	-0.25	-0.22	-1.32	-1.15
Albania	-0.17	-0.15	-1.32	-1.15
Mongolia	-0.15	-0.13	-1.32	-1.15
Macedonia	-0.14	-0.12	-1.32	-1.15
Kyrgyz Republic	-0.10	-0.08	-1.32	-1.15
Cyprus	-0.30	-0.26	-1.37	-1.19

Source: Authors' calculations.

Chapter 10

Estimating the Scale of Profit Shifting and Tax Revenue Losses Related to Foreign Direct Investment[1]

Abstract: Governments' revenues are lower when multinational enterprises avoid paying corporate income tax by shifting their profits to tax havens. In this paper, we ask which countries' tax revenues are affected most by this tax avoidance and how much. To estimate the scale of profit shifting, we start by observing that the higher is the share of foreign direct investment from tax havens, the lower is the reported rate of return on this investment. Similarly to the 2015 World Investment Report of the United Nations Conference on Trade and Development, we assume that the reported rate of return is lower due to profit shifting. Unlike the report, however, we provide illustrative country-level estimates of profit shifting related to foreign direct investment which enable us to study the distributional impact of international corporate tax abuse. We find that, on average, higher-income countries lose least and lower-income countries lose most corporate tax revenue relative to their GDP. On the basis of these estimates, we conclude that profit shifting thus deepens the existing income inequalities and the differences in government revenues between countries. Furthermore, we compare our results with three other recent studies that use different methodologies to derive country-level estimates of tax revenue losses that can be related to profit shifting. In a first such comparison made, we find that every study identifies differences across income groups, but the nature of these differences varies across the four studies.

Keywords: foreign direct investment; corporate income tax; tax avoidance; base erosion; profit shifting; inequality

JEL classification: F21, F23, H25

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10.1 Introduction

Governments' revenues are lower when multinational enterprises (MNEs) avoid paying corporate income tax by shifting their profits to tax havens. Profit shifting and tax havens represent a crucial issue for the world economy. As we show in this paper's conservative estimates, globally, around 290 billion USD in profits from foreign direct investment (FDI)—or almost half a per cent of the world's GDP—may be shifted to avoid tax, which implies a global lower-bound estimate of tax revenue lost due to profit shifting of around 80 billion USD per year. Our methodology enables us to go beyond these global figures and present estimates of the scale of profit shifting for the 89 individual countries in our sample. While the estimated dollar losses are relatively evenly divided between developing and developed countries, the developing ones incur higher losses relative to their economic size (measured by their GDP), as well as their corporate and total tax revenue.

Tax havens and the profit shifting of MNEs have been receiving increasing attention from the media, policymakers and academics alike, as documented by the recent studies cited in this paper. The reason seems to be that it has become rather easy for MNEs to avoid paying corporate tax, but also, thanks to recent leaks of confidential documents and thorough investigative case studies, it has become relatively easy for the public to learn about this trend and for researchers to provide evidence of it. Yet, the exact scale of tax losses remains uncertain due to the inherent difficulties of estimating tax avoidance and due to gaps in the availability of relevant data, some of which are being addressed by recent proposals of the European Union (EU) and the Organisation for Economic Co-operation and Development (OECD) and some of which are being overcome by innovative researchers. For example, Habu (2017) uses the United Kingdom's confidential corporate tax returns to learn how aggressively foreign MNEs reduce their corporate tax liability, whereas Alstadsæter, Johannesen, & Zucman (2017) use audit and leaked data from tax haven institutions to study tax evasion by wealthy individuals. While these studies provide rigorous evidence, they are limited in their scope and provide revenue loss estimates for only one or a handful of countries.

In this paper, in contrast, we aim to provide estimates of the scale of profit shifting and the consequent tax implications for as many countries as possible, which naturally requires us to sacrifice rigour to some extent for the sake of improved scope. Specifically, we aim to estimate the scale of profit shifting and tax revenue losses related to FDI. Our two most important data sources are the International Monetary Fund's (IMF) Coordinated Direct Investment Survey (CDIS), which contains country-by-country bilateral FDI data for around 100 countries between 2009 and 2015, and the United Nations Conference on Trade and Development's (UNCTAD) FDI unilateral database with an even wider coverage. We begin by observing that a higher share of investment from tax havens (or offshore financial centres (OFCs) – terms that we use interchangeably in this paper) is associated with a lower

reported rate of return on inward FDI. We assume, in line with UNCTAD's (2015) World Investment Report, that this pattern is due to profit shifting, and estimate its scale and the resulting tax revenue losses. For the first time, we provide detailed country-level estimates of profit shifting related to FDI, which enables us to study the impact on individual countries' government revenues and thus also the distributional impact of international corporate profit shifting. Indeed, our main research question in this paper is which countries' tax revenues are affected most.

We estimate tax revenue losses at the country level, to understand who is losing and who is gaining the most from the current practice of international corporate profit shifting related to FDI. For example, are all developing countries or all EU members losing tax revenue? Are the estimates consistent with the notion that, for example, Mauritius or Luxembourg exploit the current international tax system loopholes at the expense of Mozambique or Latvia? In line with some previous studies, we find that lower-income countries lose more corporate tax revenue than higher-income countries, relative to their GDP or their tax revenues. We conclude that profit shifting thus deepens the existing income inequalities and the differences in government revenues between countries. We further reinforce our conclusions by making comparisons with three other similar studies with country-level tax revenue loss estimates. Specifically, we compare our estimates with perhaps the most comprehensive study of the global losses due to base erosion and profit shifting by the IMF's Crivelli *et al.* (2015), as re-estimated by Cobham and Janský (2018) with country-level results, and with the results of Cobham and Janský (2017), who estimate for US-headquartered MNEs how much additional tax payments countries would collect if MNEs' reported profits were fully aligned with their economic activity. The fourth source of profit-shifting estimates is Clausing (2016), with main results for the United States, but a speculative extension to a number of big economies worldwide. Across the four methodological approaches and sets of estimates, we establish characteristics that are associated with countries being more likely to suffer from higher losses due to the MNEs' profit-shifting activities.

The paper's empirical contribution is presented in the following four stages. First, using new and updated data sources, we re-estimate and critically review the work of UNCTAD (2015), in what we call the baseline model. Second, we develop an extended model and improve on the baseline model in a number of aspects. Third, for the first time, we provide country-level results of the estimated tax revenue losses and discuss the distributional impact of corporate profit shifting. Fourth, we compare our results with three other similar studies with country-level tax revenue loss estimates. These four specific stages altogether contribute to the expanding body of literature on profit shifting and tax havens. There are at least two specific areas in which we make a contribution to the existing research. First, we contribute to the ongoing collective attempt to arrive at estimates of the scale of profit shifting. Despite the inherent difficulties in such estimation, discussed for example by Fuest and Riedel (2012), a growing number of studies do make credible estimates of the scale of

profit shifting, as our literature review below documents. However, a number of them focus on one country only, such as Gumpert *et al.* (2016) on Germany or Zucman (2014) on the United States. Indeed, one of our contributions to the literature is that we develop estimates for a wide range of countries - in practice for all countries for which we have available data. We see this study also as a contribution to international policy debates, since there is only a limited number of similar estimates for a similar number of countries, and we make a comparison with the three that do exist.

We also contribute to the study of the heterogeneous impacts of international corporate tax avoidance. So far, most research looks at individual countries or, in the case of an international focus, often concentrates only on the division between the developing and developed countries. For example, Fuest, Hebous and Riedel (2011) find that the effect of the host country corporate tax rate on the debt ratio of multinational affiliates in developing economies is larger than for affiliates in developed economies. Similar division is used by Johannesen, Tørsløv and Wier (2017), who link the tax aggressiveness of MNEs with the economic development of their host countries, but they also estimate models that exploit the cross-country variation in economic and institutional development. This more granular approach is needed and similar studies should reflect the country-specific characteristics. In this paper's extended model, we perform our regression analysis using regional and income groups and carry out the rest of the estimation at the country level at which we also present the results and discuss their implications for differences in the effects of international profit shifting across income groups.

The remainder of this paper is structured as follows. We begin with a literature review of previous similar estimates in Section 2 and an overview of the data used and basic descriptive statistics in Section 3. We describe our empirical methodology in Section 4 and present the detailed results in Section 5, in which we also compare our estimates with those reached by some previous studies. Finally, Section 6 provides a discussion of the implications of the results and concludes.

10.2 Literature review

In this section, we first discuss the main channels through which MNEs may effectively shift profits out of high-tax jurisdictions and explore which of these channels could be quantified using the available data. Second, we briefly review recent literature related to the quantification of corporate profit shifting and the resulting tax revenue losses. Third, we sum up the results of a pioneering report by UNCTAD (2015) in which they developed the FDI-driven approach that we build upon in this paper. Last, and before moving to the data description, we discuss the pros and cons of the data sets used most often in similar research and those used in this paper. For the sake of space, we provide only a brief literature review in which we focus on the research most relevant for our paper. For more

comprehensive reviews of academic literature on profit shifting, we refer to Dharmapala (2014), Clausing (2016) or Dowd et al. (2017).

Three main profit-shifting channels are recognized in the literature: debt shifting, the location of intangible assets and strategic transfer pricing. Naturally, all three are motivated by the MNEs' assumed desire to reduce their global tax liabilities by artificially shifting their profits and assets and thus tax bases to countries with lower (effective) tax rates, sometimes referred to as tax havens. First, in the case of the debt shifting channel, MNEs implement unnecessary loans at high interest rates from one MNE affiliate located in a low-tax jurisdiction to another profitable unit located elsewhere (Buettner and Wamser, 2013; Desai, 2005; Fuest et al., 2011; Huizinga and Laeven, 2008). Second, intangible assets and intellectual property, such as brands or research and development, can be stationed artificially at a subsidiary in a tax haven, to which service fees are then paid by other parts of the MNE (Bryan et al., 2017; Dischinger and Riedel, 2011; Seabrooke and Wigan, 2015; Taylor et al., 2015). As discussed thoroughly by OECD (2017), pricing such intangible assets poses several major challenges, making it intrinsically difficult to disentangle profit-shifting effects from actual prices. The third main channel for profit shifting is to inflate or deflate the prices of goods or services being transferred between the various foreign parts of an MNE in such a way as to minimize the tax burden faced in all the countries put together (Bartelsman and Beetsma, 2003; Clausing, 2003; Davies et al., 2014; Peralta et al., 2006).

The quantitative evidence of MNEs shifting profits and debt and locating their headquarters or intellectual property in such a way as to avoid tax is substantial. As outlined above, a number of studies have provided evidence of profit shifting, especially on how tax rate differentials affect reported pre-tax profits, and on the strategies MNEs employ to reallocate profits within their groups. A range of studies analysed how reported income changes with respect to tax rate differences across countries, represented by Hines Jr and Rice (1994), Huizinga and Laeven (2008) and Dharmapala and Riedel (2013). Although the existing academic and policy studies provide useful guidance on what can be quantified, findings on the implications of tax avoidance for government revenue are rather limited. Three recent exceptions are Clausing (2009) and Zucman (2014), who both provide estimates for the United States, and Clausing (2016) who adds a speculative extension to other countries around the world. For developing countries, Johannesen and Pirttilä (2016) provide an overview and Johannesen et al. (2016) offer firm-level empirical results, whereas recent examples of revenue estimates come from Reynolds and Wier (2016) for South Africa and from Cobham and Janský (2018) for a range of countries. Furthermore, at least three international organizations have recently developed estimates of the budgetary impact of international corporate tax avoidance: OECD (2015a), IMF's Crivelli et al. (2015), UNCTAD (2015) and IMF (2014). Although these studies often make a number of strong assumptions and have to deal with a lack of any realistic counterfactual data (i.e.

what the tax base would be in the absence of profit shifting), they do provide comparable estimates for many countries and have been influential in the policy debate.

We naturally build on a range of existing research in this paper, but here we build upon one specific source more than others. UNCTAD (2015) estimate tax revenue losses related to inward investment stocks as directly linked to tax havens, focusing specifically on developing countries. They develop an FDI-driven approach to measure the scale and economic impact of tax avoidance schemes. Their investment perspective on tax avoidance puts the spotlight on the role of tax havens as major global investment players. They estimate that some 30 per cent of cross-border corporate investment stocks are routed through tax havens before they reach their destination as productive assets (Bolwijn et al., 2017b). Their preferred estimate of annual revenue losses for developing countries, the focus of their study, is 90 billion USD; extending that estimate globally results in USD 200 billion, or 8% of all corporate income tax, lost in government revenue in 2012. In this paper, we review their methodology and then extend it to help us better answer our research question. Moreover, using updated data sources, we report the results at country level and discuss the resulting distributional impacts of profit shifting.

The data source that many of the recent profit-shifting studies aiming for a wide coverage of countries use—including Fuest, Hebous and Riedel (2011) and Johannesen et al. (2017)—is the Orbis database, the largest commercially available database of company balance sheets. One of the advantages of Orbis is that it contains data that enable researchers to produce rigorous estimates about various profit-shifting channels such as, for example, the choice of patent location within MNEs, as documented by Karkinsky and Riedel (2012). Orbis, however, does have its quite well-known substantive shortcomings, in addition to being available only to subscribers. It suffers from a country selection bias, with some countries' companies being more likely to be represented than others. As argued by Clausing (2016) or Alstadsæter et al. (2017), Orbis includes extremely limited information on tax havens and an analysis based on the data thus excludes many of the observations that drive most of the income-shifting behaviour. Cobham and Loretz (2014) and Kalemli-Ozcan et al. (2015) document that the coverage is severely limited especially among developing countries. Therefore, as recently acknowledged by Garcia-Bernardo et al. (2017) while identifying tax havens, the Orbis data is biased against tax havens and developing countries, both of which are obviously crucial for research such as ours.

Instead of Orbis, we use country-level FDI statistics, described below and employed in various recent research ranging from Pérez et al. (2012), on illicit financial flows as motives for FDI, to Akkermans (2017), considering the long-term effects of FDI. On the one hand, the level of granularity of FDI data remains much lower than that of Orbis and some concerns about data quality remain, especially when the data is reported by tax havens. On the other hand, coverage of both tax havens and developing countries is what makes FDI data superior to Orbis for our purposes. All in all, we believe that both Orbis and country-

level FDI data sets should be used for research into profit shifting and that their results can complement each other. Given the better coverage, our FDI-data driven approach is apt for estimating the scale of global distribution of profit shifting and tax revenue losses.

10.3 Data

The methodology that we use in this paper relies on country-level FDI data. First and most important, we use data on FDI stocks on a bilateral level from the IMF's CDIS, which contains data for around 100 countries between 2009 and 2015.[2] For stocks of direct inward investment, we use the variable 'Inward Direct Investment Positions, US Dollars (IIW_BP6_USD)'. As a complement, in some limited cases where we do not need bilateral FDI data, we use UNCTAD's unilateral FDI database for its greater coverage of countries.[3] The volume of total global stock of international investment rose substantially over the observed time period. Figures A1 and A2 in the Appendix show this development for countries classified into income groups (Figure A1) and regions (Figure A2). While in 2009 the total global FDI stock amounted to 19.26 trillion USD, in 2015 it was 26.94 – a 40% increase. All groups increased their FDI stock except one – the Middle East and North Africa lost 69% of its FDI stock, likely due to the combined effect of declining oil prices, the Arab spring and military conflicts in the region. The significant increase (by 1,382%) in South Asia's FDI stock between 2009 and 2015 is caused by the lack of data for India in 2009 – if we use India's 2010 value to compute the difference over the observed time period, we arrive at a modest 43% increase. The bars in Figures A1 and A2 are divided into two parts based on the origin of the FDI—from tax havens and other countries—a classification that we explain in detail in the following section. We observe that the increase in total FDI stock was caused by investment from both OFCs and other countries. Summary statistics of the data on FDI stock are presented in Table A1 in the Appendix.

The other important data required for our methodology is FDI income, which we source from the IMF's Balance of Payments Statistics. Specifically, for FDI income we use the variable called 'Current Account, Primary Income, Investment Income, Direct Investment, Debit, USD (BMIPID_BP6_USD)'. We compute the rates of return on FDI as the shares of FDI income on total FDI stocks in each country. We recognize at least three potential drawbacks of this step. First, while investment from different countries may yield different returns across countries, the FDI income data are only available at country level (and not at a bilateral level), which hides some of the information that could potentially be used to obtain better estimates of the size of corporate profit shifting (for example by distinguishing between FDI income from OFCs and from other countries). Second, although both sources

[2] Available at: http://data.imf.org/?sk=40313609-F037-48C1-84B1-E1F1CE54D6D5 [Accessed January 7, 2017]

[3] UNCTAD FDI statistics, available at: http://unctad.org/en/Pages/DIAE/FDI%20Statistics/FDI-Statistics.aspx [Accessed February 4, 2017]

(for FDI income and FDI stocks) that are combined into a single number (the rate of return on FDI) come from the IMF, they may potentially use slightly inconsistent methodologies to identify what is classified as FDI. Third, while we use the equity and debt components of the rate of return (in addition to the overall rate of return), the equity and debt components are divided by the same overall FDI stock, rather than the equity component and the debt component of the FDI stock. Despite these data limitations, we assume that these sources are reflective of the true rate of return on FDI. In addition to FDI-related data, our methodological approach requires data sources that are auxiliary to the main analysis, including data on corporate tax rates from KPMG[4] and the WB (2016), lists of tax havens from various sources, and data on GDP from the World Bank, complemented by data from the UN[5] and the CIA's World Factbook[6]. To present the estimates in relative terms to tax revenues, we use the relatively recently introduced ICTD/WIDER Government Revenue Dataset[7] (Prichard et al., 2014). We present summary statistics of all the used variables in Table A1 in the Appendix.

10.4 Methodology

In this section, we describe the empirical strategy that we use to estimate the scale of corporate profit shifting. Since the phenomenon is intrinsically difficult to observe directly, the existing methodological approaches aim to shed more light on certain aspects of profit shifting indirectly. In this paper, we build on one such approach developed by UNCTAD (2015) and detailed by Bolwijn et al. (2017a) and we extend it further to provide the answer to our research question of which countries' tax revenues are most affected by profit shifting. We begin by empirically testing whether a higher share of investment from tax havens is associated with a lower reported rate of return on inward FDI. After this relationship is tested and assumed to be due to profit shifting, we describe how we estimate its scale and the resulting tax revenue losses. The final part of this section explains in detail how we define the share of investment from tax havens in total inward FDI in each country, used as an input in the first part.

[4] Corporate tax rates table, available at: https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html [Accessed February 4, 2017].

[5] Available at: http://data.un.org/Data.aspx?d=WDI&f=Indicator_Code%3ANY.GDP.MKTP.CD [Accessed June 6, 2017]

[6] The latest CIA data are available at: https://www.cia.gov/library/publications/the-world-factbook/ [Accessed February 12, 2017]

[7] Available at https://www.wider.unu.edu/project/government-revenue-dataset [Accessed July 17, 2017]

The hypothesis central to our analysis is that a higher share of FDI from tax havens is associated with a higher volume of profit-shifting practices, resulting in an artificially deflated reported rate of return on FDI. In our baseline model, the regression to be estimated using ordinary least squares (OLS) with regional- and time-fixed effects is:

$$FDI\_ROR_{it} = \beta * share\_offshore_{it} + \sum_{s=2009}^{2015} \delta_s z_{s,i} + \sum_{k=1}^{7} \phi_k d_{k,i} + \varepsilon_{it},$$

where FDI_ROR_{it} is the rate of return on FDI in country i in year t, $share\_offshore_{it}$ is the share of FDI from tax havens in country i in year t, $z_{s,i}$ are year-fixed effects, and $d_{k,i}$ are regional-fixed effects based on World Bank classifications. The rationale behind using regional-fixed effects is that some regions share common characteristics that have significant effects on both the explanatory and the dependent variable. To ensure the comparability of our results to those reached by UNCTAD (2015), the regression model is estimated using the same list of 72 countries, but includes additional data for 2013-2015 and thus increases the sample from 265 to 477 observations. We estimate the model for all countries as well as separately for two groups—for developing and developed countries—and for three alternatives of the dependent variable: rate of return on FDI and its equity and debt components. While we hypothesise a negative relationship for the rate of return and also its equity component, we expect a smaller effect for the debt component since it is composed primarily of interest paid by the foreign affiliates to the parent, which is, in fact, a cost for the affiliates that is not subject to corporate income taxation. Therefore, we include the estimation of the debt component for the sake of completeness, but we focus on models that use the equity component of the rate of return and the overall rate of return itself.

In the second part of our empirical analysis, we propose an extended model:

$$\begin{aligned} FDI\_ROR_{it} = {} & \alpha * share\_offshore_{it} + \sum_{m=1}^{5} \beta_m * share\_offshore_{it} * inc_{m,i} \\ & + \sum_{k=1}^{7} \gamma_k * share\_offshore_{it} * d_{k,i} + \sum_{m=1}^{5} \delta_m inc_{m,i} + \sum_{k=1}^{7} \phi_k d_{k,i} \\ & + \sum_{s=2009}^{2015} \theta_s z_{s,i} + \varepsilon_{it}, \end{aligned}$$

where $inc_{m,i}$ are dummy variables for income groups (as per the classification by the World Bank), with the remaining notation the same as in the baseline model.

Our extended model makes four innovations over the baseline model. First, we use a more granular definition for lower-income countries, which is based on the World Bank's classification of countries by income. Specifically, we add controls for income groups in our model, using a dummy variable in the full-sample regression, rather than splitting the

sample for developing and developed countries and performing the regressions separately. Second, the extended model allows for effects that are heterogeneous across regions and income groups, to influence the relationship between the offshore indicator and rate of return. This addition is enabled by including not only dummy variables for income groups, regions and years, but also interaction terms for income groups and regions with the share of FDI from tax havens. The regional and income-group effects are thus implicitly divided into those that affect the examined relationship and those that do not. The rationale behind this process is that the countries within these groups share some common characteristics that have a specific effect on the behaviour of the MNEs that route their investment through tax havens. Our approach enables the capture of these common effects and this innovation is instrumental for the derivation of country-level results. A first-best model might be one that includes country-level fixed effects, yet the low levels of variation in inward investment stock and rate of return on these investments prevent a country-fixed effects model from having enough explanatory power. Third, we estimate the country-level results using specific corporate tax rates for each country rather than one estimate for all countries. This, together with the inherent fixed-effects heterogeneity, yields more accurate results at the country level. Fourth, our sample covers not only a longer time period, but also a larger number of countries, bringing the total number of observations included in our headline extended model to 509, compared to the 265 used by UNCTAD (2015).

While these innovations improve on the baseline model, some concerns and a need for assumptions remain and we discuss them here. For example, an MNE may decide to route the investment through an OFC because the destination country has an inefficient financial sector. As a result, the low level of financial development causes a lower rate of return (i.e. lower financial development implies fewer sources of local financing for the foreign affiliate and, therefore, a lower rate of return) and a higher offshore indicator (the MNE has to route the investment through the OFC in order to finance its foreign affiliate efficiently). More generally, due to potential endogeneity problems, we do not aim to establish causality in the relationship between the two variables, but instead focus on the correlation between them across countries, income and regional groups. Unfortunately, data on bilateral FDI are only available at country-, rather than industry- or firm-level, which prevents further improvement in the precision of estimating the relationship between the offshore indicator and the rate of return on FDI. There thus remain some concerns about, for example, potentially more profitable investment being routed more through tax havens, which would make our estimates biased upward. Conversely, investment into developing countries may be more likely to be routed through tax havens, but may also be likely to yield higher profits, which would make our estimates biased downward.

Furthermore, even if we observe a statistically significant negative relationship between the share of tax haven investment and rate of return, it is only evidence consistent with profit shifting and, of course, it does not necessarily imply that profit shifting is responsible for all, or much, or even any part of the observed relationship. As is the case with similar

relationships, such correlation might be spurious or explained by some not included or unobserved variable, or some other endogeneity issue. There does not seem to be a credible way to establish the extent to which the correlation is driven by profit shifting. Instead, we assume that it is so. We make this important assumption mostly based on the underlying logic, i.e. that the profits are lower as a consequence of being shifted to tax havens, that the origin of FDI should not significantly affect the actual profitability of the foreign affiliate, and existing evidence that profit shifting is indeed an important phenomenon presented by other studies, including those discussed in the literature review. Due to making this assumption, we can consider the estimates an upper bound for the effects of profit shifting, since we assume that only profit shifting is responsible for all of the observed relationship. On the other hand, another implication of this methodology is that, of all the various schemes used to shift profit, we capture only those that are reflected by the FDI data. For example, trade mispricing is thus not fully accounted for in our estimates, since it does not require a direct investment link. These estimates thus may not include the full effects of profit shifting and may, in this respect, be viewed as lower-bound estimates of the scale of all profit-shifting activity.

Once we make this assumption, we can estimate how much profit is shifted and the associated tax revenue loss for the affected countries. Specifically, to arrive at an estimate of the scale of shifted profits we multiply the actual amount of offshore investment by the responsiveness of the reported rate of return on offshore investment – a parameter estimated by the regression above. To further increase the coverage (from 79 to 92 countries), for countries that do not report bilateral FDI data but do report unilateral inward FDI data to the UNCTAD's FDI database, we calculate the share of offshore investment as a simple average of the shares of offshore investment in the region-income group. Finally, to arrive at an estimate of the associated tax loss, we transform the shifted profits to pre-tax values and multiply them by the relevant statutory tax rate. For the baseline model, we do so in the same straightforward way as UNCTAD (2015), considering average rather than country-specific values for FDI stock, a share of FDI from offshore financial centres and the corporate tax rate.[8] In contrast, for the extended model, we do use the country-specific values for these variables whenever available. These estimations are implicitly underpinned by a number of other assumptions, such as assuming that all the shifted profits would, were they not shifted, be liable to corporate income taxation at a the same particular statutory tax rate. Indeed, the important assumption discussed above, together with these additional assumptions, imply that we should be careful when interpreting and using these illustrative estimates of profit shifting.

[8] Their approach can be summed up in the following way (with their headline numbers for developing countries in the parentheses): corporate income tax revenues lost due to profit shifting for developing countries = average tax haven exposure of total inward FDI stock (46%) × reported FDI stock (USD 5,000 billion) × responsiveness of reported rate of return on tax haven investment (15.8%) × transforming the after-tax values to pre-tax values (1.25) × weighted average effective tax rate (20%) = USD 91 billion.

We now return to explaining how we define the share of offshore investment that each country receives. In constructing the share of inward FDI from tax havens, we identify the OFCs in three categories, mostly following UNCTAD (2015). We acknowledge that this method partly relies on somewhat arbitrary decisions about the criteria for the dichotomous selection of OFCs, criticised for example by Cobham, Janský, & Meinzer (2015). Indeed, we would prefer to use a continuous measure that does not rely on binary criteria for all three groups. However, to our knowledge, there is currently no such one measure for offshore investments and the three groups used here at least combine binary with continuous measures.[9] The first group is a list of 38 *tax havens* compiled by UNCTAD (2015) based on OECD's (2000) initial list of 41 jurisdictions.[10] The whole stock of investment from these jurisdictions is considered as offshore investment. The second is a group of so-called self-declared special-purpose entity (SPE) countries. An SPE is an institutional unit that provides financial services to MNEs that allow it to transfer funds through a jurisdiction. These entities are sometimes called pass-through units or shell companies because the financial flows administered by these entities do not correspond to their actual economic activities in the SPEs' country of incorporation (OECD, 2015b). We consider four SPE countries from UNCTAD (2015) with data for 2012, available as of April 2014, from the countries' central banks. The share of inward investment operated through SPEs were 40% for Austria, 58% for Hungary, 96% for Luxembourg and 83% for the Netherlands.[11]

The final group of tax havens are 'other SPE countries', which do not declare themselves to be SPE-enabling countries, but seem to behave as such. We identify other SPE countries in the same way as UNCTAD (2015), proceeding in two steps. First, we identify countries that have been successful in becoming important offshore financial centres. We classify a country as an 'other SPE country' if, as of 2015 data, it ranks in the first quartile in terms of inward FDI stock and has a ratio of inward FDI stock to GDP of more than 1. For 2015 data, we identify 25 countries complying with the first criterion and 12 with the second, with seven countries at the intersection of these two groups (thus complying with both criteria). Excluding self-reported SPE countries results in four countries classified into the final 'other SPE countries' group (i.e. Hong Kong, Ireland, Singapore and Switzerland).[12]

[9] However, future research should investigate the sensitivity of the results to alternative lists and classifications that have been used in the literature to refer to selected jurisdictions as tax havens.

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

[11] In future research, the selection process for classifying countries into this group may thus potentially be improved by using newly available data from other countries' central banks.

[12] Based on 2012 data, 26 countries compled with the first criterion and 12 with the second, the intersection of which results in six countries falling into the 'other SPE countries' category. Out of these, Hungary,

In the second step, we consider the four 'other SPE countries' and calculate the level of investment implied by the size of their economy (based on a simple OLS cross-country regression of reported inward investment on GDP in 2015). The difference between the actual FDI stock and the predicted FDI stock is then accounted towards the offshore indicator. Combined, the three categories contribute to how much each country receives in inward FDI from offshore financial centres relative to all of its inward FDI. This figure feeds into the regression at the methodology's start and with it we also begin the discussion of results.

10.5 Results

We present our empirical results in this section. First, we present estimates of the baseline model using updated data sources. Second, we break down these numbers into country-level results. Third, we estimate the newly developed extended model and present its country-level estimates. Fourth, we compare our results with three other similar studies and highlight their relevance for the cross-country distributional impact of international corporate profit shifting.

We begin with the results of the estimation of the baseline model in Table A2 in the Appendix. For both the rate of return and its equity component, we find a statistically significant negative relationship between the offshore indicator and the rate of return on FDI stock using the full sample of countries, with larger and statistically significant coefficients for the sample of only developing countries and with no statistically significant effect for the sample of only developed countries. Our longer data series improves the explanatory power of the model and suggests slightly smaller coefficients in absolute value than the original results reached by UNCTAD (2015). Positive and statistically significant coefficients obtained for the model that uses the debt component of the FDI rate of return are in line with the notion that the debt component is composed primarily of interest paid by the foreign affiliates to the parent, which is, in fact, a cost for the affiliates and thus an element that actually erodes the taxable base. In the remaining part of our analysis, including the extended model, we focus only on models that use the equity component of the rate of return or the rate of return itself.

We now derive the estimate of the scale of profit shifting, assuming that the observed negative relationship between the share of offshore investment and the rate of return on FDI can be attributed to profit shifting. Table A3 in the Appendix summarizes the results for 2015. We use information on the total global exposure to tax haven investment reached (41.5% for all, 52% for developing and 37% for developed countries) and the total reported FDI stock (19.57 trillion USD for all, 6.37 trillion USD for developing and 13.19 trillion

Luxembourg and the Netherlands were already included in the self-declared SPE countries category, so that only the remaining three countries fall into the 'other SPEs' group: Hong Kong, Ireland and Singapore.

USD for developed countries). One option is to use the regression estimates for all countries from Table A2. That way, we arrive at a global estimate of 126 and 178 billion USD lost in tax revenues in 2015, using the rate of return and its equity component only, respectively. While the obvious advantage of this option is to have the estimates of tax losses for all countries (except for tax havens, of course), a drawback of this model is that it averages out significant heterogeneity across countries. Therefore, we consider more granular options, starting with the one that divides the sample into two groups – developing and developed countries. Our results for 2015, presented in detail in Table A3 in the Appendix, show similar results to those reached by UNCTAD (2015) for 2012. While our estimated profitability gap is lower, total FDI stock in developing countries increased from 5 in 2012 to 6.37 trillion USD in 2015, leading to estimates of similar magnitude – 91 and 114 billion USD lost in tax revenue in developing countries in 2015.[13] Using actual corporate tax rates (instead of the averaged ones as indicated in Table A3) results in country-level estimates as presented in the first two columns of Table A4 in the Appendix. These estimates, however, use the same estimated profitability gaps for all countries and for the groups of developed and developing countries (in the first and second column, respectively). In our extended model, we use an even more granular level of fixed effects at the region-income level to derive more precise estimates of the profitability gap.

For the extended model, we begin with the regression results in Table 1. As in the baseline model, we use three specifications that differ in their dependent variable. In line with the hypotheses outlined above, we observe a statistically significant, negative relationship between the offshore indicator and the first two dependent variables, as well as a lower coefficient for the debt component of the rate of return. [14] Importantly, the regressions in the extended model include controls for income-, region- and year-fixed effects. The coefficient combinations for the two classifications result in the estimates presented in Table 2. We exclude from further analysis countries in those region-income groups for which the estimated profitability gap is positive, since we focus on estimated losses only and, similarly, we do not investigate the potential tax gains by tax havens.[15] Our extended

[13] One speculative, and perhaps too optimistic, explanation for the lower estimated profitability gap is that recent government efforts to curb profit shifting have already started to have an impact and we can observe that change in the estimates. Also speculatively, because of the statistically insignificant coefficients for developed countries, we derive the estimate of 102–116 billion USD of tax revenue losses for developed countries – only to be interpreted with caution. If we combine it with the estimate for developing countries, a global estimate of 193–230 billion USD is slightly higher than in our first model, which used the same regression estimate for all countries.

[14] We do not observe statistically significant estimates for the interaction terms 'OI*North America' and 'OI*Middle East and North Africa' only; the remaining estimates are statistically significant, at least at the 10% level. We, nevertheless, account for the insignificant estimates in the construction of the coefficient combinations.

[15] We recognize several potential reasons why we obtained positive regression estimates for some country groups. First, our list of tax havens and SPE countries is the same for all countries, but in reality, each country's MNEs may use different tax havens with different intensity, resulting in an artificially deflated or inflated

approach takes advantage of the inclusion of region- and income-fixed effects and exploits the heterogeneity in the relationship between the rate of return and the offshore indicator across combinations of these classifications, thereby providing a more country-specific, and thus precise, estimate of the relationship for individual countries. We use these estimates in the following section to compute estimated tax revenue losses at the country level.

We follow the steps as applied above for the baseline model, but with information specific to each country on actual tax haven exposure and nominal corporate tax rates. Where those are missing, we input the average values in the respective region-income group at the cost of losing some degree of precision, but with the objective of obtaining estimates for as many countries as possible despite data limitations. In total, we obtain country-level results of positive tax revenue losses for 89 countries. If we sum up these country-specific estimates, the total global tax revenue losses amount to 66.7 and 81.5 billion USD, using the rate of return and its equity component only, respectively. We present these country-level estimates for all countries in our sample in Table A4 in the Appendix (along with these estimates as shares of GDP, corporate tax revenue and total tax revenue) and in Figure 1, which shows the share of total tax revenue losses from the total GDP, by income and regional groups. As explained above, unfortunately, the relatively short panel of observations and low heterogeneity of the explanatory variable over time prevents the use of country-fixed effects, which is why we use the income-region groups instead. Therefore, the differences between countries within the income-region groups are driven by the heterogeneity in FDI stock, tax haven exposure and corporate tax rates, whereas the differentiated regression estimates also contribute to the differences across countries from different income-region groups.

offshore indicator for such countries. A potential solution for future research might be to weigh the tax-haven FDI against a form of bilateral definition for tax havens, preferably defined as a continuous variable rather than a binary one. Second, the data on bilateral FDI may be collected using different methodologies in different countries, as not all countries comply with the IMF's international standards for FDI reporting. Third, in some countries there might not be any substantial profit shifting requiring a direct FDI link with the countries that we define as tax havens, and the higher profits are achieved there for reasons other than corporate profit shifting.

Table 1: Estimation results of the extended model

	(1) Rate of return	(2) Rate of return – equity component	(3) Rate of return – debt component
Offshore indicator (OI)	-0.132***	-0.106**	-0.0256***
	(0.0439)	(0.0420)	(0.00813)
OI*Low income	Omitted (=base)	Omitted (=base)	Omitted (=base)
OI*Lower-middle income	0.197**	0.175**	0.0232***
	(0.0842)	(0.0820)	(0.00852)
OI*Upper-middle income	0.261***	0.214**	0.0575***
	(0.0934)	(0.0921)	(0.00999)
OI*High income: non-OECD	0.228**	0.223**	0.0376***
	(0.0967)	(0.0964)	(0.00973)
OI*High income: OECD	0.289***	0.282***	0.0137
	0.197**	0.175**	0.0232***
OI*Sub-Saharan Africa	Omitted (=base)	Omitted (=base)	Omitted (=base)
OI*Europe and Central Asia	-0.171**	-0.186**	0.00346
	(0.0831)	(0.0827)	(0.00464)
OI*East Asia and Pacific	-0.142*	-0.161*	0.0153
	(0.0826)	(0.0830)	(0.0101)
OI*Latin America and Caribbean	-0.266***	-0.256***	-0.0122**
	(0.0843)	(0.0846)	(0.00557)
OI*Middle East and North Africa	-0.110	-0.0979	-0.00772*
	(0.0791)	(0.0772)	(0.00413)
OI*North America	-0.144	-0.181*	0.0297***
	(0.0943)	(0.0941)	(0.00973)
OI*South Asia	-0.348**	-0.361***	-0.000383
	(0.142)	(0.139)	(0.0130)
Constant	0.0740***	0.0627***	0.0118***
	(0.0124)	(0.0119)	(0.00313)
Observations	513	502	422
R-squared	0.327	0.353	0.318
Income effects	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes

Source: Authors.

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

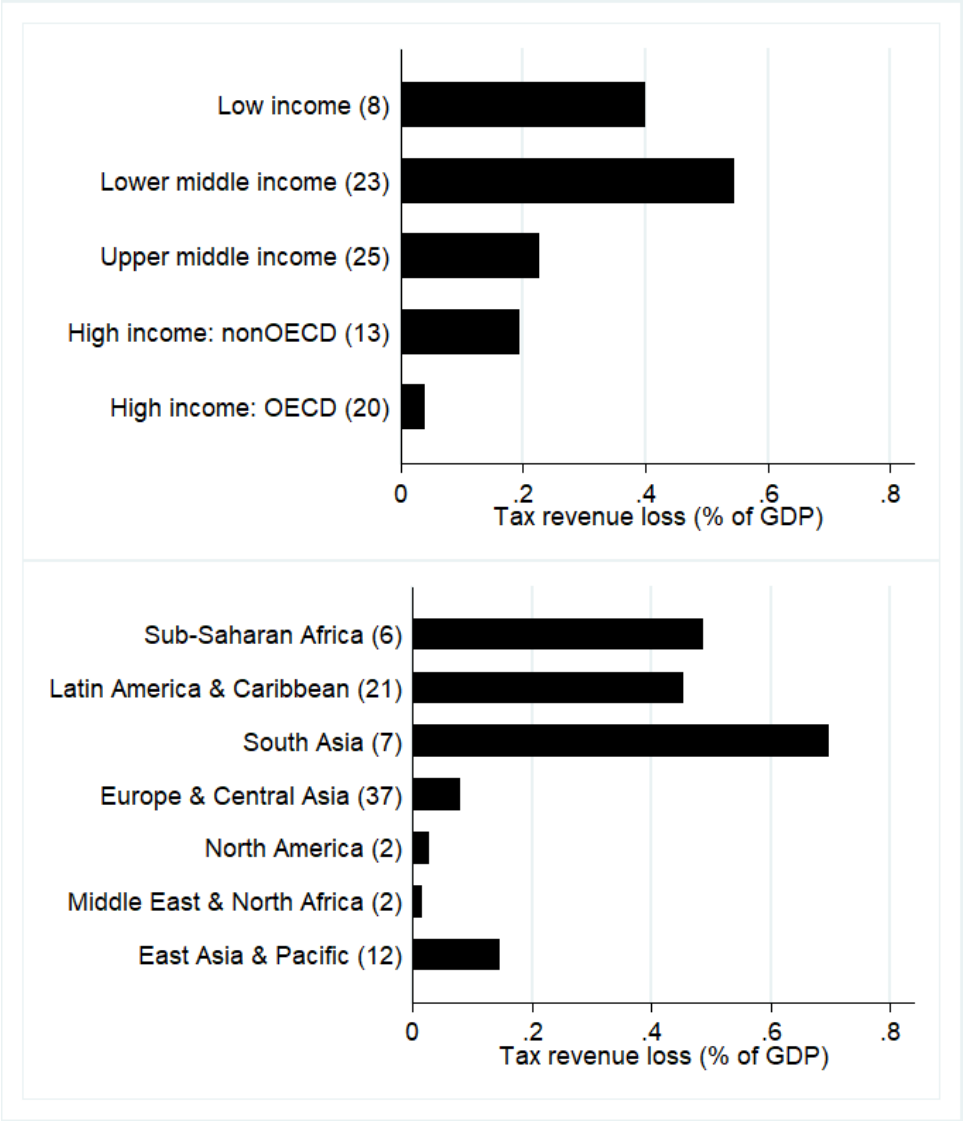
Table 2: Results of the estimation of the extended model – summary of region-income group combinations

Region	Income group	ROR method	ROR – equity component method	No. of countries
South Asia	Low income	-0.467	-0.472	2
South Asia	Lower-middle income	-0.291	-0.274	5
Latin America and Caribbean	Lower-middle income	-0.187	-0.198	6
Latin America and Caribbean	Upper-middle income	-0.148	-0.138	11
Latin America and Caribbean	High income: non-OECD	-0.139	-0.184	9
Europe and Central Asia	Lower-middle income	-0.116	-0.125	8
Sub-Saharan Africa	Low income	-0.106	-0.132	25
East Asia and Pacific	Lower-middle income	-0.091	-0.077	10
Latin America and Caribbean	High income: OECD	-0.080	-0.084	1
Europe and Central Asia	Upper-middle income	-0.077	-0.065	12
Europe and Central Asia	High income: non-OECD	-0.069	-0.110	8
East Asia and Pacific	Upper-middle income	-0.052	-0.016	9
East Asia and Pacific	High income: non-OECD	-0.044	-0.062	7
Middle East and North Africa	Lower-middle income	-0.028	-0.043	6
Europe and Central Asia	High income: OECD	-0.009	-0.010	17
Middle East and North Africa	High income: non-OECD	0.019	-0.029	5

Source: Authors.

Figure 1 presents weighted averages of the shares of estimated tax revenue losses on GDP for income and regional groups. We find evidence in favour of the hypothesis that lower-income countries lose more tax revenue in relative terms than higher-income countries. For low-income, lower-middle-income and upper-middle-income countries, we estimate the total tax revenue losses due to profit shifting at 0.4%, 0.54% and 0.22% of GDP, respectively, which can be considered substantial amounts. On average, our estimates suggest that Sub-Saharan Africa, South Asian, and Latin American and Caribbean countries lose the most significant amounts relative to their GDP.

Figure 1: Estimated tax revenue loss as a share of GDP, by income and region group, 2015.



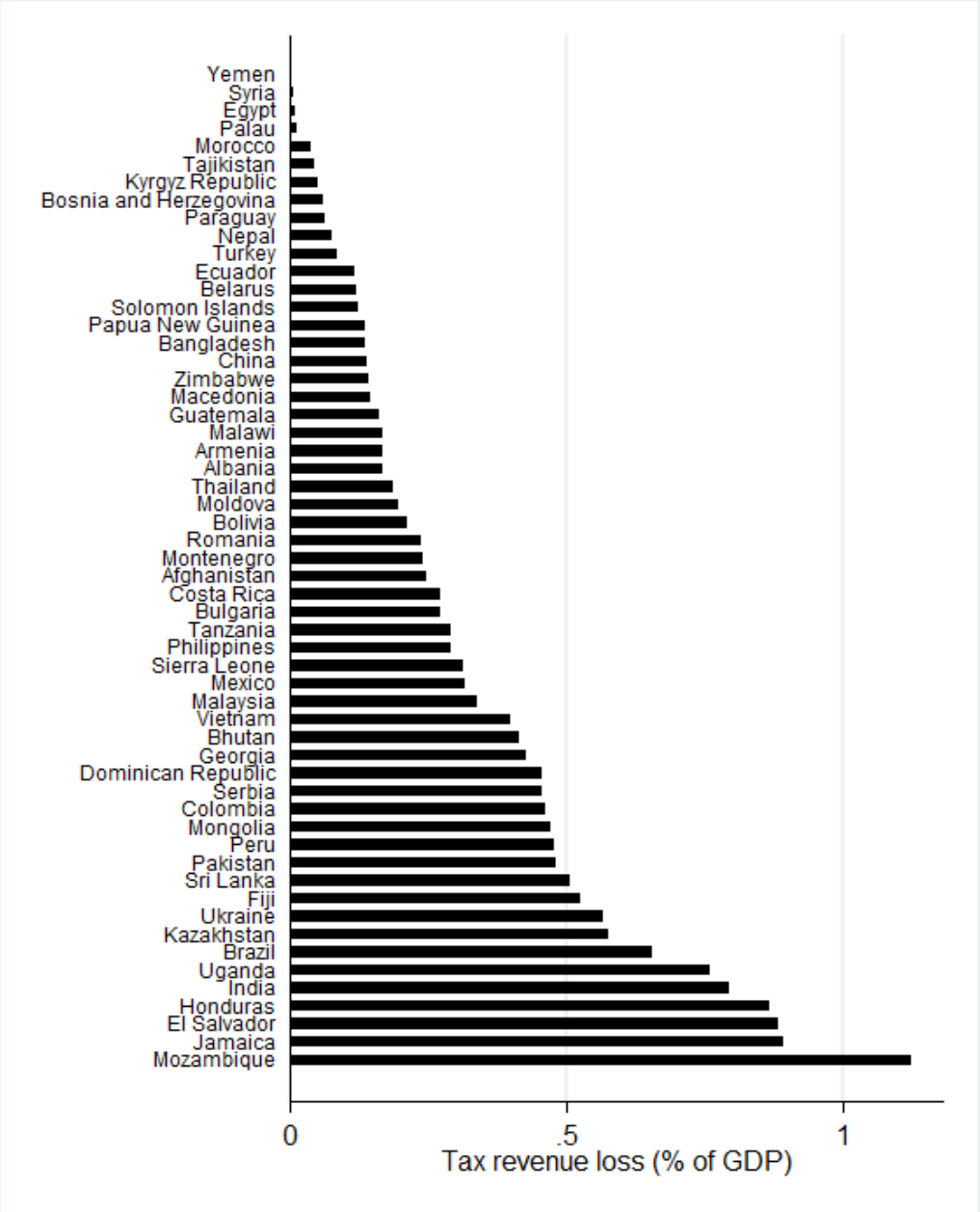
Source: Authors.

Note: The number of countries in each income group is included in parentheses.

Figure 2 shows the estimates of tax revenue losses as shares of GDP for low-income, lower-middle-income and upper-middle-income countries, providing a clearer picture of which lower-income countries' losses contribute most to the high numbers for the three least developed groups of countries in Figure 1. The estimated tax revenue losses for the countries that lose the most reach up to around 1% of GDP.[16]

[16] We present the estimates of tax revenue losses as shares of GDP for two reasons. First, we consider it a suitable indicator for the relative size of the tax revenue losses. Second, and in contrast to some other potentially suitable data such as tax revenues, data on GDP is available for most countries worldwide. Still, we believe it

Figure 2: Estimated tax revenue loss as a share of GDP for low-income, lower-middle-income and upper-middle-income countries, 2015



Source: Authors.

is relevant to present the estimated losses in terms of the total tax revenues or corporate tax revenues. Therefore, in Figures A6 and A7 we present our estimates as shares of corporate tax revenue and total tax revenues, respectively, for all countries in our sample that have data on these tax revenues available in the *Government Revenue Dataset*. They suggest that significant shares of the countries' current tax revenues are relinquished due to profit shifting, with lower-income countries again losing higher shares of corporate tax revenue in relative terms. Furthermore, as reported in Table A5, the correlation between GDP per capita and tax revenue losses as shares of corporate tax revenue is negative at -0.3464 and is statistically significant at the 5% level, underlining our previous results.

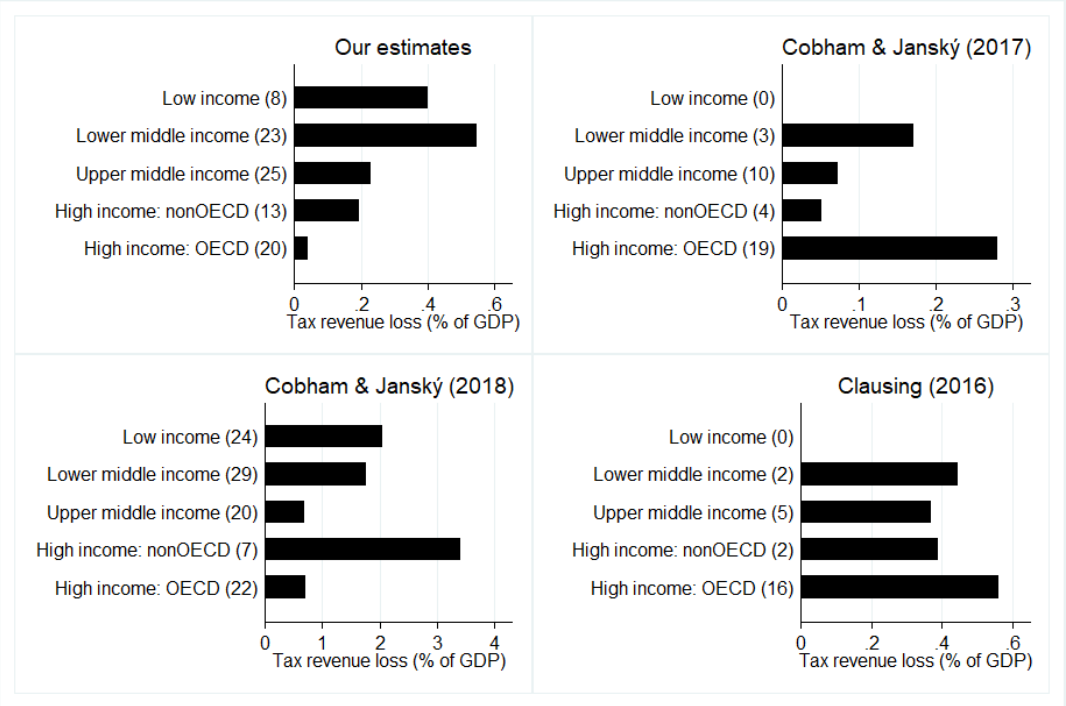
In the final part of this section, we compare our estimates with those obtained by three other recent studies that use different methodologies to derive country-level estimates of tax revenue losses that could be related to profit shifting. Figure A3 in the Appendix shows a direct comparison of our results with those provided by Cobham and Janský (2018), whose approach builds on the spillover methodology developed by IMF's Crivelli et al. (2016), and those provided by Cobham and Janský (2017) and Clausing (2016), who both only focus on US-headquartered MNEs, in contrast to the other studies' intended global coverage. While Cobham and Janský (2017) estimate the misalignment between the location of the profits and the economic activity, Clausing (2016) derives her revenue effect estimates from profits' sensitivity to lower tax rates. All four sets of estimates employ different methodologies (detailed discussion of which is beyond the scope of this paper), samples and scope, making direct comparisons difficult. While recognising the differences and related difficulties, we make these comparisons.[17] Figure 3 compares the various studies' results by showing the estimated tax revenue losses as weighted shares of GDP for the income groups used above. In addition to the average tax revenue loss as a percentage of GDP, we include the number of countries per income group for each of the studies in parentheses.

In the first such comparison made, we find that every study identifies substantial differences across income groups, but the nature of these differences varies across the four studies. There are substantial differences in the weighted averages, for example, around 0.4% of GDP for our estimates and 2% of GDP for Cobham and Janský (2018). Importantly, the number of countries included in the income groups varies greatly. For example, neither Cobham and Janský (2017) nor Clausing (2016) have any low-income country in their sample, while our paper, as well as that by Cobham and Janský (2018), has a relatively good coverage of lower-income countries. While Cobham and Janský (2017) and Clausing (2016) identify high-income, OECD countries and then only lower-middle-income countries as the countries most affected by profit shifting, the results are different for the two studies with better country coverage. Although on different scales, our results and those of Cobham and Janský (2018), with the exception of the smallest group in their sample (high-income, non-OECD countries) point to the similar pattern that, in relative terms, the tax revenues of lower-income countries are generally affected more than those

[17] Although we do provide results in both dollars and relative terms, due to the differences in methodologies and scope of the compared studies, our preference is for the latter, as with our main results discussed above. In order to analyse the disparities between the relative losses of different income groups, we compute the share of each income group on the total global estimated tax revenue losses resulting from profit shifting. Figure A3 thus shows the share for each income group of the total tax revenue losses, as estimated by the four studies. Since these are absolute numbers, it is not surprising that the loss of higher-income economies accounts for the bulk of global tax revenue losses. Moreover, as indicated by the numbers in parentheses in the bar labels of Figures 3, A4 and A5, lower-income countries are strongly underrepresented in the samples of the three above mentioned studies, especially those by Cobham and Janský (2017) and Clausing (2016), a characteristic on which our results improve significantly.

of higher-income countries. This pattern is mostly confirmed by Figure A4, which shows the amount of profit shifted rather than tax revenue losses.[18]

Figure 3: Estimated tax revenue loss as a share of GDP – weighted averages by income group, 2015



Source: Authors, data from Cobham and Janský (2018), Cobham and Janský (2017) and Clausing (2016).

Note: The number of countries in each income group is included in parentheses.

We further analyse correlations between the results from our and the three other papers and GDP per capita to shed more light on the relationship between countries' incomes and their estimated tax revenue losses resulting from profit shifting, and to compare our estimates more rigorously with those reported by similar studies. Tables A5-8 report the correlation coefficients for tax revenue losses as shares of corporate tax revenue, GDP, total tax revenue and in absolute numbers, respectively.[19] Overall, the estimated correlation

[18] The reason we also consider the amount of profit shifted is to ensure that differences in tax rates across countries alone do not cause the heterogeneity in estimates of the tax revenue losses across income groups, as these are calculated as the product of the estimated amount of shifted profit and the nominal corporate tax rate in each country. Nevertheless, as documented by the fact that Figure A5 (which shows the tax revenue losses for each income group in absolute terms) shows similar patterns to Figure A4, the heterogeneity in corporate tax rates at the country level does not play a significant role in the distribution of estimated tax revenue losses among income groups.

[19] A caveat of presenting and comparing these results in terms of shares of corporate and total tax revenue is that, out of the 89 countries for which we provide estimates of tax revenue losses, only 47 and 71 have data available for corporate and total tax revenue, respectively.

coefficients vary across the four studies and the four versions, and most of the correlation coefficients are not different from zero at the standard levels of statistical significance. Still, they suggest that there is some negative correlation between our estimates and GDP per capita, a result that is in support of the findings reported above. Moreover, as best documented by Table A8, our estimates are positively correlated with the results reached by all three other studies, even those that have much lower coverage than our estimates (i.e. Cobham and Janský (2017) with 36 observations and Clausing (2016) with 25 observations), suggesting that the pattern we find using the FDI approach is roughly in line with the results of other efforts to quantify international corporate tax avoidance. While our estimates are, in general, lower in magnitude than those reached by the other studies (for reasons described above), their wide coverage—especially for lower-income countries—makes them particularly suitable for the study of the global distributional impact of international corporate profit shifting.

10.6 Conclusion

In this paper, we have focused on quantifying the scale of one particular aspect of international corporate tax avoidance – profit shifting related to FDI. We began by closely following the methodology of one of the leading works in the area by UNCTAD (2015), what we call a baseline model, using new data to obtain updated estimates. We reach similar results, with a global estimate of lost tax revenue of around 150–200 billion USD, roughly evenly divided between developing and developed countries, with the former incurring much more significant losses in relative terms, whereas our preferred extended model results in a more conservative estimate of around 80 billion USD.

We extend the baseline model in three major ways. First, we use a more sensitive classification of countries by regional and income groups. Second, our model implicitly divides the regional- and income-group effects into those that affect the examined relationship and those that do not. The rationale behind this is that countries within these groups share some common characteristics that have a specific effect on the behaviour of the MNEs that route their investment through tax havens. Our approach has enabled us to capture these effects. Third, we derived country-level estimates using specific corporate tax rates and shares of tax-haven FDI for each country, rather than using averages for the whole sample. This approach, together with the inherent fixed-effects heterogeneity, yields more accurate results at the country level.

We find that lower-income countries lose significantly more revenue in relative terms than higher-income countries, a force that contributes toward widening the gap between rich and poor countries, rather than diminishing it. At the same time, lower-income countries are more likely to be among those that are relatively less able to implement effective tools to reduce the amount of profit shifted out of their countries. Our work thus further corroborates the importance of the wider inclusiveness of initiatives such as the OECD's

Base Erosion and Profit Shifting framework for the tax revenues that developing countries need.

We provide a direct comparison of our estimates with the ones reached by Cobham and Janský (2018), Cobham and Janský (2017) and (Clausing, 2016). We find that every study identifies differences across income groups, but the nature of these differences varies across the four studies, as does their country coverage. We observe that the other existing study with relatively good developing country coverage, Cobham and Janský (2018), is mostly in line with our results, supporting the hypothesis that lower-income countries lose significantly more tax revenue in relative terms than higher-income countries, although in different magnitudes. Furthermore, our estimates are lower in magnitude compared to the other studies, which might be due to several reasons. For example, our methodology captures only those profit-shifting outcomes observable in the FDI data. Also, we exploit the differences in profitability between countries that are exposed to offshore investment to different extents, but we are not able to observe the counterfactual of what the rate of return on FDI would be in case of no profit shifting at all. On the other hand, our approach has a significantly increased coverage compared to most previous studies, and, as we argue, it provides a more suitable tool for analysing the distributional impact of international corporate profit shifting.

Several limitations of our approach persist. First, we have observed a statistically significant negative relationship between the share of inward investment stock originating from tax havens and the rate of return for developing countries, and for groups of other countries too in our extended model. We believe that this relationship can be attributed in part to missing profits due to profit shifting. However, we are not able to estimate how much of this is due to profit shifting and how much is due to other potential reasons for lower profitability. Furthermore, our approach does not provide insight into the likely channels of profit shifting associated with lower returns; it is, however, clear that there exist corporate tax avoidance schemes that do not require a direct investment relationship through equity or debt, and are thus not captured by our estimates.

In addition to addressing these limitations, it would be desirable for further research to focus on the role of various assumptions, including those concerning tax rates—perhaps using average effective tax rates—and on the definition of tax havens, for example by applying various sets of definitions as a robustness check and as a means of learning about which havens are responsible for the estimated revenue losses. An alternative approach to the definition of tax havens could be to focus on continuous measures of tax havens, such as the Financial Secrecy Index, rather than on dichotomous classifications. Furthermore, despite significant data limitations, combining FDI with micro-level data could lead to interesting findings about which industry sectors are exploited the most by the current international tax avoidance schemes.

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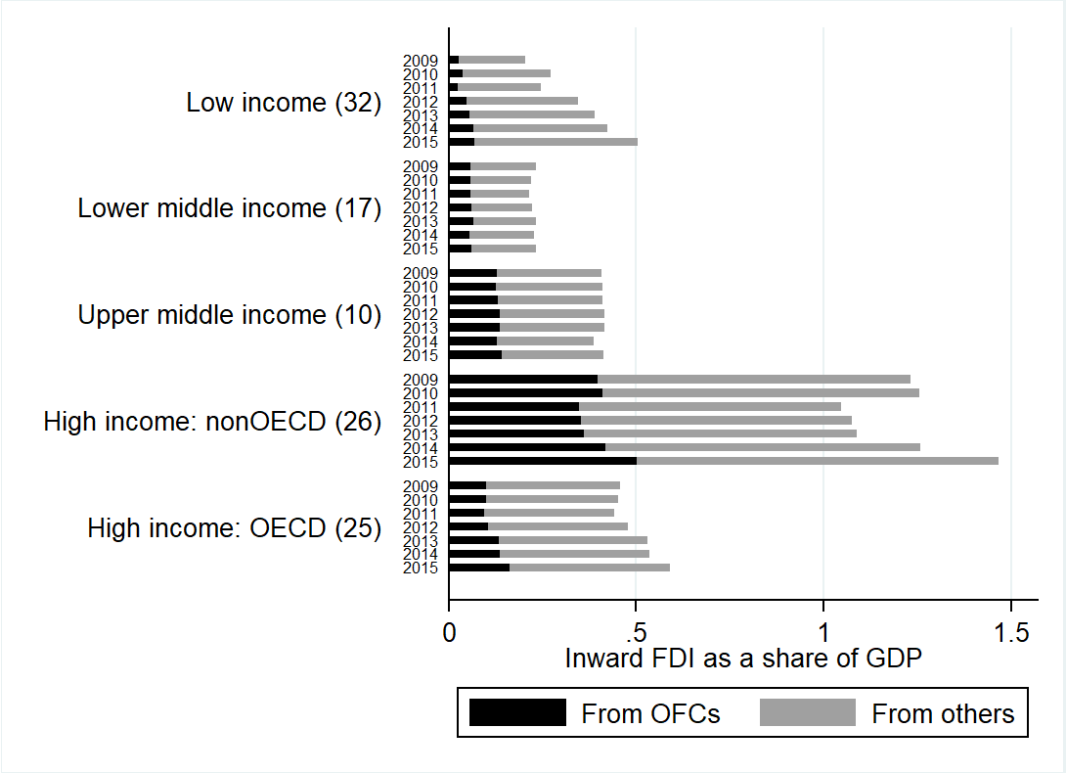
10.8 Appendix

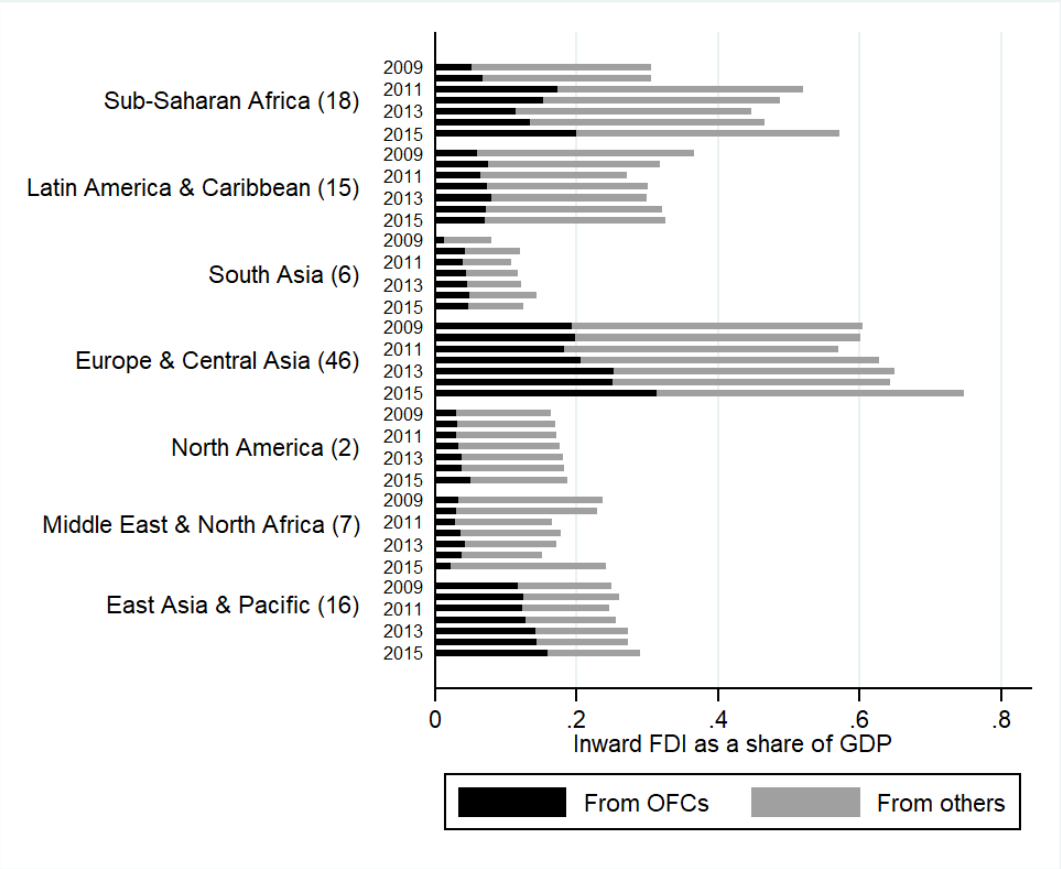
Figure A1: Development of the volume of total inward FDI stock between 2009 and 2015 (as a share of GDP; by income group and origin).



Source: Data from IMF's CDIS; classification by the World Bank; authors' construction.

Note: The classification of 'offshore financial centres' is defined in Section 4. The number of countries in each income group is included in parentheses.

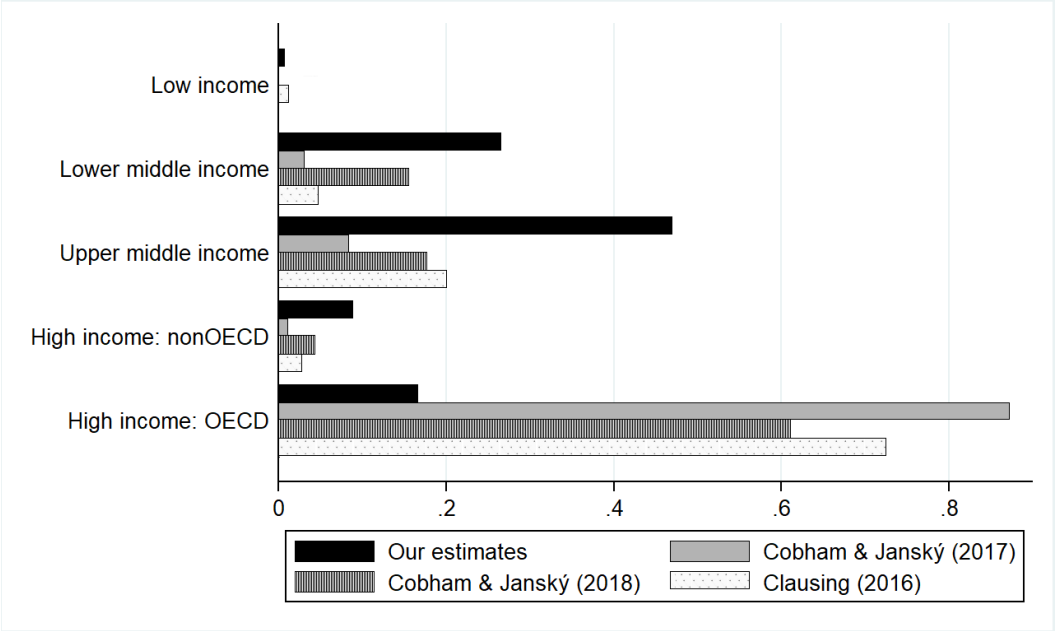
Figure A2: Development of the volume of total FDI stock between 2009 and 2015 (by region and origin).



Source: Data from IMF's CDIS; classification by the World Bank; authors' construction.

Note: The classification of 'offshore financial centres' is defined in Section 4. The number of countries in each income group is included in parentheses.

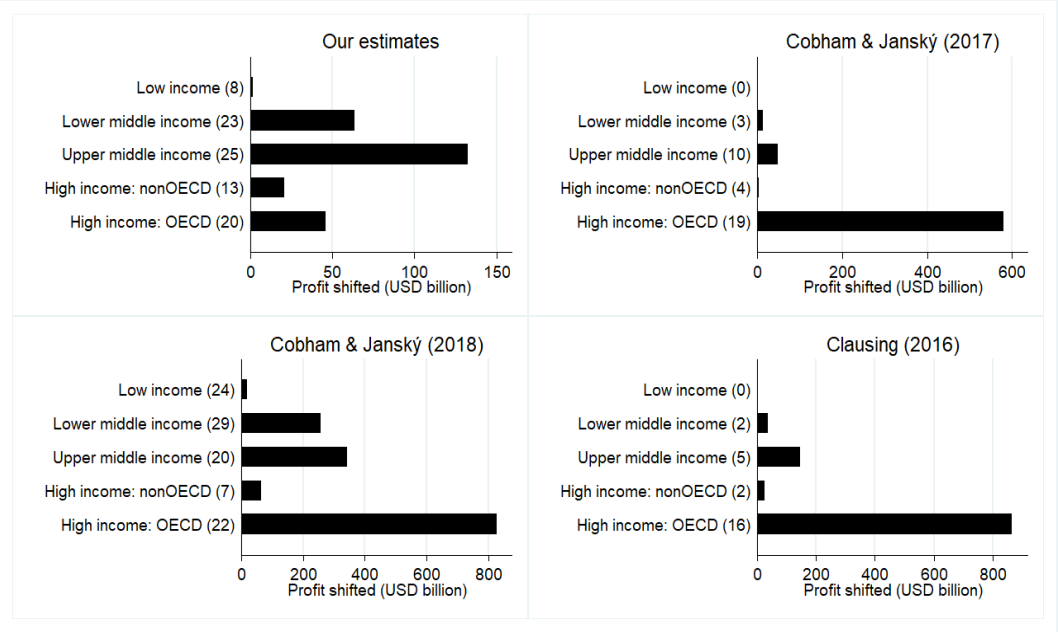
Figure A3: Share of estimated tax revenue losses on total global estimated revenue losses, by income group, 2015.



Source: Authors; data from Cobham and Janský (2017), Cobham and Janský (2018) and Clausing (2016).

Note: The number of countries in each income group is included in parentheses.

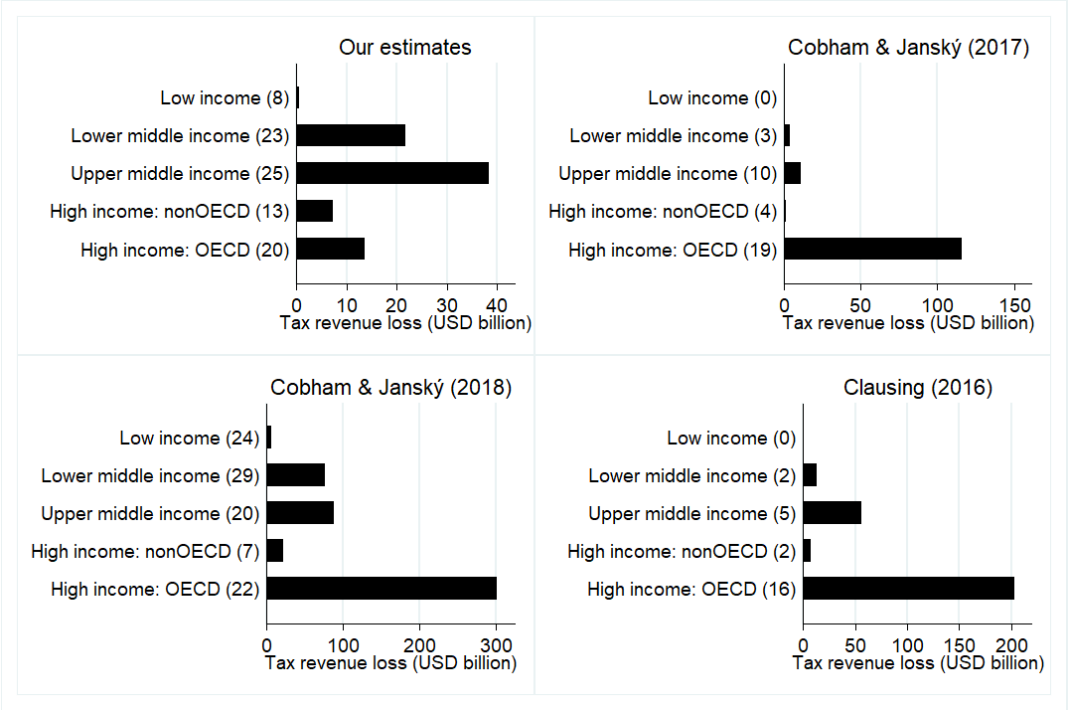
Figure A4: Estimated profit shifted out of countries – sums by income group, 2015.



Source: Authors; data from Cobham and Janský (2017), Cobham and Janský (2018) and Clausing (2016).

Note: The number of countries in each income group is included in parentheses.

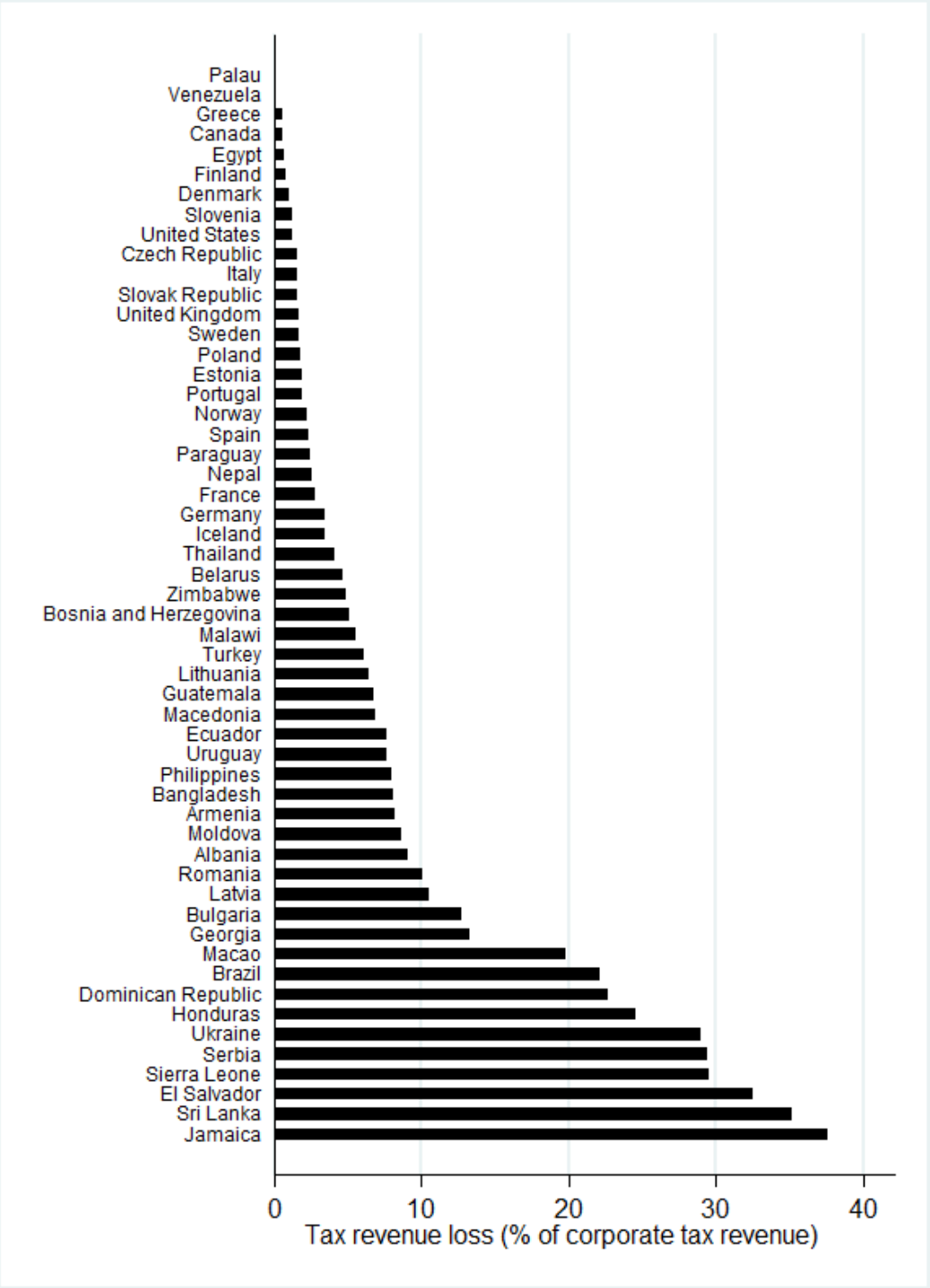
Figure A5: Estimated tax revenue losses – sums by income group, 2015.



Source: Authors; data from Cobham and Janský (2017), Cobham and Janský (2018) and Clausing (2016).

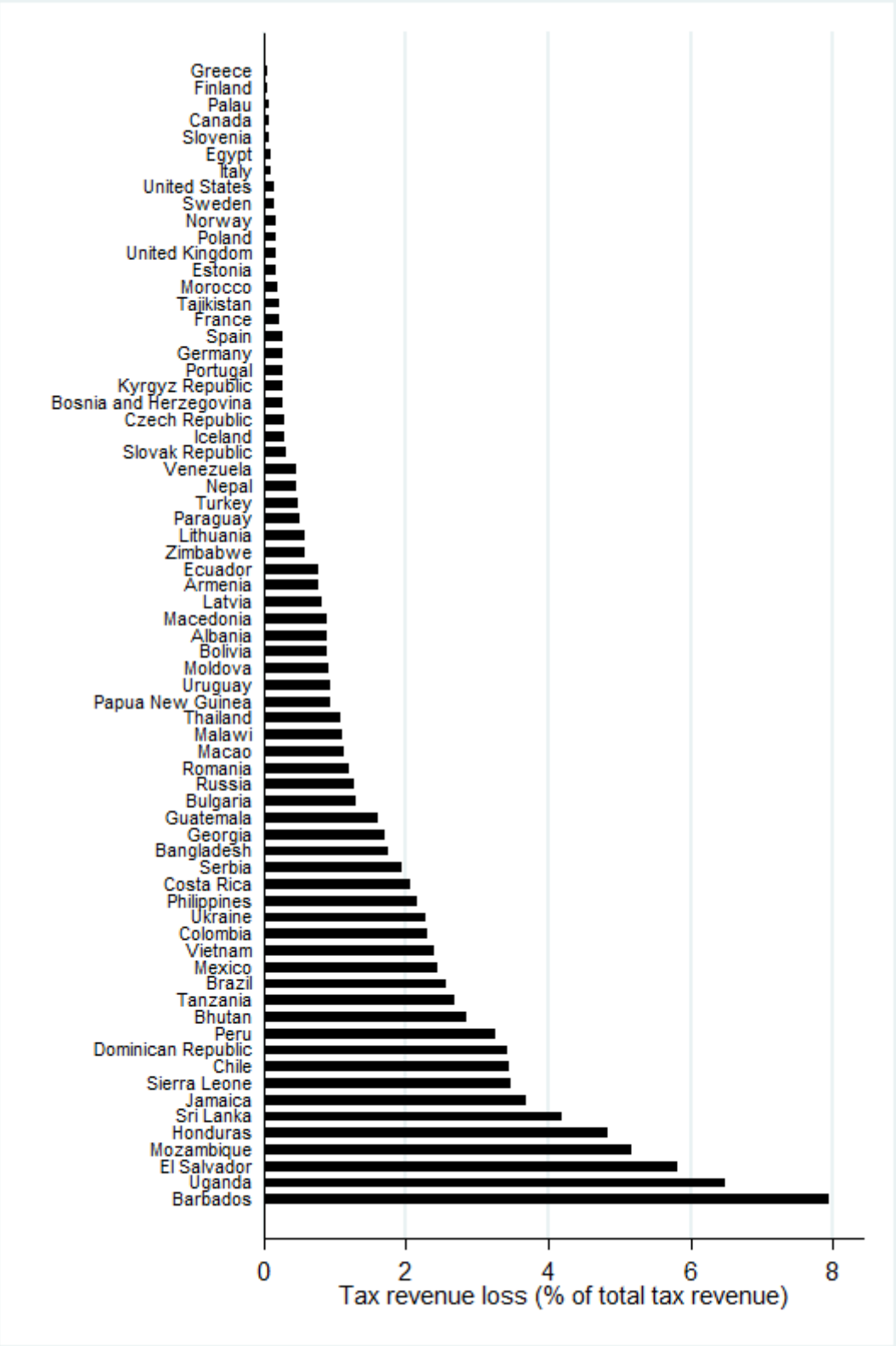
Note: The number of countries in each income group is included in parentheses.

Figure A6: Share of estimated tax revenue losses on corporate tax revenue, 2015



Source: Authors.

Figure A7: Share of estimated tax revenue losses on total tax revenue, 2015



Source: Authors.

Table A1: Summary statistics of the used variables

Variable	Obs	Mean	Std. Dev.	Min	Max	Source
Rate of return on FDI (%)	513	6.9301	4.9019	0	25.3039	IMF BoP
Rate of return on FDI - equity component (%)	502	6.4044	5.0152	0	25.2433	IMF BoP
Rate of return on FDI - debt component (%)	422	0.7048	0.7164	0	4.7702	IMF BoP
Share of FDI from OFCs	538	0.2504	0.1464	0	0.7210	IMF CDIS
Inward FDI stock (USD billion)	538	182	417	0.147	3120	IMF CDIS
Inward FDI stock (USD billion)	1066	112	404	0.0046	5590	UNCTAD
GDP (USD billion)	1296	395	1590	0.0271	18600	WB, UN, CIA
Nominal corporate tax rate (%)	756	24.5541	8.2794	0	55	KPMG, WB
Total corporate tax revenue (% of GDP)	542	2.5268	1.3326	0	14.0881	GRD
Total tax revenue (% of GDP)	898	17.0100	7.2575	0.6074	54.3056	GRD

Source: Authors; data from IMF's CDIS and UNCTAD's FDI database.

*Note: Only the basic statistics displayed. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

Table A2: Regression of the offshore indicator on the rate of return

	Dependent variable: FDI rate of return			Dependent variable: equity component of FDI rate of return			Dependent variable: debt component of FDI rate of return		
	All	Developing	Developed	All	Developing	Developed	All	Developing	Developed
Offshore indicator	-.0395** (.0177)	-.0824*** (.0299)	-.049 (.0429)	-.0558*** (.0182)	-.1036*** (.03)	-.0557 (.0437)	.0104*** (.0033)	.0162*** (.0055)	.008 (.0066)
No. of obs.	477	215	188	464	209	181	402	160	175
R^2	0.278	0.289	0.102	0.309	0.303	0.108	0.236	0.177	0.152

Source: Authors; data from IMF's CDIS and UNCTAD's FDI database.

*Note: Only the basic statistics displayed. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

Table A3: Estimating the size of profit shifting, 2015.

		A	B	C = A*B	D	E = D*C	F	G = E/(1-F)	
	Model	Estimate from the regression	Exposure to tax haven investment	Estimated profitability gap	Reported FDI stock (billion USD)	Simulated profit shifting (after-tax, billion USD)	Average corporate tax rate weighted by FDI income	Simulated profit shifting (pre-tax, billion USD)	Tax revenue losses (billion USD)
All countries	Our results – ROR	.0395**	41.54%	.0164	19,570	320.95	28.20 %	447	126.05
	Our results – ROReq	.0558**	41.54%	.0232	19,570	454.02	28.20 %	632.34	178.32
Developing countries	UNCTAD (2015) – ROR	.115***	46%	.053	5,000	265	20%	331	66
	UNCTAD (2015) – ROReq	.158***	46%	.072	5,000	360	20%	450	90
	Our results – ROR	.0824***	51.99%	.0428	6,370	272.64	24.97 %	363.37	90.73
	Our results – ROReq	.1036***	51.99%	.0539	6,370	343.34	24.97 %	457.6	114.26
Developed countries	Our results – ROR	.049	37%	.0181	13,190	238.74	29.9%	340.57	101.83
	Our results – ROReq	.0557	37%	.0206	13,190	271.71	29.9%	387.6	115.89

*Source: Authors' construction; UNCTAD (2015). *** p<0.01, ** p<0.05, * p<0.1.*

Table A4: Estimated tax revenue losses and their share on GDP. Global model, developed and developing countries model, and extended model's rate of return and rate of return on equity method, 2015

	Global model	Developed and developing countries model	Extended model			
Country	ROR – equity component	ROR – equity component	ROR – equity component, 2015 (USD million)	ROR – equity component, 2015 (% of GDP)	ROR – equity component, 2015 (% of corporate tax revenue)	ROR – equity component, 2015 (% of total tax revenue)
Sint Maarten	6.81	5.44	13.64	3.73		
Barbados	46.14	36.91	92.44	2.09		7.95
Trinidad and Tobago	192.44	153.96	385.60	1.64		
Mozambique	109.50	87.60	166.38	1.12		5.18
Jamaica	59.88	47.91	127.48	0.89	37.57	3.69
El Salvador	85.74	68.59	230.19	0.88	32.43	5.82
Honduras	67.50	54.00	181.23	0.87	24.55	4.83
India	4010.97	3208.82	16785.27	0.79		
Uganda	139.63	111.71	212.15	0.76		6.50
Brazil	5565.61	4452.56	11847.49	0.66	22.11	2.57
Kazakhstan	958.08	766.48	1065.90	0.58		
Chile	1211.25	969.01	1391.52	0.57		3.44
Ukraine	309.90	247.92	517.08	0.57	28.92	2.28
Fiji	30.63	24.51	23.08	0.53		
Sri Lanka	98.05	78.44	410.34	0.51	35.14	4.20
Curaçao	7.78	6.23	15.59	0.50		
Pakistan	312.99	250.39	1309.79	0.48		
Peru	426.65	341.33	908.21	0.48		3.26
Mongolia	73.46	58.77	55.35	0.47		
Colombia	635.69	508.56	1353.20	0.46		2.31
Serbia	152.77	122.22	169.96	0.46	29.35	1.93
Dominican Republic	145.97	116.78	310.73	0.46	22.69	3.41
Croatia	215.89	172.72	213.20	0.44		
Georgia	36.05	28.84	60.15	0.43	13.31	1.70
Bhutan	2.05	1.64	8.58	0.42		2.85
Vietnam	588.29	470.64	770.32	0.40		2.40
Argentina	1049.33	839.48	2102.54	0.36		
Malaysia	1331.33	1065.08	1003.04	0.34		
Macao	232.83	186.27	146.31	0.32	19.81	1.14

Mexico	1719.46	1375.59	3660.21	0.32		2.44
Sierra Leone	8.77	7.02	13.33	0.31	29.51	3.48
Philippines	655.92	524.74	858.87	0.29	7.97	2.15
Tanzania	87.61	70.09	133.11	0.29		2.68
Bulgaria	122.80	98.25	136.62	0.27	12.77	1.30
Costa Rica	70.06	56.04	149.13	0.27		2.06
Afghanistan	7.31	5.85	48.97	0.25		
Montenegro	8.76	7.01	9.75	0.24		
Russia	3292.13	2633.74	3251.07	0.24		1.28
Romania	379.10	303.28	421.76	0.24	10.10	1.19
Bolivia	26.20	20.96	70.34	0.21		0.90
Moldova	7.71	6.17	12.87	0.20	8.63	0.91
Thailand	1002.94	802.36	755.63	0.19	4.13	1.08
Uruguay	45.57	36.45	91.30	0.17	7.66	0.93
Albania	17.43	13.94	19.39	0.17	9.04	0.89
Latvia	46.08	36.86	45.50	0.17	10.56	0.82
Armenia	10.62	8.50	17.72	0.17	8.17	0.78
Malawi	7.06	5.65	10.72	0.17	5.55	1.11
Guatemala	38.85	31.08	104.30	0.16	6.77	1.61
Macedonia	13.31	10.65	14.81	0.15	6.85	0.89
Zimbabwe	15.24	12.19	23.16	0.14	4.84	0.58
China	20387.26	16310.05	15360.05	0.14		
Bangladesh	64.65	51.72	270.56	0.14	8.12	1.75
Papua New Guinea	28.86	23.08	37.78	0.14		0.93
Solomon Islands	1.07	0.86	1.41	0.12		
Belarus	61.88	49.50	68.84	0.12	4.60	
Ecuador	56.15	44.92	119.53	0.12	7.57	0.77
Lithuania	41.22	32.97	40.70	0.10	6.40	0.57
Iceland	124.31	99.45	16.49	0.10	3.42	0.30
Venezuela	192.78	154.23	386.28	0.09		0.45
Turkey	665.31	532.25	740.18	0.09	6.03	0.48
Nepal	2.42	1.94	16.21	0.08	2.54	0.45
Paraguay	8.44	6.76	17.97	0.07	2.47	0.51
Bosnia and Herzegovina	8.93	7.15	9.94	0.06	5.08	0.27
Portugal	917.90	734.33	121.78	0.06	1.94	0.27
Germany	15027.95	12022.53	1993.87	0.06	3.40	0.26
France	10515.67	8412.66	1395.19	0.06	2.71	0.21

Slovak Republic	370.07	296.06	49.10	0.06	1.60	0.31
Czech Republic	781.29	625.04	103.66	0.06	1.57	0.30
Spain	5002.58	4002.12	663.73	0.06	2.29	0.25
Kyrgyz Republic	2.10	1.68	3.51	0.05		0.27
Sweden	1907.41	1525.95	253.07	0.05	1.72	0.16
Tajikistan	2.19	1.75	3.65	0.05		0.21
Taiwan	808.27	646.63	507.92	0.05		
United Kingdom	8978.75	7183.11	1191.28	0.04	1.68	0.17
Norway	1197.96	958.38	158.94	0.04	2.22	0.16
Morocco	99.55	79.64	40.69	0.04		0.19
Estonia	67.19	53.76	8.92	0.04	1.89	0.18
Italy	4486.35	3589.13	595.24	0.03	1.59	0.11
Poland	1169.49	935.60	155.16	0.03	1.77	0.16
United States	72590.23	58073.04	5050.94	0.03	1.28	0.14
Denmark	603.73	482.99	80.10	0.03	1.03	
Canada	4155.76	3324.65	289.16	0.02	0.59	0.07
Slovenia	57.09	45.67	7.57	0.02	1.20	0.08
Finland	281.16	224.93	37.30	0.02	0.74	0.05
Palau	0.05	0.04	0.04	0.01		0.07
Greece	177.65	142.12	23.57	0.01	0.56	0.05
Egypt	88.69	70.95	36.25	0.01	0.63	0.10
Syria	9.82	7.86	4.01	0.01		
Yemen	0.56	0.45	0.23	0.00		
Qatar	41.62	33.30				
Kuwait	29.10	23.28				
Japan	1906.10	1524.91				
Oman	30.84	24.67				
South Korea	950.07	760.07				
Saudi Arabia	632.53	506.03				
New Zealand	338.88	271.11				
Kenya	35.12	28.10				
Australia	3464.27	2771.45				
Cape Verde	1.61	1.29				
United Arab Emirates	1533.95	1227.18				
Angola	95.19	76.15				
Cameroon	52.33	41.87				

Sudan	183.26	146.61				
Nigeria	927.21	741.78				
Ghana	122.67	98.14				
Botswana	33.54	26.83				
South Africa	1028.99	823.20				
Namibia	42.14	33.71				
Zambia	128.85	103.08				
Total	188207.15	150567.94	81586.15			

Source: Authors.

Table A4: Estimated tax revenue losses and their share on GDP. Global model, developed and developing countries model, and extended model's rate of return and rate of return on equity method, 2015 (continued)

	Extended model			
Country	ROR (USD million)	ROR (% of GDP)	ROR (% of corporate tax revenue)	ROR (% of total tax revenue)
Sint Maarten	17.96	4.91		
Barbados	121.74	2.75		10.47
Trinidad and Tobago	507.81	2.16		
Mozambique	207.06	1.40		6.44
Jamaica	118.95	0.83	35.05	3.44
El Salvador	244.42	0.94	34.44	6.18
Honduras	192.43	0.92	26.07	5.13
India	15783.01	0.75		
Uganda	264.03	0.95		8.08
Brazil	11055.19	0.61	20.63	2.40
Kazakhstan	892.01	0.48		
Chile	1454.26	0.60		3.60
Ukraine	556.41	0.61	31.12	2.46
Fiji	7.24	0.16		
Sri Lanka	385.84	0.48	33.04	3.95
Curaçao	20.53	0.66		
Pakistan	1231.58	0.45		
Peru	847.47	0.45		3.04
Mongolia	17.37	0.15		
Colombia	1262.71	0.43		2.15
Serbia	142.23	0.38	24.57	1.62
Dominican Republic	289.95	0.43	21.17	3.19
Croatia	341.86	0.70		
Georgia	64.72	0.46	14.33	1.83
Bhutan	8.07	0.39		2.68
Vietnam	647.65	0.34		2.02
Argentina	2768.94	0.47		
Malaysia	314.86	0.11		
Macao	206.97	0.46	28.02	1.61
Mexico	3415.43	0.30		2.28

Sierra Leone	16.59	0.39	36.72	4.33
Philippines	722.10	0.25	6.70	1.81
Tanzania	165.66	0.36		3.33
Bulgaria	114.34	0.23	10.68	1.08
Costa Rica	139.15	0.25		1.93
Afghanistan	49.56	0.25		
Montenegro	8.16	0.20		
Russia	5212.94	0.38		2.05
Romania	352.95	0.20	8.45	1.00
Bolivia	74.69	0.23		0.96
Moldova	13.85	0.21	9.28	0.98
Thailand	237.19	0.06	1.30	0.34
Uruguay	120.24	0.23	10.09	1.22
Albania	16.22	0.14	7.56	0.74
Latvia	72.96	0.27	16.93	1.31
Armenia	19.07	0.18	8.79	0.84
Malawi	13.34	0.21	6.91	1.38
Guatemala	110.75	0.17	7.19	1.71
Macedonia	12.39	0.12	5.74	0.74
Zimbabwe	28.82	0.18	6.02	0.72
China	4821.60	0.04		
Bangladesh	254.41	0.13	7.64	1.64
Papua New Guinea	31.77	0.12		0.79
Solomon Islands	1.18	0.10		
Belarus	57.61	0.10	3.85	
Ecuador	111.54	0.11	7.07	0.72
Lithuania	65.26	0.16	10.25	0.91
Iceland	18.07	0.11	3.74	0.32
Venezuela	508.71	0.12		0.60
Turkey	619.42	0.07	5.05	0.40
Nepal	16.41	0.08	2.57	0.46
Paraguay	16.77	0.06	2.30	0.48
Bosnia and Herzegovina	8.32	0.05	4.25	0.23
Portugal	133.40	0.07	2.12	0.29
Germany	2183.99	0.06	3.72	0.29
France	1528.23	0.06	2.97	0.24
Slovak Republic	53.78	0.06	1.76	0.34
Czech Republic	113.54	0.06	1.72	0.32
Spain	727.02	0.06	2.51	0.28

Kyrgyz Republic	3.78	0.06		0.29
Sweden	277.20	0.06	1.88	0.17
Tajikistan	3.93	0.05		0.22
Taiwan	718.49	0.06		
United Kingdom	1304.87	0.05	1.84	0.18
Norway	174.10	0.05	2.43	0.18
Morocco	62.07	0.06		0.29
Estonia	9.77	0.04	2.08	0.19
Italy	652.00	0.04	1.74	0.12
Poland	169.96	0.04	1.93	0.18
United States	-28428.81	-0.16	-7.18	-0.80
Denmark	87.74	0.03	1.13	
Canada	-1627.54	-0.10	-3.34	-0.39
Slovenia	8.30	0.02	1.32	0.09
Finland	40.86	0.02	0.81	0.06
Palau	0.01	0.00		0.02
Greece	25.82	0.01	0.61	0.05
Egypt	55.30	0.02	0.96	0.16
Syria	6.12	0.01		
Yemen	0.35	0.00		
Qatar				
Kuwait				
Japan				
Oman				
South Korea				
Saudi Arabia				
New Zealand				
Kenya				
Australia				
Cape Verde				
United Arab Emirates				
Angola				
Cameroon				
Sudan				
Nigeria				
Ghana				
Botswana				
South Africa				
Namibia				

Zambia				
Total	66694.80			

Source: Authors.

Table A5: Correlations between GDP per capita and estimated tax revenue losses as shares of corporate tax revenues.

	GDP per capita	Our estimates	Cobham and Janský (2018)	Cobham and Janský (2017)	Clausing (2016)
GDP per capita	1				
Our estimates	-0.3464** (0.0119)	1			
Cobham and Janský (2018)	-0.4895*** (0.0021)	0.5912*** (0.0009)	1		
Cobham and Janský (2017)	-0.0257 (0.9096)	0.0892 (0.7336)	0.2537 (0.3096)	1	
Clausing (2016)	0.43* (0.0749)	0.2207 (0.4484)	0.5048 (0.0785)	0.532* (0.0613)	1

Source: Authors; data from the World Bank; Cobham and Janský (2018), Cobham and Janský (2017) and Clausing (2016).

*Note: p-values in parentheses, * p<0.1, ** p<0.05, *** p<0.01.*

Table A6: Correlations between GDP per capita and estimated tax revenue losses as shares of GDP.

	GDP per capita	Our estimates	Cobham and Janský (2018)	Cobham and Janský (2017)	Clausing (2016)
GDP per capita	1				
Our estimates	-0.1676 (0.1186)	1			
Cobham and Janský (2018)	-0.3864*** (0.0001)	0.3210** (0.0296)	1		
Cobham and Janský (2017)	-0.202 (0.2444)	0.3308* (0.0988)	0.0719 (0.7269)	1	
Clausing (2016)	0.3001 (0.1449)	0.1817 (0.4566)	0.3863 (0.1394)	0.0142 (0.9556)	1

Source: Authors; data from the World Bank, Cobham and Janský (2018), Cobham and Janský (2017) and Clausing (2016).

*Note: p-values in parentheses, * p<0.1, ** p<0.05, *** p<0.01*

Table A7: Correlations between GDP per capita and estimated tax revenue losses as shares of total tax revenues.

	GDP per capita	Our estimates	Cobham and Janský (2018)	Cobham and Janský (2017)	Clausing (2016)
GDP per capita	1				
Our estimates	-0.3531*** (0.0029)	1			
Cobham and Janský (2018)	-0.3142** (0.0115)	0.4792*** (0.0027)	1		
Cobham and Janský (2017)	-0.1803 (0.3681)	0.498** (0.0184)	0.1597 (0.5012)	1	
Clausing (2016)	-0.078 (0.7299)	0.4803* (0.0597)	0.7535*** (0.0029)	0.1256 (0.6429)	1

Source: Authors; data from the World Bank, Cobham and Janský (2018), Cobham and Janský (2017) and Clausing (2016).

*Note: p-values in parentheses, * p<0.1, ** p<0.05, *** p<0.01*

Table A8: Correlations between GDP per capita and estimated tax revenue losses (in USD)

	GDP per capita	Our estimates	Cobham and Janský (2018)	Cobham and Janský (2017)	Clausing (2016)
GDP per capita	1				
Our estimates	-0.0102 (0.9252)	1			
Cobham and Janský (2018)	0.2678*** (0.0068)	0.525*** (0.0002)	1		
Cobham and Janský (2017)	0.2817 (0.1011)	0.1443 (0.4818)	0.9159*** (0)	1	
Clausing (2016)	0.2932 (0.1549)	0.3273 (0.1713)	0.9705*** (0)	0.8895*** (0)	1

Source: Authors; data from the World Bank, Cobham and Janský (2018), Cobham and Janský (2017) and Clausing (2016).

*Note: p-values in parentheses, * p<0.1, ** p<0.05, *** p<0.01*