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**Working Paper**

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IES Working Paper, No. 19/2018

**Provided in Cooperation with:**

Charles University, Institute of Economic Studies (IES)

*Suggested Citation:* Jansky, Petr (2018) : Estimating the revenue costs of tax treaties in developing countries, IES Working Paper, No. 19/2018, Charles University in Prague, Institute of Economic Studies (IES), Prague

This Version is available at:

<https://hdl.handle.net/10419/203197>

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# Estimating the Revenue Costs of Tax Treaties in Developing Countries

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IES Working Paper: 19/2018



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**Bibliographic information:**

Jansky P. (2018): "Estimating the Revenue Costs of Tax Treaties in Developing Countries" IES Working Papers 19/2018. IES FSV. Charles University.

This paper can be downloaded at: <http://ies.fsv.cuni.cz>

# Estimating the Revenue Costs of Tax Treaties in Developing Countries

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August 2018

## **Abstract:**

Tax treaties between countries influence how much tax revenues governments receive from multinational enterprises. These treaties often reduce the withholding tax rates on outgoing dividend and interest payments. We provide illustrative estimates of costs for these two taxes for 14 developing countries in sub-Saharan Africa and Asia in a first multi-country comparison of this kind. These might be overestimates because we assume that foreign direct investments are not influenced by the tax treaties. We estimate that the highest potential tax revenue losses are within hundreds of millions USD and around 0.1% of GDP, with Philippines incurring the highest losses both in USD and relative to GDP. We also find that around 95% of the losses is due to dividends and that only four investor countries - Japan, Netherlands, Switzerland, and Singapore - are together responsible for more than half of the losses. We discuss the limitations of these estimates and how future research could improve their quality as well as coverage.

**JEL:** F21; F23; H25; H26

**Keywords:** foreign direct investment; multinational enterprises; tax treaty; double taxation agreement; withholding tax; developing countries

# 1 Introduction

Foreign direct investment (FDI) by multinational enterprises (MNEs) is given substantial weight by an expanding number of developing countries. How much tax revenue developing countries' governments gain from this investment is influenced by their bilateral tax treaties with the MNEs' investor countries. Bilateral tax treaties, or double taxation agreements (DTAs), are signed by two countries to divide up the right to tax cross-border economic activity between them. While these tax treaties can increase investment and thus the tax base, of which Neumayer (2007) finds some evidence for middle- but not low-income countries, they often reduce the applicable tax rates; we focus on the effects of this latter aspect. Paolini et al. (2016) use a theoretical model to show under which conditions a developing and a developed country will voluntarily sign a tax treaty where the developing country is more inclined to share the information with the developed country and whether they should share revenues. Among others, Hearson (2016) argues that when one of the signatories is a developing country that is predominantly a recipient of foreign investment, the effect of the tax treaty is to impose constraints on its ability to tax inward investors. We attempt here to find out what the impact of this effect on tax revenues is, for as many developing countries as possible.

The existing literature on the revenue costs of tax treaties is limited and we are only aware of six specific estimates so far and each centred around one country only. McGauran (2013), in an impact assessment made jointly with colleague Fernandez, estimated dividend- and interest-related tax revenue losses of 770 million euros in 2011 for developing countries because of lower withholding tax rates in the developing countries' tax treaties with the Netherlands. Also for the Netherlands, Weyzig provided revenue estimates for a few countries and the Dutch special purpose entities in the concluding chapter of his dissertation (Weyzig 2013). The International Monetary Fund (IMF, 2014, p. 27) estimated tax revenue losses of 1.6 billion US dollars in 2010 for non-OECD countries that had tax treaties with the United States. ActionAid (2016) estimated that Bangladesh might have lost up to 85 million US dollars in 2013 due to dividend tax breaks in its treaties with thirty other countries. Van de Poel (2016) calculated the impact of the reduction of tax rates in Belgian tax treaties on the government revenues for dividends and interest earnings. He estimates the total loss for developing countries in 2012 at around 35 million euros, with Brazil and the Democratic Republic of Congo losing most (€ 9,44 million and € 7,83 million, respectively). While van de Poel (2016) notes that only 3% of Belgium's overall FDI's stock is located in a developing country with which it signed a tax treaty, he also argues that these are very conservative estimates because he focuses on one developed country only and only two provisions in tax treaties.

Most recently, the World Bank's Balabushko, Beer, Loeprick, & Vallada (2017) provide perhaps the most rigorous quantification of the revenue effects of tax treaties for one country, Ukraine. They exploit administrative data to estimate the tax sensitivity of dividend, interest, and royalty payments. While they find what they call direct revenue costs of high magnitude, the estimated elasticities are also high and imply that increases in withholding rates at the individual treaty partner level might not necessarily result in increased revenue. Additionally, they use firm-level data to show that the reported profitability of MNE affiliates is sensitive to changes in the relevant treaty network. Due to data limitations, in this paper we estimate what they call the mechanical (or static), and not the behavioural (or dynamic), revenue effect of tax treaty withholding rates by multiplying dividend and interest payments to a country by the differential of the applicable general withholding tax rate and the rate negotiated in the country-specific treaty. In this paper we thus provide estimates of how much revenue would increase if a higher withholding rate applied. However, in contrast with Balabushko, Beer,

Loeprick, & Vallada (2017) for Ukraine, we do not have access to such detailed data for the developing countries in our sample and we do not provide estimates of how much the investments and the associated tax base would change and what revenue implications this would have if there were a tax treaty change. The investments and the associated tax revenue would likely decrease following the increase in an applicable withholding rate, and we use the potential scale of this adjustment estimated by Balabushko, Beer, Loeprick, & Vallada (2017) while discussing our results below. For Ukraine and its five most important partner countries in a given payment, they estimate the losses at 144 (and 169 without reflecting the behavioural change) million US dollars in 2014 for dividends and at 52 (and 184) million US dollars in 2012 for interest payments.

In this paper we aim to estimate the impact the tax treaties might have on tax revenue for as many developing countries as possible. We focus on the potential tax revenue losses, or revenue foregone, stemming from the fact that the withholding tax rates for dividends and interest payments granted in tax treaties are lower than those that would apply otherwise. Methodologically we build on the existing literature, especially the estimates by McGauran & Fernandez (2013) for the Netherlands and by ActionAid (2016) for Bangladesh. We aim to apply a similar empirical approach to as wide range of developing countries as possible, limited only by the availability of the data. We rely on detailed information about developing countries' tax treaties from the ActionAid Tax Treaties Dataset introduced by Hearson (2016) and we use cross-country information on FDI stocks and incomes from the IMF. Like the previous estimates, we make a number of assumptions when approximating the revenue losses, which we set out in the methodology section.

Most importantly, our estimates are based on the assumption that investment flows and stocks and thus the related payments as tax bases would not change if the withholding rates changed. We make this assumption because we do not have data available to estimate this sensitivity. However, we do discuss the potential implications of it, with reference to the empirical estimates of the same sensitivity for Ukraine by Balabushko, Beer, Loeprick, & Vallada (2017). Due to this and other assumptions, including the need to disaggregate the IMF's unilateral FDI income data into bilateral data, our estimates are only illustrative and imprecise, much like the existing estimates for the Netherlands and Bangladesh. Another limitation is that, similarly to the existing literature, we only estimate the revenue effects of selected FDI incomes, namely dividends and interest payments. We do not estimate the tax revenue effects of other FDI incomes, such as those related to royalties or capital gains, for which there might be special provisions in the tax treaties. However, we substantially improve the availability of estimates – our estimates are based on data for the most recent years and cover the broadest range of developing countries so far.

In this paper we make contributions to at least four following areas of literature. First of all, we aim to contribute to the literature related to tax treaties, as reviewed recently by Hearson (2016). Tax treaties seem to be of particular importance for FDI and Haberly & Wójcik (2015), for example, found that including tax treaty information improved the precision of their FDI regression model. Furthermore, for studying the impact of tax treaties on investment, which has been a relatively frequent focus in the existing research, Hearson (2016) only reports two studies that take into account specific treaty provisions rather than just the bilateral indicator of whether there is a treaty or not. Mintz and Weichenrieder (2010) use detailed German data to find a relationship between DTA's withholding rates and probability that FDI is diverted through a third country, first such empirical finding for a developed country. Lejour (2014) finds that lower dividend withholding tax rates in tax treaties increase the stock of bilateral FDI and he argues that these are treaty shopping effects rather than increases in real investment. Azémar, Desbordes, & Mucchielli (2007) find that the existence of the so-called tax sparing clauses for Japanese FDI into developing countries between 1989 and 2000 had important effects. Still, the specific impact of tax treaties on government revenues in developing

countries remains largely unknown so far, although some of the country-specific estimates suggest their magnitude is substantial.

Second, we make an important contribution to the question of how much revenue developing countries might lose due to tax treaties. As discussed above, all the existing studies have focused on one country only and there are only six existing one-country studies so far. To date, only six studies have provided estimates of tax treaty-related revenue losses for developing countries, each of them only for one country: McGauran & Fernandez (2013), Weyzig (2013), IMF (2014), ActionAid (2016), van de Poel (2016) and Balabushko, Beer, Loeprick, & Vallada (2017). We apply a methodological approach that enables the estimation for as many countries as there are suitable available data for, which currently results into a sample of 14 developing countries. By providing results for 14 developing countries, we substantially expand the number of countries for which estimates are available and provide the first multi-country comparison of this kind.

The third strand of the relevant literature is one on non-revenue effects of DTAs on developing countries. There are a few analyses of the effects of DTAs on developing countries that do not provide estimates of potential revenue implications for governments of developing countries. In addition to the theoretical model by Paolini, Pistone, Pulina, & Zagler (2016) and an empirical argument by Hearson (2016) discussed above there is, for example, IBFD (2013) that examined tax treaties concluded between the Netherlands and developing countries, but it did not estimate revenue implications. Also within the IBFD and while looking at wider effects of the Irish tax system on developing countries, Kusters, Kool, Groenewegen, Weyzig, & Bardadin (2015) discuss DTAs, including withholding taxes on dividends, interest and royalties, but they do not provide revenue estimates. Similarly, Bürgi & Meyer (2013) analyse the DTAs of Switzerland with developing countries (it has a DTA with one quarter of the world's 134 developing countries). While they do not provide revenue estimates, they find that the treaties tend to contain provisions that are more favourable to Switzerland. Also, Braun & Fuentes (2016) analyse Austria's DTAs with developing countries and, although they do not quantify the potential revenue losses, they show that the signatory states may suffer from limited withholding taxation rights established in DTTs for the source country, which could lead to reduced tax revenues in developing countries. Most recently, Braun & Zagler (2018) evaluated alternative indirect revenue channel providing a theoretical model and empirical evidence for the effect of tax treaties on increased foreign aid flows to the developing country in question. In contrast with these studies, our focus here is on providing revenue estimates.

Fourth, we aim to estimate revenue losses due to taxing rights limitations in tax treaties, i.e. how much revenue developing countries might be losing due to their tax treaties with other, especially developed, countries. Similar revenue losses have only very recently been estimated for various individual countries - but not in relation to tax treaties - by IMF's Crivelli et al. (2016) and Cobham & Janský (2018), UNCTAD (2015) and Janský & Palanský (2017), Clausing (2016), Cobham & Janský (2017), OECD (2015b) and Johansson, Skeie, Sorbe, & Menon (2017), IMF (2014) and Tørsløv, Wier, & Zucman (2018). We add our dividend and interest payments tax treaties-related estimates to this growing set of estimates of tax revenue losses. Out of these listed cross-country tax-related estimates, UNCTAD (2015) and Janský & Palanský (2017) in particular focus on FDI, but also cover other potential tax revenue losses than those that we cover in this paper and thus highlight some of the limitations of our approach. Still, by estimating the revenue costs of tax treaties we manage to address the three main challenges in international tax cooperation that developing countries face according to Hearson (2017). We estimate the potential scale of tax avoidance by foreign investors in an international tax institutions' environment that supports tax competition and places disproportionate restrictions on capital-importing countries' ability to tax foreign investors.

The rest of the paper is structured as follows. In section 2 we describe the data. In section 3 we outline the methodology that we use for estimating the revenue effect of tax treaties in developing countries. In section 4 we present our results. The final section concludes and provides lessons for policy and questions for further research.

## 2 Data

We now proceed to discuss the data sources on tax treaties, FDI and other data that we use to estimate the revenue impact of tax treaties in developing countries. For tax treaties we rely on detailed information about double taxation agreements between developing and, mostly, developed countries from the ActionAid Tax Treaties Dataset introduced by Hearson (2016), rather than the other often used source, the International Bureau of Fiscal Documentation (IBFD), to which we have no access. The ActionAid dataset is freely available and includes the encoded content of 519 tax treaties signed by low- and lower-middle-income countries in Africa and Asia. As Hearson (2016) acknowledges, his data set might be the most recent one, but the biggest study of tax treaty content compared 1811 treaties on the basis of 30 standardised variations that affect how constrained a developing country is in its ability to tax inward investors (Wijnen and de Goede 2013). One of the most important limitations of the dataset from the point of view of using it to estimate the tax revenue costs of tax treaties is that it does not include information on national tax systems. For example, the dataset only includes information on withholding tax rates as stated in the tax treaties, but what the comparable tax rates are without a treaty is not included and we need to complement this data from other data sources. Therefore, when needed, in addition to the ActionAid tax treaty dataset, we rely on data concerning domestic corporate tax rates from PwC (2017), EY (2017), and Deloitte (2017), which we consider credible sources of this information. In addition, we use information about tax rates in Bangladesh from ActionAid (2016).

We use cross-country information on FDI stocks and incomes from the IMF. The important data required is FDI income, which we source from the IMF's Balance of Payments data. Specifically, for dividends we use data on Investment income, debit; Direct investment income; Dividends and withdrawals from quasi-corporations, while for interest payments we use data on Investment income, debit; Direct investment income; Interest. Furthermore, we use data on FDI stocks on a bilateral level from the IMF's Coordinated Direct Investment Survey (CDIS), which contains data for around 100 countries between the years 2009 and 2015. We have downloaded the data in November 2017 and we use the data from this original download for all countries with the exception of one, Pakistan. For Pakistan only the CDIS data have been revised substantially between November 2017 and July 2018 and we thus use the revised data downloaded in July 2018. Specifically, for Pakistan the volume of total FDI stock increased by an order of magnitude and the share of FDI investment from DTA countries doubled. Therefore, in the case of Pakistan we have decided to work with the revised data in order to avoid obvious imprecisions in our results. More generally, the case of Pakistan serves as a reminder that our estimates depend on the quality of the underlying data and why our estimates are only illustrative.

Indeed, before proceeding further, it is useful to provide a brief discussion of the inherent limitations of the FDI data. As is described in the Coordinated Direct Investment Survey Guide (2015) IMF follows the guidelines outlined in the Benchmark Definition of Foreign Direct Investment (2008) during the construction of the FDI data. These are based on the immediate investor approach. Consequently, the data do not enable us to distinguish whether an investor country is only a conduit or represents the real origin of the investment. We possess information only about the immediate



investor, whose tax treaties with the developing country are relevant. There are additional reasons for which this may represent a significant issue. Among the principal ones is the existence of SPEs, pass-throughs and the practice of round tripping. While the first two complicate the identification of the ultimate investing country, the last inflates the FDI statistics as they include investment for which the ultimate investing and ultimate host economy are identical. Ledyeva et al. (2015) identify three principal reasons for round tripping. It is motivated by regulatory, fiscal and secrecy arbitrage. Both OECD and IMF are aware of these limitations. OECD proposes remedies against SPEs in the Benchmark Definition of Foreign Direct Investment (2008). It states that each national compiler should provide separate data on them. However it also acknowledges that it is nearly impossible to provide a concrete definition of SPEs as what constitutes them varies across different countries. Based on these objections Haberly and Wójcik (2015) dispute the representativity of the FDI data. They state that they can be considered representative within an order of magnitude rather than being a robust indicator. While we are aware of the limitations of the FDI data we use them as these are to the best of our knowledge the most reliable data currently available. Nevertheless we want to stress the importance of further research into the above outlined issues. OECD also identifies the above described challenges as key areas for further research in the Benchmark Definition of Foreign Direct Investment (2008).

We now discuss some basic descriptive statistics. Table A1 in the Appendix shows the total FDI stock from the DTA countries and their share in the total. There is a considerable difference between the countries' total FDI stocks - large in Mozambique and the Philippines, small in Guinea-Bissau and Mali— perhaps reflecting a range of factors such as the size of the economy or the countries' openness to international investment and trade. There is also substantial heterogeneity in terms of the percentage of the FDI stock from countries with DTAs. According to the available data, Benin, Burkina Faso and Togo seem to have no FDI stock from their DTA countries and therefore we would expect no tax treaty-associated tax revenue losses (or revenue foregone). On the other hand, Bangladesh, the Philippines, Pakistan and Sri Lanka all receive more than three quarters of their FDI stock from DTA countries. Even without looking at the details of the tax treaties, it is clear that these countries are dependent on what is in their DTAs and that the related losses might be substantial. Table A2 in the Appendix provides an overview of the FDI stock in developing countries covered by the ActionAid tax treaties dataset, conditioned on having a DTA between the investor country and the developing country. According to the available data for this specific sample of 21 countries, the Netherlands is the biggest investor country, accounting for nearly a fifth of the total investment, followed by the United Kingdom, China, and the United Arab Emirates. Other big economies follow, but some of the countries often considered tax havens, such as Mauritius, Singapore, and Switzerland are also substantial investors among the top twelve, which might, according to Blanco & Rogers (2014), further increase FDI for developing countries. On the recipient side, some countries such as the Philippines, Nigeria and Pakistan have higher FDI stocks than others and their most important investor countries differ, although for all of these three the Netherlands is among the four most important investor countries. The Netherlands were already highlighted as a top FDI conduit country in existing research on tax treaties by McGauran & Fernandez (2013), treaty shopping by Weyzig (2012) and conduit countries by Garcia-Bernardo, Fichtner, Takes, & Heemskerk (2017).

We also make use of GDP data for the purposes of comparing the tax revenue losses we estimate. We use the World Bank's World Development Indicators series on GDP in current USD. What we do not use, although it might seem relevant at first sight, are country-specific FDI income data from individual countries' statistical offices and other sources, instead relying on the IMF cross-country database which is more readily available. McGauran & Fernandez (2013) used data from the Dutch Central Statistics Bureau, which until 2013 reported how much capital income the Netherlands

receives from its FDI stock abroad from withholding taxes on incoming interest and dividend payments. It is unclear whether this dataset will be made available for 2014 onwards, but if so, further research should use this data to compare the estimates based on that, and on other country-specific data sources, with those we have made using the IMF data.

We provide an overview of the availability of the data in Table 1. We have information about tax treaties for 43 developing countries. For 21 of those we have information about their FDI stocks from the IMF's CDIS and for all those 21 developing countries there is at least some information about FDI incomes (e.g. for some the totals, for others only the dividend income). For 14 out of those 21, there are available data on standard domestic tax rates from either PwC (2017), EY (2017) or Deloitte (2017). Table 1 also highlights the fact that the IMF data includes information for both dividend and interest income for most countries, but only dividend income for some other countries.

**Table 1. IMF data availability showing the latest years for which data is available**

	FDI stock	FDI income	Both	Domestic rates	Notes on the FDI sources
Bangladesh	2015	2016	2015	OK	OK
Benin	2015	2015	2015	-	OK
Bhutan	2015	2016	2015	-	Dividend income for 2014
Burkina Faso	2015	2014	2014	-	OK
Cape Verde	2015	2016	2015	OK	OK
Ghana	2014	2015	2014	OK	OK
Guinea-Bissau	2015	2015	2015	-	Dividend income for 2013 and 2015, interest income for 2014
Mali	2015	2015	2015	-	Dividend and interest income for 2014
Mongolia	2015	2016	2015	OK	OK
Mozambique	2015	2015	2015	OK	OK
Nepal	2015	2016	2015	-	Only dividend income
Nigeria	2015	2015	2015	OK	OK
Pakistan	2015	2016	2015	OK	OK
Philippines	2015	2016	2015	OK	OK
Rwanda	2015	2016	2015	OK	Only dividend income
Senegal	2014	2014	2014	OK	OK
Sri Lanka	2015	2016	2015	OK	Only dividend income
Tanzania	2013	2015	2013	OK	OK
Togo	2015	2015	2015	-	OK
Uganda	2015	2015	2015	OK	OK
Zambia	2015	2016	2015	OK	Only dividend income

*Source: Authors on the basis of the data sources.*

*Notes: For 22 out of 43 developing countries in the ActionAid tax treaty dataset, there is no available IMF CDIS data about stocks. These countries, which are not shown in the table, are: Cameroon, Congo (D.R.), Congo (R.), Ethiopia, Gambia, Guinea, Chad, Ivory Coast, Kenya, Kiribati, Laos, Lesotho, Liberia, Madagascar, Malawi, Myanmar, Papua New Guinea, Sudan, Swaziland, Timor, Vietnam, Zimbabwe. Comparable withholding tax rates are available from either PwC (2017), EY (2017) or Deloitte (2017) for only 14 of the remaining 21 countries listed.*

### 3 Methodology

In general, our methodological approach requires at least three pieces of information. First, we need information on the existence of tax treaties and the tax rates applied according to these treaties. Second, we need a proxy for what tax rate would be applied if it was not set by the treaty. Third, we need information on the scale of underlying economic activity, i.e. the tax base in the form of dividends or other income from FDI. This FDI income is what we multiply with the difference between the real tax treaty-based tax rate information and the alternative tax rate, to arrive at our estimate of revenue effects (losses). Our methodological approach can be then be summed up in the following way:

$$\text{Potential tax revenue loss} = (\text{Standard rate} - \text{Tax treaty rate}) \times \text{FDI income}$$

as long as the standard tax rate is higher than the agreed rate in the tax treaty. If the standard rate is lower than the tax treaty rate, the standard rate applies.

We aim to estimate the tax revenue losses that occur as a result of lower dividend and interest withholding tax rates being agreed upon within tax treaties than those that would be applied otherwise, i.e. the standard domestic rates. In this approach, we build on the estimates by McGauran & Fernandez (2013) for the Netherlands (they explain their methodology in detail in Annex II and we rely on their description here) and by ActionAid (2016) for Bangladesh. We apply a similar methodological approach to a wider range of countries, limited only by the availability of the data. To arrive at an estimate of potential tax revenue loss due to tax treaties, we need to make certain assumptions that we discuss along the way, because we believe that being explicit about these assumptions makes it clear that our estimates of potential tax revenue losses are only illustrative.

Importantly, we assume that FDI inflows and stocks in developing countries would not be any different without the tax treaties. Although the research into the impacts of tax treaties on FDI is not conclusive (see e.g. Hallward-Driemeier, 2003, Davies, 2004, Neumayer, 2007, Egger, Larch, Pfaffermayr, & Winner, 2006, Blonigen, Oldenski, & Sly, 2014), our estimates are vulnerable to a lack of reliable counterfactual information on FDI incomes (i.e. what they would be in the absence of tax treaties). We make this assumption because we do not have access to any data that would enable us to estimate of this sensitivity, but we understand – from the recent empirical results for Ukraine by Balabushko, Beer, Loeprick, & Vallada (2017) in particular – that this assumption has important empirical implications.

The leading IMF data source on FDI income (Balance of Payments Statistics) includes information only at unilateral, rather than bilateral level. The IMF statistics include how much capital income the investor countries receive from all (undistinguished by recipient country) and their FDI stock abroad, and distinguishes between interest income and dividend income (Direct investment income has one subcategory of Income on equity and investment fund shares, which has three subcategories: Dividends and withdrawals from income of quasi-corporations; Reinvested earnings (direct investor in direct investment enterprises); Interest). Given that this is the only FDI income data available to us, we only estimate the revenue effects of selected FDI incomes, namely dividends and interest payments. We do not estimate the tax revenue effects of other FDI incomes, such as those related to royalties or management fees, for which there might be special provisions in the tax treaties. Corporate income tax and capital gains taxes also fall outside the scope of this study for the same reason, although we are aware that tax treaties may have important implications for tax revenues related to these taxes. Furthermore, we estimate the potential revenue effects of withholding tax rates on interest payments and dividends, but not the effects of other related taxes. However, the lower rates of tax on interest might incentivise MNEs to borrow more, which would reduce corporate profits and thus the corporate

income tax base and in turn result in an additional revenue loss. We do not quantify these effects, but Weyzig (2013) calculates that they may be around a third of the avoided withholding tax in the case of the Dutch special purpose entities.

In addition to the assumptions explained by McGauran & Fernandez (2013), it is important for us to highlight the limitation posed by the lack of bilateral data on FDI income. Unfortunately, the FDI income data are only available at country level and for each investor country we have only one data point: we do not know which countries that income was received from. In the absence of this information, we assume that the FDI income is distributed across countries in the same way as FDI stock. In reality this is likely not the case, since FDI income differs according to the origin country (as shown, for example, by Janský & Palanský, 2017). To fill in for this missing detail, it is possible to disaggregate the unilateral FDI income data to obtain bilateral estimates on the basis of the country-pair data on FDI stocks. The additional assumption needed is that an investor country's MNEs' profit in a developing country is proportional to that investor country's FDI stock in the given developing country. In other words, we assume that each dollar of investment leads to the same amount of profit (whatever that amount is). On the basis of this assumption, we can state that a specific percentage of FDI stock equals a specific percentage of the total profit from the total FDI stock (similar to assumption 2 on SPEs by McGauran & Fernandez (2013)). Similarly, unfortunately, the IMF statistics do not classify what income can be attributed to Special Purpose Entities (SPEs), which would provide a further indication of treaty shopping.

The methodology of the calculation can be summarized by the following three steps. First, we extract the data on FDI from the International Monetary Fund's (IMF) Coordinated Direct Investment Survey (CDIS). For each country, we consider overall FDI stocks as reported by the country itself, rather than data derived from partner countries' reports or on FDI stock distinguished between equity and debt, but future research should consider these alternative data, especially if their availability and quality has improved. These data are used to find the share of inward direct investment from the total FDI for each of the countries with a DTA, using the following formula where the numerator stands for the direct investment received from the respective country and the denominator represents the total inward direct investment received i.e. the sum of all inward FDI from all countries.

$$Share_i = \frac{FDI_i}{FDI_{total}}$$

Second, in order to calculate the volume of dividends and interest payments paid to partner countries, we use data from the IMF Balance of Payments statistics. However, IMF only reports the total volume of dividends and interests paid from a given country and does not provide bilateral data. Therefore the below outlined equation is used to estimate the dividends and interest payments from source to resident countries. When data are available for both dividends and interests, we make the estimates for dividends and interest payments separately and then sum them up to arrive at the estimate for both these components of the FDI income. We show the equations below for dividends only.

$$Dividends_i = Share_i * Dividends_{total}$$

Third, the data obtained can serve as proxy in the calculation of the loss on dividend and interest withholding taxes. We take the dividend or interest withholding tax rate from the ActionAid dataset. We consider all treaties that are labelled in the ActionAid dataset as signed, ratified and effective. In addition we consider treaties that are labelled in the ActionAid dataset as signed, ratified, but not effective, if they are listed by either EY (2017) or PwC (2017) as effective. (It is also important to note

that in certain cases there are significant discrepancies between the DTA tax rates provided by the ActionAid dataset and the tax rates provided by PwC (2017), EY (2017) and Deloitte (2017). Data for Pakistan and Nigeria were the most discrepant, and for these countries we rely on the ActionAid dataset, so that we use one consistent source.) As the comparison rate, the tax rate applied to non-treaty countries as provided by EY (2017), PwC (2017), or Deloitte (2017) was used and the loss of the withholding tax attributable to the DTA was then obtained by:

$$Revenue\ loss_{i,dividends} = (Tax\ rate_{standard} - Tax\ rate_{i,tax\ treaty}) * Dividends_i$$

where the standard rate is higher than the tax treaty rate. If the standard rate is lower than the tax treaty rate, the standard rate applies. To illustrate this methodological approach, we present the calculation for Mongolia in Table A3 in the Appendix.

We now provide a brief discussion of how the weaknesses of the FDI data can affect our calculations. We have identified the main weaknesses relevant to our calculations in the previous section on data. Existence of the practice of round tripping as well as SPEs and pass-throughs can introduce bias in our calculations. The first can introduce bias in the first step. During the calculation of the share of FDI received from a given country we use the data as they are provided by the IMF. However these also include round tripped funds. Consequently the FDI income received by a DTA country can be overestimated as the round tripped funds are unlikely to generate the similar return to regular FDI. The latter can have a downward influence on the final stage of the calculation. In the final step we combine FDI income data with the share estimated on the basis of the FDI stock data. Also, for all countries the calculations are based on the latest year for which both FDI stock and FDI income data are available. We have decided not to combine data from different years as this approach could cause significant imprecisions in our results due to volatility of the FDI data.

## 4 Results

Before moving on to a discussion of our results, we recall the key data restrictions we worked with. Only 21 out of the 43 countries in the ActionAid dataset are covered by the IMF's CDIS. Therefore, we were unable to calculate the loss of withholding taxes on dividend and interest payments caused by DTAs for the other 22 countries, more than half of the ActionAid data set, from the very first step. Further data limitations restricted us in the second step of calculation, as data on dividends and interest payments are not reported for all countries in the Balance of Payments statistics. Thus in the cases of Rwanda and Zambia, for example, we could only calculate the loss of withholding tax on dividends because there was no data available on interest payments. Finally, in the third step of the calculation, where we used data from EY (2017), PwC (2017), and Deloitte (2017) for domestic tax rates, we found that these rates were only provided for 14 out of our 21 countries. Therefore, our results only present estimates of the losses caused by DTAs for those 14 countries.

Despite these significant limitations in data availability and the restrictive assumptions we have had to make, we are still able to present illustrative estimates of dividend and interest withholding tax revenue losses attributable to tax treaties for 14 countries. These estimates are reported in Table 2, together with the size of the estimated loss relative to the GDP of each country. The year for which the calculation was performed (always the most recent year for which data were available) is also indicated in the table. As can be seen, the Philippines endures the greatest loss of withholding tax on outgoing dividend and interest payments in absolute terms (509 million USD) and Pakistan comes in second place (214 million USD). As far as the relative indicator is concerned, i.e. the size of the loss relative to the GDP of the given country, the biggest losses attributable to DTAs are endured by the

Philippines and Mongolia (both 0.17%). As Table 2 highlights, the estimated dividend losses are much higher than those related to interest. The majority of the estimated losses are due to dividends, only around 5% are due to interests.

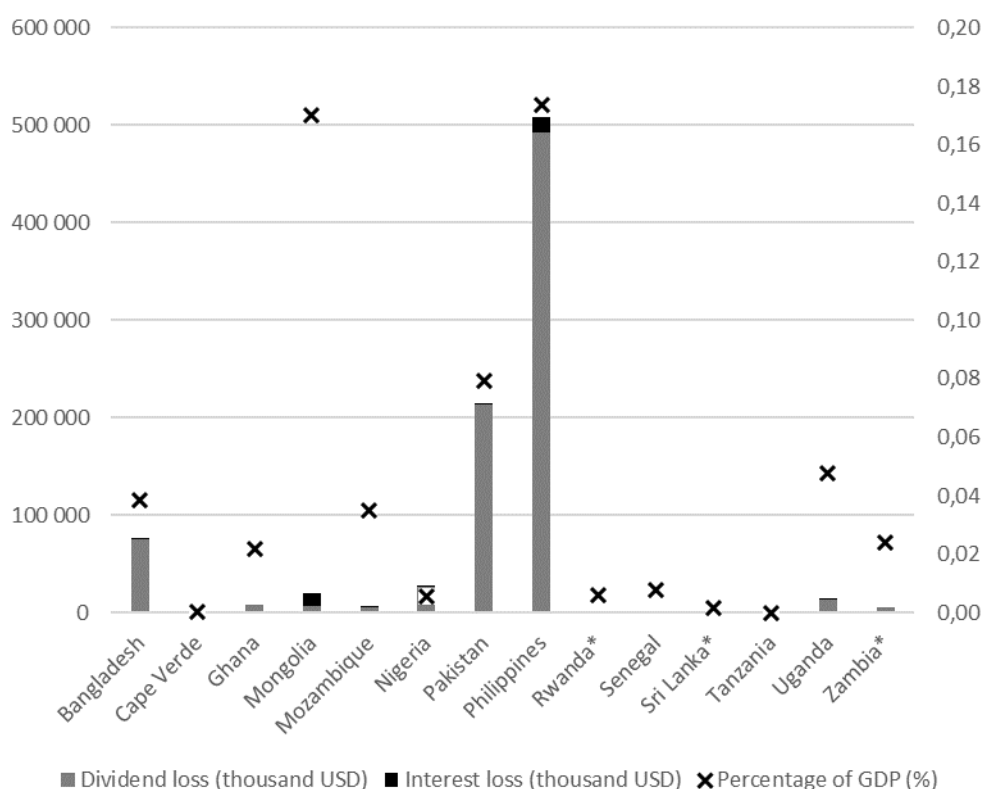
**Table 2. Potential revenue loss estimates due to dividends and interest payments (thousand USD)**

Country	Year	Dividend loss	Interest loss	Combined loss	Percentage of GDP (%)
Bangladesh	2015	74736	55	74791	0.03834
Cape Verde	2015	0	7	7	0.00044
Ghana	2014	8496	0	8496	0.02201
Mongolia	2015	7117	12848	19965	0.17004
Mozambique	2015	5103	81	5183	0.03503
Nigeria	2015	27140	131	27271	0.00567
Pakistan	2015	214081	474	214555	0.07934
Philippines	2015	492796	16228	509024	0.17386
Rwanda*	2015	495	-	495	0.00599
Senegal	2014	945	227	1172	0.00766
Sri Lanka*	2015	1314	-	1314	0.00163
Tanzania	2013	11	0	11	0.00003
Uganda	2015	13021	218	13239	0.04753
Zambia*	2015	5090	-	5090	0.02406

*Source: Authors.*

*Note: The asterisks indicate where we have made the estimates only on the basis of dividends data because interest was not reported, as indicated in Table 1.*

**Figure 1. Potential revenue loss estimates due to dividends and interest payments**



*Source: Authors.*

*Note: The asterisks indicate where we have made the estimates only on the basis of dividends data because interest was not reported, as indicated in Table 1.*

The estimates seem to be comparable in size with those reported in the existing literature on the revenue impacts of tax treaties. McGauran & Fernandez (2013) estimated dividend and interest tax revenue losses of 770 million euros in 2011 for developing countries as a consequence of lower withholding tax rates in the developing countries' tax treaties with the Netherlands. The International Monetary Fund (IMF, 2014, p. 27) estimates tax revenue losses of 1.6 billion US dollars in 2010 for non-OECD countries that had tax treaties with the United States. Our estimates are of similar order, to within hundreds of USD. We estimate Bangladesh's potential tax losses related to dividends in 2015 at 75 million USD, which is lower than the estimate of 85 million USD by ActionAid (2016) for 2013. The difference is mostly explained by the fact that the total dividends paid from Bangladesh fell by a quarter between 2013 and 2015.



The study of the cross-country determinants of the scale of the losses would require even larger coverage of countries, but it is clear even now that these would include characteristics of both the tax treaties as studied by Hearson (2016) and the countries and their partners. The currently available FDI data do not enable the distinction by sector and we are thus not able to shed more light on the sector-specific effects of tax treaties. There is some evidence of this for extractive industries. For example, Otto (2017) argues that treaty provisions that reduce withholding tax rates below the normal statutory rate are of particular importance to foreign-owned mines. He further argues that withholding taxes are often one of the largest fiscal costs incurred by a mine. Also, recent presentations of ongoing contract-level research by IGF-OECD program to address BEPS in mining have shown that there are many tax incentives given at the contract level in the mining sector. These contract-level tax incentives have effects that are additional to any domestic law and tax treaty provisions. Our estimates focus on two provisions in tax treaties and do not take into account any contract-level tax incentives. It follows that in this respect the overall costs of tax incentives are likely to be higher than those estimated here for tax treaties.

Extractive industries are important for some of the countries in our sample. A case in point is Mongolia (with 16.5% total natural resources rents as a share of GDP in 2015 according to World Development Indicators). Mongolia is also an illustrative example of how contract-level tax incentives can interact with country-level tax treaties. One possible interaction is when tax treaty provisions are changed or cancelled, but still apply for a specific contract because of a so called stabilisation provision often included in the contracts. A case in point is Rio Tinto's and the government of Mongolia's cooperation on Oyu Tolgoi, one of the largest copper mines in the world, recently discussed by Redhead & Mihalyi (2018) with regard to the Netherlands-Mongolia tax treaty. Although the treaty has been annulled by the government of Mongolia in 2014, the 0% withholding tax rate on dividends and interests still applies due to the fiscal stabilisation clause included in this contract. This is important in itself, but also has implications for our revenue estimates, which are in this respect conservative because they consider provisions only in the tax treaties valid at the time and not the contracts or their fiscal stabilisation clauses.

The estimated losses reported in Table 2 include the approximate answers to the key question of what the potential government revenue loss from tax treaties in specific developing countries is. Nevertheless, certain aspects of that answer need to be taken into consideration during its interpretation. We do not estimate the tax revenue effects of other FDI incomes, such as those related to royalties or capital gains, for which there might be special provisions in the tax treaties. A case in point is taxation of assets that are immovable or generating location-specific rents such as mobile phone operators are important from the point of view of tax treaty policy, but are outside the scope of this paper. A specific example is the indirect sale by Zain of various assets in Africa including a mobile phone operator in Uganda discussed in a draft toolkit of the Platform for Collaboration on Tax (2017) by the IMF, OECD, WB and UN. The authors of the toolkit argue that the amount at stake is very large, in the order of 5 percent of total government revenue (and nearly a half of public spending on health). It implies that we are possibly omitting a substantial revenue losses due to tax treaties from our analysis. The toolkit of the Platform for Collaboration on Tax (2017) also provides a policy recommendation. Specifically, provisions of both the OECD and the UN Model treaties imply that capital gains taxation of offshore indirect transfers of immovable assets be primarily allocated to the location country. But they note that the relevant Article 13(4) is found only in around 35 percent of all DTAs, and is less likely to be found when one party is a low income resource rich country. They also note that the 2017 Multilateral Convention has had a positive impact on this percentage by increasing the number of tax treaties that effectively include the article.

Most importantly, as discussed above, the presented results only estimate the mechanical, not the behavioural, revenue effect of tax treaty withholding rates, as we obtain them by multiplying dividend and interest payments to a country by the differential of the applicable general withholding tax rate and the rate negotiated in the country specific treaty. We do not take into account how much the investments and the associated tax base changed, nor what revenue implications these follow-up changes had, when the tax treaties were brought into force, or changed. Investments and the tax revenue associated with them would likely decrease following an increase in the applicable withholding rate.

For the case of Ukraine, Balabushko, Beer, Loeprick, & Vallada (2017) do estimate the sensitivity of tax bases to changes in tax treaty rates, and their results can help us shed at least some light on the potential scale of this sensitivity for the developing countries we have studied here. In line with their expectations, they find that increasing the tax rate applied for foreign investors in a specific country (in their case Ukraine) does reduce income flows to that country. They estimate the implied own-price semi-elasticity for dividend and interest payments: a one percentage point increase in the withholding rate reduces income flows to the affected country by around 2.3 and 7 percent respectively (while the estimates are 12 percent for royalty payments, for which we do not have data). For the five most important investor countries for Ukraine, Balabushko, Beer, Loeprick, & Vallada (2017) find that adjusting the revenue effects by behavioural change (lower dividend and interest payments as a result of increasing the relevant withholding tax rate) leads to a decrease of 15 percent for dividends in 2012 and 70 percent for interest payments in 2014 (and around 92 % for royalties in 2014). While acknowledging that Balabushko, Beer, Loeprick, & Vallada (2017) made rather imprecise and not very statistically significant estimates for just one country, for illustrative purposes we can combine their estimates with information from our data in order to derive very approximate lower bounds for our estimates. In our data, the average difference between the tax treaty rate and otherwise applied tax rate is 11 percentage points for both 207 dividend and 176 interest observations with non-zero differences, coincidentally of almost the same scale for both. This combination estimated elasticities for Ukraine and our data for 14 developing countries results in the following estimates for the case of average values. If the tax treaty was cancelled and the standard rate applied then, hypothetically, dividends would be reduced by 25.3 percent and interest payments would be reduced by 77 percent. These illustrative observations imply that our estimates might overestimate withholding tax revenue losses substantially for interest payments, while for dividends, which account for a vast majority of the revenue losses estimated here, we may have a relatively modest overestimate at around one quarter of the estimated revenue losses.

Furthermore, there are other limitations to our estimates. One is caused by the absence of some values in the FDI data – we came across some which were not specified or were marked as confidential. These were set to zero for the purpose of the calculations. It is important to note that the share of FDI represented by the considered country does not suffer from bias as these flows are reported under the heading titled “Not specified (including confidential)”. However, these missing values are likely to introduce a downward bias into the estimates. A second crucial limitation is that we chose to apply domestic tax rates in our calculations, to represent the rates that would apply if there were no DTA; however, we can have no certainty that dividends and interest payments would in fact be subject to these rates if there was no DTA. Furthermore, the potential increase in FDI flows caused by the existence of each DTA should be considered too, if we want to achieve a realistic estimate. Even though this effect is still subject to academic scrutiny, its potential implications should be contemplated when interpreting the estimates we outline below. As can be seen, it is hard to be sure of the direction of the potential bias in our estimates as the last two forces impose an opposite bias to the first.

In Table 3 we show which investor countries are responsible for most of the potential revenue losses shown in Table 2. Naturally, some of the biggest investors (shown in Table A2) are present in this table as well. Not surprisingly, some of the biggest investors in the Philippines, including Japan, play a more important role here than in Table A2. Investor countries Japan, the Netherlands, Switzerland, and the United States are together responsible for more than half of all the estimated potential losses.

**Table 3. Ten investor countries associated with the highest potential revenue loss estimates due to dividends and interest payments, by (thousand USD)**

	Dividend lost	Interest loss	Combined loss
Japan	170 242	4 175	174 417
Netherlands	136 765	2 948	139 713
Switzerland	102 611	2 091	104 702
United States	70 576	2 503	73 079
United Kingdom	66 527	3 681	70 208
Singapore	52 931	5 600	58 531
Korea, Republic of	46 047	1 659	47 706
China, P.R.: Mainland	39 350	3 192	42 542
United Arab Emirates	41 596	219	41 815
Malaysia	11 921	248	12 169

*Source: Authors.*

## 5 Conclusions

We established that revenue costs of tax treaties can be substantial for some developing countries. In a first multi-country comparison of this kind we provided estimates of costs of tax treaties for 14 developing countries in sub-Saharan Africa and Asia. We estimated that the annual dividend and interest withholding tax revenue losses associated with tax treaties could reach hundreds of million dollars for two countries in our sample, the Philippines (509 million USD) and Pakistan (214 million USD). We estimated the biggest losses relative to the GDP for the Philippines and Mongolia (both 0.17%).

These are illustrative estimates of the potential costs of tax treaties in developing countries. We estimated, if all else remained unchanged, what additional tax revenues the developing countries could have if the standard tax rate applied rather than the tax treaty rate for withholding taxes on dividends and interest payments. Due to data restrictions, we assumed that investments are not influenced by the tax treaties and in this important respect we might overestimate. In reality, as we discussed, there are exiting studies showing a positive effect of tax treaties on investments and the estimated revenue losses that we focus on in this paper might be made up by increased FDI inflows. We make this assumption because we do not have access to any data that would enable us to estimate this sensitivity, although we use the empirical estimates of the equivalent sensitivity for Ukraine by Balabushko, Beer, Loeprick, & Vallada (2017) to approximate the scale of this assumption, which seems to be more important for interest rather than dividend withholding tax revenue losses. The available data limit us in two other ways. First, we are only able to estimate the revenue effects of selected FDI incomes, namely dividends and interest payments, because there is no data available for other FDI incomes, nor for corporate income taxes or capital gains taxes. It follows naturally that if these other taxes had been included in the analysis, the estimated potential tax revenue losses would have been higher. Second, our data and other necessary information is available for just 14 developing countries and their

investor countries. This is far more than the existing one-country studies have presented, but somewhat less than what we had hoped for when using our aggregate IMF data-based approach.

Against this background, we draw four conclusions with implications for suitable future steps in both policy and research. First, the available data restricts what we can currently learn about the impact of tax treaties on revenues in developing countries. There are data gaps both in the IMF sources and in the easily accessible and comparable sources of domestic tax rates. The data only enable the calculation of losses related to dividend and interest payments resulting from lower withholding tax rates in tax treaties. However, treaties are also known to lead to considerable losses through avoiding capital gains tax and profit shifting using royalties, management fees or other artificial costs in combination with treaty shopping and tax haven subsidiaries. In this respect, our estimate is conservative: it includes only some of the aspects of tax treaties that potentially lead to revenue losses, whereas including more such aspects would result in higher estimates of tax revenue losses. Policy makers and researchers should work towards closing these gaps and carrying out more rigorous research with a better country coverage.

Second, our results and the limited previously existing evidence suggest that the potential revenue impact of DTAs varies a lot across countries and that it is substantial, at least for some countries, both in dollar terms and relative to their GDP. A case in point is the Philippines, with estimated revenue losses of 509 million USD, or 0.17% of its GDP. Third, we hope that our detailed results can be used to highlight specific tax treaties in need of attention – and maybe revision – by the respective governments. This is relevant especially in those cases where the estimated losses are relatively high. In this respect it is encouraging that in recent years, some developing countries have moved to renegotiate or terminate their tax treaties. A case in point is Mongolia, which around 2011 decided to cancel tax treaties with the Netherlands, Luxemburg, Kuwait and the United Arab Emirates arguably because of their high costs for government revenues (Jargalsaikhan 2016).

Fourth, we briefly discuss implications for the design of tax treaties. Currently most treaties follow either the OECD or the UN model treaty. The UN model tax treaty allows developing countries to maintain significantly more taxing rights than the OECD model (ActionAid, 2016). Of course, we encourage the developing countries' governments to negotiate the tax treaty provisions in their best interests and the suggested rates in the UN model treaty could be considered minimum standards. Indeed, for non-conduit FDI that does not flow in through conduit countries, the main recommendation, directly related to our results, is to renegotiate the tax treaty provisions, especially the withholding tax rates related to interest and dividend payments associated with high revenue costs with not corresponding benefits. To guard against the adverse effects of conduit FDI, countries should aim to effectively implement effective anti-abuse measures (for example, the 2015 Action 6 of the OECD's BEPS on preventing the granting of treaty benefits in inappropriate circumstances, might be a case in point). A further option for lower income countries, that so far have not joined it, would be to join the OECD's Multilateral Instrument. This convention to implement tax treaty related measures to prevent base erosion and profit shifting was signed by the first 70 countries in June 2017. Lower income countries should carefully consider if it is in their interest to sign it at this stage and, if they are inclined to do so, then lower income countries should consider making some available adjustments (such as not opting in on mandatory arbitration) before signing.

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## 7 Appendix

**Table A1. FDI stock from DTA countries and in total (in million USD)**

	FDI from DTA countries	Total FDI	Percentage (%)
Bangladesh	9577	12352	78
Benin	0	146	0
Bhutan	47	203	23
Burkina Faso	0	1630	0
Cape Verde	287	1617	18
Ghana	2728	7683	36
Guinea-Bissau	44	284	15
Mali	65	2679	2
Mongolia	4568	16746	27
Mozambique	17495	28927	60
Nepal	229	906	25
Nigeria	42300	83218	51
Pakistan	28566	34339	83
Philippines	29247	33479	87
Rwanda	579	1404	41
Senegal	241	2426	10
Sri Lanka	8542	9971	86
Tanzania	5893	14876	40
Togo	0	1803	0
Uganda	5703	8877	64
Zambia	11493	15659	73

*Source: Authors.*



**Table A2. FDI in developing countries covered by the ActionAid tax treaty dataset, conditioned on having a DTA between the investor country and the developing country (million USD)**

	Total of these 14 countries	Bangladesh	Cape Verde	Ghana	Mongolia	Mozambique	Nigeria	Pakistan	Philippines	Rwanda*	Senegal	Sri Lanka*	Tanzania	Uganda	Zambia*
Netherlands	32057	689		0			18162	2081	5158			1768		3916	283
United Kingdom	27685	1294		0	1198		10594	9893	447			490		623	3146
China	12118	192			1048		6641	1015	229			789			2204
United Arab Emirates	12009	138				7384		3798	118			571			
South Africa	10983			1559		3301	1970	7		165			3659	322	
Japan	9425	325						1340	7699						61
Switzerland	9284	9		191	36			5699	2592			757			
United States	7952	3019							4616			317			
Canada	7299	162			403		43	0	518		0	181	1805		4187
France	6871	43		1546	16		4840	148	256			22			
Singapore	5974	433			1386			336	3260	5		554			
Mauritius	4408	97				2324		0		381	59	321		519	707
South Korea	3022	715			145			213	1949			0			
Malaysia	2925	684			9			707	397			1128			
India	2701	327			1	690			69			1193	79	286	56
Italy	2526	41		19		2321		22	1		0	106	7	0	9
Portugal	1722		287			1469		5			11				
Germany	980	103		35	42			336	352			71			41
Australia	779								682			97			
Ireland	759							23							736

*Source: Authors.*

**Table A3. An illustrative case of calculations: Mongolia in 2015**

Investor country	Treaty	FDI	FDI_B	FDI_P	BOP_Dividends	BOP_Interest_s	BOP_Dividends_P	BOP_Interests_P	Tax_D_T	Tax_I_T	Rate_D_D	Rate_D_I	Tax_Div_re_c	Tax_Int_re_c	Tax_Div_p_ot	Tax_Int_p_ot	Lost_Di_v	Lost_In_t
Austria	1	3	3	0	176441311	463690313	31609	83069	0	0	0	0	1580	8307	6322	16614	4741	8307
Belarus	1	0	0	0	176441311	463690313	0	0	0	0	0	0	0	0	0	0	0	0
Belgium	1	97	97	0	176441311	463690313	1022024	2685893	0	0	0	0	51101	268589	204405	537179	153304	268589
Bulgaria	1	0	0	0	176441311	463690313	0	0	0	0	0	0	0	0	0	0	0	0
Canada	1	403	403	0	176441311	463690313	4246139	11158915	0	0	0	0	212307	1115892	849228	2231783	636921	1115892
China, P.R.: Mainland	1	1048	1048	0	176441311	463690313	11042069	29018718	0	0	0	0	552103	2901872	2208414	5803744	1656310	2901872
Czech Republic	1	12	12	0	176441311	463690313	126436	332275	0	0	0	0	12644	33228	25287	66455	12644	33228
France	1	16	16	0	176441311	463690313	168581	443034	0	0	0	0	8429	44303	33716	88607	25287	44303
Germany	1	42	42	0	176441311	463690313	442526	1162964	0	0	0	0	22126	116296	88505	232593	66379	116296
Hungary	1	1	1	0	176441311	463690313	10536	27690	0	0	0	0	527	2769	2107	5538	1580	2769
India	1	1	1	0	176441311	463690313	10536	27690	0	0	0	0	1580	4153	2107	5538	527	1384
Indonesia	1	1	1	0	176441311	463690313	10536	27690	0	0	0	0	1054	2769	2107	5538	1054	2769
Kazakhstan	1	6	6	0	176441311	463690313	63218	166138	0	0	0	0	6322	16614	12644	33228	6322	16614
Korea, Republic of	1	145	145	0	176441311	463690313	1527767	4014994	0	0	0	0	76388	200750	305553	802999	229165	602249
Kyrgyz Republic	1	1	1	0	176441311	463690313	10536	27690	0	0	0	0	1054	2769	2107	5538	1054	2769
Malaysia	1	9	9	0	176441311	463690313	94827	249207	0	0	0	0	9483	24921	18965	49841	9483	24921
Poland	1	5	5	0	176441311	463690313	52682	138448	0	0	0	0	5268	13845	10536	27690	5268	13845
Russian Federation	1	143	143	0	176441311	463690313	1506695	3959615	0	0	0	0	150669	395962	301339	791923	150669	395962
Singapore	1	1386	1386	0	176441311	463690313	14603348	38377808	0	0	0	0	730167	3837781	2920670	7675562	2190502	3837781
Switzerland	1	36	36	0	176441311	463690313	379308	996826	0	0	0	0	18965	99683	75862	199365	56896	99683
Turkey	1	6	6	0	176441311	463690313	63218	166138	0	0	0	0	6322	16614	12644	33228	6322	16614
Ukraine	1	0	0	0	176441311	463690313	0	0	0	0	0	0	0	0	0	0	0	0
United Kingdom	1	1198	1198	0	176441311	463690313	12622518	33172160	0	0	0	0	631126	3317216	2524504	6634432	1893378	3317216
Vietnam	1	9	9	0	176441311	463690313	94827	249207	0	0	0	0	9483	24921	18965	49841	9483	24921

*Source: Authors*

**Table A4. Detailed description of the calculations – by column**

1. Country

Country for which the loss based on the DTA is calculated. In this case Mongolia.

2. Year

The year for which the calculation was made. This is the most recent year available.

3. Country\_P

List of all potential partner countries.

4. Treaty

A dummy variable indicating the existence of a DTA between the source and resident countries. Note that in this example the data are already filtered conditional on the existence of a DTA. A full table with all the potential partner countries would include more than 200 entries in the Country\_P column.

5. FDI

The total amount of FDI received by the source country from the resident country. As was outlined in the text these data were extracted from the Coordinated Direct Investment Survey of the International Monetary Fund.

6. FDI\_B

Bottom coded FDI data from the previous column. All negative and confidential values were set to zero.

7. FDI\_P

The percentage of FDI received from the partner country relative to total FDI received. Obtained as:

$$share_i = \frac{FDI_i}{Total\ FDI}$$

8. BOP\_Dividends

The total amount of dividends paid by the considered state, extracted from the International Monetary Fund Balance of Payments statistics.

9. BOP\_Interests

The total amount of interest paid to other countries, extracted from the International Monetary Fund Balance of Payments statistics.

10. BOP\_Dividends\_P

The volume of dividends attributable to the partner country, i.e. dividends received by the partner country. These are obtained by the formula:

$$BOP\_Dividends\_P = share_i * BoP_{dividends\ total}$$

11. BOP\_Interests\_P

The volume of dividends attributable to the partner country, i.e. dividends received by the partner country. These are obtained by the formula:

$$BOP\_Interests\_P = share_i * BOP\_Interests$$

12. Tax\_D\_T

Withholding tax rate on dividends set by the DTA. Extracted from the ActionAid dataset.

13. Tax\_I\_T

Withholding tax rate on interest set by the DTA. Extracted from the ActionAid dataset.

14. Rate\_D\_D

Tax rate on dividends for non-treaty states extracted from EY (2017), PwC (2017), and Deloitte (2017).

15. Rate\_D\_I

Tax rate on interests for non-treaty states extracted from EY (2017), PwC (2017), and Deloitte (2017).

16. Tax\_Dic\_rec

Money actually received from withholding tax on dividends to the partner country.

17. Tax\_Int\_rec

Money actually received from withholding tax on interest to the partner country.

18. Tax\_Div\_pot

Money that would potentially be received from withholding tax on dividends to the partner country if these were not subject to the tax rate set by the DTA.

19. Tax\_Int\_pot

Money that would potentially be received from withholding tax on interest to the partner country if this was not subject to the tax rate set by the DTA.

20. Lost\_Div

Loss on withholding tax on dividends caused by the DTA. Obtained as:

$$Lost\_Div = Tax\_Div\_pot - Tax\_Div\_rec$$

21. Lost\_Int

Loss on withholding tax on interest caused by the DTA. Obtained as:

$$Lost\_Int = Tax\_Int\_pot - Tax\_Int\_rec$$

*Source: Authors*

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