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The Effect of Taxing Rights Allocation in Double Tax Treaties on FDI Inflows - Evidence from developing countries

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Abstract

This thesis examines the effect of the conclusion of double tax treaties (DTT) on the FDI inflow of developing countries. In prior research, ambiguous results on the conclusion of DTTs on FDI inflow are found. Besides, this thesis researches the impact of the allocation of taxing rights within a DTT on FDI inflow based on the novel *Tax Treaty Explorer* (TTE) database made by Hearson (2021). Lower-middle-income countries' FDI inflow increases when they conclude a DTT. In addition, the allocation of taxing rights within a DTT does not affect the FDI inflow of developing countries. The results are based on a Random Effects regression model with country and year fixed effects containing 28.611 observations covering 3.615 country pairs spread over the period 2003 to 2020. Besides, 2.500 signed DTTs from the TTE are used.

Keywords: Double tax treaties, foreign direct investment, developing countries, tax policy

JEL Classification: F21, H25, K34, P33

NON-PLAGIARISM STATEMENT

By submitting this thesis the author declares to have written this thesis completely by himself/herself, and not to have used sources or resources other than the ones mentioned. All sources used, quotes and citations that were literally taken from publications, or that were in close accordance with the meaning of those publications, are indicated as such.

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1. Introduction

The merits of double tax treaties (DTTs) are highly debated in the current discourse on international taxation policy. DTTs aim to lower taxation barriers and prevent double taxation of multinational enterprises (MNEs) their profits. However, in the past years, it has become apparent that MNEs are using the networks of DTTs to avoid taxation (Lejour, 2014). Tax avoidance and evasion by MNEs mainly affect developing countries.[1] These countries are deprived of tax revenues as DTTs limit their ability to tax profits made by foreign companies in their jurisdiction. Oxfam Novib (2016a) has shown that they lose at least $100bn in tax revenues annually. Therefore, developing countries have called for a fundamental revision of the international tax system (Braun & Fuentes, 2016).

In the wake of the Financial Crisis in 2008, developed countries have also started acknowledging that the current international tax system needs to be revised to offset their fiscal deficits. Currently, the OECD strongly advocates the Base Erosion and Profit Shifting (BEPS) initiative, which aims to undermine multinational corporations' aggressive tax planning structures by resolving several different problems of the current international tax—such as profit shifting, taxing the digital economy, and preventing tax treaty abuse (OECD, 2013).

The current international tax treaty system is highly influenced by the OECD Model Tax Convention (OECD Model) and UN Model Tax Convention (UN Model) (Wijnen & de Goede, 2014). Both models are based on the residence principle, whereby residents of a country are subject to tax on their worldwide income, and most taxing rights are allocated to the resident country (Daurer, 2014). DTTs based on this principle shift taxing rights from the capital-importing country (source state) to the capital-exporting country (resident state).[2] This is not

[1] Developing countries are low, lower-middle, and upper-middle-income countries as distinguished by the World Bank (2022).

[2] The terminology to indicate each treaty country differs in the economic and tax law literature. In the economic literature, the capital-importing country is seen as the destination country because the FDI flows from the host country (the capital-exporting country) to the country where an investment is made. On the other hand, in tax law literature, the capital-importing country is called the source country because it is the country from which a dividend, interest or royalty payment originates. This cash is sent to an affiliated company in the other treaty country (the resident state). In addition, tax treaties do not follow the direction of the investment flow but the direction of the dividend, interest or royalty flow for the distribution of tax rights. As MNEs are taxed based on these flows, the terminology from the tax literature is followed.

a problem if this happens between two countries with similar foreign direct investment flows. However, relatively capital-import countries risk losing tax revenues if these flows are not mutual, e.g., FDI flows between a developed (capital-exporting) and a developing country (capital-importing). As a result, developing countries will have little taxing rights allocated, as most are net capital importers and source countries (Braun & Fuentes, 2016).

The above discussion on the impact of DTTs on developing countries is at the heart of this thesis. If countries are not allocated any or hardly any taxing rights in a DTT, they are unable to tax or can only minimally tax foreign direct investment (FDI) inflows. Therefore, countries strive to achieve a favourable balance of taxing rights during the tax treaty negotiations. If a government has negotiated an advantageous treaty, FDI inflows can be taxed in that country. However, companies could be deterred from entering a country through FDI if faced with corporate taxes in the source country (Bellak & Leibrecht, 2009). Thus, it could be the case that it is more desirable to negotiate fewer taxing rights and offset the loss in tax revenues with a higher inflow of FDI. The effect of the balance of taxing rights in DTTs on FDI has only been analysed based on anecdotal evidence or case studies of specific countries (Braun & Fuentes, 2016; Buergi Bonanomi & Meyer-Nandi, 2018; Lejour, 2014; McGauran, 2013). However, these papers have not provided a conclusive understanding of the effects; therefore, this thesis adds to the literature by looking at the impact of the allocation of taxing rights to participating treaty countries within a DTT on the FDI inflow of developing countries. This thesis aims to answer the following research question:

How does the allocation of taxing rights within a DTT affect the FDI inflow of developing countries?

To answer this, first, it must be examined what the general effect of signing a DTT is on developing countries' FDI inflow. In the literature, several approaches are used to evaluate the effects of tax treaties on FDI flows. First, some papers use a qualitative method and analyse the expected results from a legal perspective. Based on a case study of specific countries and anecdotal evidence, they conclude that developing countries benefit and suffer from the consequences of signing DTTs (Bürgi Bonanomi & Meyer-Nandi, 2013; McGauran, 2013). Other papers, with a quantitative approach, use economic analysis to analyse the

impact of DTTs based on macro and micro data. Their findings are not uniform and often show insignificant or adverse effects (e.g., Blonigen & Davies, 2002; Egger et al., 2006; Neumayer, 2007). To get a baseline understanding of how a DTT affects the FDI inflow of the countries examined in this thesis is needed before the effects of the allocation of taxing rights in a DTT on FDI inflow can be researched. In this thesis, a Random Effects regression model based on panel data set from the OECD on developed countries' FDI outflows is used to analyse the effect of a DTT on developing countries' FDI inflow. Central to this part will be the following sub-question:

What is the effect of signing a DTT on the FDI inflow of developing countries?

Besides, the abovementioned papers only superficially analyse DTTs and whether a DTT's conclusion influences FDI. They do not study the impact of taxing rights distribution in specific DTT provisions among the resident (capital-exporting) and source (capital-importing) states. To address this, the data is complemented with data on DTTs. Based on the *Tax Treaty Explorer* database (TTE), 2.500 DTTs are quantified by indicating whether the DTT and specific DTT provisions give a favourable taxing rights balance over inward investments to the resident or source state (Hearson, 2021). This allows for a precise estimation of the impact of the allocation of taxing rights within DTTs on developing countries' FDI inflows. As shown by Brauner (2020), the allocation of taxing rights during treaty negotiations is mainly driven by the quality of institutions of the countries involved. Therefore, the second sub-question will focus on how, through the allocation of taxing rights in a DTT, countries' institutional quality results in increased or decreased FDI inflow of developing countries. The second sub-question is:

How does the allocation of taxing rights within a DTT affect the FDI inflow of developing countries?

The OECD and TTE data are combined with variables from the World Bank Development Indicators dataset. This research finds evidence of an increase in the FDI inflow of lower-middle income countries due to the conclusion of DTTs. Additionally, when splitting the data into sub-samples for developing countries' income levels, only lower-middle income

countries. However, no effect of the taxing rights allocation within DTTs on the FDI inflow of developing countries is found.

Next to extending academic knowledge on the effect of DTTs on FDI, this thesis serves to help governments of developing countries better understand if and under what circumstances DTTs benefit their country. Furthermore, this research could lead to a broader discussion on how to design an international tax system that promotes a beneficial distribution of taxing rights and is advantageous for both source and residence states.

The rest of this paper is structured as follows. Section 2 discusses the literature on the relationship between DTTs and FDI, followed by the hypotheses used to answer the research question. The data are discussed in section 3. Section 4 elaborates on the estimation model. The empirical results and robustness tests are discussed in section 5. Section 6 concludes and gives suggestions for further research.

2. Literature review

This section will discuss the literature on the influence of DTTs on FDI inflow. First, an overview of developing counties' motives for attracting FDI is given. Second, developing countries' objectives for concluding DTTs are reviewed. Third, the effects of the DTT conclusion on attracting FDI for developing countries found in the literature are examined. Finally, the effect of institutional quality on taxing rights allocation during DTT negotiation and the effect of this allocation on FDI inflow is discussed. Based on this, hypotheses will be drafted to answer the research question.

2.1 Motives for attracting FDI at the country level

Developing countries have multiple reasons for wanting to attract FDI. It is argued that FDI inflows can drive economic growth through job creation, increased capital accumulation, and enhanced integration with the global economy (Romer, 1990; Rostow, 1990; Solow, 1956; Todaro Smith, 2006). In addition, FDI can result in productivity increases, MNEs can improve the human capital of the local population, and technical spillovers to local firms can occur (OECD, 2012; UNCTAD, 2012). These increased economic activities can boost a country's tax

revenues (OECD, 2012). Therefore, FDI policies can be integral to a country's economic development strategy (Goodspeed et al., 2011).

However, FDI inflows can also have serious drawbacks. FDI can cause the creation of economic centres that are hardly related to the local economy, displacing domestic investment or causing financial instability. Besides, investments by foreign MNEs can cause damage to the environment and the degradation of nature. Additionally, MNEs can evade national laws and regulations such as labour laws and local taxes (Navaretti & Venables, 2020). Navaretti and Venables (2020) also emphasise that FDI inflows sustain the current economic and political dependency of developing countries ("the periphery") on developed countries ("the centre"). Foreign subsidiaries in the periphery mainly supply natural resources and cheap labour, while decision-making functions at the corporate headquarters remain in the centre (Todaro Smith, 2006).

The extent to which the potential benefits of FDI manifest themselves in developing countries depends primarily on local, political, or institutional factors and the source country's capacity to absorb the investments (Crespo & Fontoura, 2007; OECD, 2012). The benefits of FDI are more likely to materialise when a source country's infrastructure, as well as its financial markets, have developed to some degree and a certain level of human capital and technical knowledge is present (Borensztein et al., 1998; Crespo & Fontoura, 2007; Hermes & Lensink, 2003). Therefore, lower- and upper-middle-income countries benefit more from FDI inflows than low-income countries (Blomström et al., 1994; Narula & Zanfei, 2005).

The location choice of MNEs' FDI consists of two different choices. First, a firm decides whether to invest in a specific country, the so-called "extensive margin" of investment. Then, the company chooses how much capital to invest, the "intensive margin" of investments. Regarding the extensive margin, political and economic factors determine the degree to which a country is attractive for FDI. For example, political stability, geographic location, size of the local market, infrastructure, quality of the country's institutions and degree of bureaucracy in the country play a role in the choice of an MNE to establish a subsidiary in that country (OECD, 2012; Schwab, 2013). In addition, tax considerations - including whether a DTT is closed - can influence the location choice of an MNE (Braun & Fuentes, 2016). From a

policy perspective, a DTT is an attractive instrument to influence FDI decisions because it can be introduced relatively quickly compared to adjusting the other factors, which take longer to show results (Braun & Fuentes, 2016).

2.2 Countries' international tax treaty policy objectives and their harmful effects on global tax revenues

The primary motivation of developed and developing countries' international tax treaty policy is to make the country more attractive to FDI inflows by eliminating double taxation, lowering statutory tax rates, and growing economic relations. In addition, by signing DTTs, developing countries can signal to the international community their economic openness and willingness to accept internationally accepted standards by entering into a DTT (Dagan, 2003). Governments hope to compensate for the loss in tax revenue through increased economic activity resulting from FDI inflows (Villaverde & Maza, 2015). Besides attracting FDI, countries aim to increase legal certainty and reduce tax avoidance and evasion through DTTs (Lejour, 2014; Loukota et al., 2004).

However, these policies have caused adverse effects. Countries compete to become and remain attractive for FDI, which has resulted in a race to the bottom in which countries continuously lower corporate tax rates. Since 1980, the average statutory corporate tax rate of 177 countries has fallen from 46.5% to 26% (Oxfam Novib, 2016c). In addition, governments have introduced tax credits and deductions in their national legislation, making the effective tax rates much lower than the average statutory tax rate (Oxfam Novib, 2016c). The lowering of statutory corporate tax rates is found to increase FDI, but in the long-run, annual GDP growth decreases (Anguelov, 2017). This could be partially explained by developing countries losing $138bn in tax revenues due to tax incentives (such as corporate tax breaks) to attract FDI (Oxfam Novib, 2016b).

Moreover, several countries have had the policy to conclude as many bilateral tax treaties as possible and become a hub for global investment flows. DTT networks of partner signatory states open the doorway to tax-friendly countries such as the Bahamas, Ireland, and the British Virgin Islands, even if a developing country has not signed a DTT. For instance, the Dutch government has had the policy of signing as many tax treaties as possible. According to

Oxfam Novib (2016b), the Dutch tax treaty policies have resulted in the Netherlands accounting for 15,4% of global FDI flows, whereas it only accounts for 0,91% of global GDP. Only Luxembourg and Mauritius have a more imbalanced ratio between GDP and FDI. The disproportionate percentage can only be explained by considering the aggressive tax planning of MNEs (IMF, 2014). These avoidance routes also contribute substantially to developing countries' $100bn lost tax revenues (Oxfam Novib, 2016b).

The above has led countries to question the current international tax system. In the past years, the objectives of international tax policy have partially shifted to the prevention of tax. This has resulted in efforts to close several loopholes and a more fundamental revision of the global tax system. Currently, the OECD is working on the *Base Erosion and Profit Shifting* (BEPS) project, and the European Union (EU) is proposing minimum corporate taxation for MNEs active in the EU (European Commission, 2021; OECD, 2015).

Due to pressure from the European Union, the Dutch government has changed its stance on its tax treaty policy and its merits. The Secretary of State (Staatssecretaris van Financiën, 2015) announced they would put more effort into countering tax evasion. From 2021, royalties, interest and dividends flowing through the Netherlands will be taxed based on a withholding tax. Besides, several measures have been taken to increase information sharing and transparency.

2.3 The effects of DTTs on FDI inflow for developing economies

The previous sections have highlighted how developing countries hope FDI will affect their economies and the effects of international tax policy and tax competition between governments on developing countries' tax revenues. Developing countries hope to compensate for the loss in tax revenue with increased FDI inflows by concluding DTTs. Since this theoretical perspective is the premise on which the conclusion of DTTs is built, it is essential to examine whether this holds in practice and see which results are found in the literature.

First, a distinction must be made between developing and developed countries. Blonigen and Wang (2004) argue that different factors affect investment location choices in developed and

developing countries. Therefore, these two groups of countries should not be analysed together. Currently, developing countries are more impacted by tax evasion and avoidance based on DTT networks. Thus, it is more pressing to understand the effects of developing countries' DTTs on FDI. This thesis excludes developed countries as source countries and focuses on developing countries as potential source countries to address the concern voiced by Blonigen and Wang (2004). Based on the findings discussed below, hypotheses are drafted on the expected effects of DTTs on the FDI inflow of developing countries.

The current state of literature is that it is unclear whether and how DTTs affect FDI activity in developing countries. From a theoretical perspective, DTTs are expected to have a positive effect on developing countries' FDI inflow by preventing double taxation and reducing tax rates, thereby lowering barriers to invest (Barthel et al., 2010; Blonigen et al., 2014; Egger et al., 2006; Lang & Owens, 2014).

In contrast to the theoretical premise used by governments, several papers show from a legal perspective that developing countries benefit and suffer from signing a DTT. This depends on country-specific characteristics such as the domestic legal system and the interaction between treaty countries' legal systems and the DTT (Braun & Fuentes, 2016; Bürgi Bonanomi & Meyer-Nandi, 2013; McGauran, 2013).

Other papers, with a quantitative approach, use econometric analysis to examine the impact of DTTs based on macro and micro data. Their findings are not uniform and often show insignificant or adverse effects. Based on Swedish and German firm-level data, a positive impact of the existence of a DTT on the probability that a firm will establish a subsidiary in the other treaty country (perform FDI) was found (Davies et al., 2009; Egger & Merlo, 2011). Both papers argue that this positive effect is mainly explained by the certainty provided by the DTT on tax and taxation. On the other hand, others see no or opposite effects of DTTs on FDI inflows due to DTTs limiting tax avoidance and evasion opportunities (Davies et al., 2009; Egger et al., 2006; Louie & Rousslang, 2008; Millimet & Kumas, 2007). It is argued that DTTs can hinder FDI inflow by reducing tax avoidance and evasion based on three arguments. First, DTTs facilitate the exchange of information and administrative assistance between tax administrations (Barthel et al., 2010). Second, DTTs contain a provision requiring transactions

between associated enterprises to occur on an arm's length basis. These transactions should appear as if they were between unrelated parties (Art. 9 OECD Model). This article is intended to prevent profit shifting based on strategic under- and overvaluation of intra-group transactions (Blonigen et al., 2014; Egger et al., 2006). Third, specific anti-mispricing provisions in a DTT must prevent treaty shopping. This means that the (mis-)use of a DTT by a person who does not have access to the treaty's benefits is prevented, which could limit FDI inflows (Braun & Fuentes, 2016).

Contrary to the above, Baker (2014) argues that there is simply no effect of DTT on FDI choices and questions the adverse effects of OECD Model provisions on FDI. First, as stipulated in DTTs, information exchange happens mostly on demand. Thereby, source and residence countries often have the same information, as FDIs usually take the form of a subsidiary in which the parent company in the country of residence holds all or a majority of the shares (Baker, 2014). Second, Article 9 OECD Model cannot lead to an adjustment of profits and agreed prices for goods and services provided between related companies on an independent legal basis (Lang, 2013). Since these adjustments can only be made based on domestic law, it is not likely that DTT provisions will prevent tax avoidance and thus influence FDI. Third, the anti-abuse provisions in DTTs seek to prevent non-residents (or other persons and companies excluded from treaty access) from taking advantage of the treaty. However, this will hardly apply to companies based in one of the signatory states and thus has a limited impact on bilateral FDI flows (Baker, 2014).

Considering the arguments above, theory suggests that developing countries FDI inflow should increase due to signing a DTT. Inconclusive effects are found in practice, primarily due to particularities related to specific countries or groups of countries. As this thesis includes a different (and broader) scope of countries compared to the papers discussed above, it is unclear how the results should be extrapolated to this thesis. However, as developing countries still use the theoretical argument over the evidence found in the literature to justify signing a DTT, the theoretical perspective will be taken as a starting point of analysis. Therefore, a positive effect of signing a DTT on the FDI inflow of developing countries is expected.

Hypothesis 1: On average, the conclusion of a DTT has a positive influence on the FDI inflows of developing countries.

In addition to studies examining the overall effects of concluding a DTT on FDI inflow without distinguishing between countries' income levels, DTTs are found to positively affect FDI for middle-income countries (Barthel et al., 2010). Besides, when looking at the Austrian DTT network, Braun and Fuentes (2016) find that middle-income countries receive increased FDI inflows from Austrian companies, while no effects are found for low-income countries. In addition, Neumayer (2007) has shown that when developing countries signed a DTT with the US, this led to about 20 per cent higher FDI stocks from 1970 to 2001. However, this effect is only significant for middle-income countries.

Besides, as discussed earlier, middle-income countries benefit more from FDI inflows than low-income countries (Blomström et al., 1994; Narula & Zanfei, 2005). This could be explained by a higher overall institutional development in middle-income countries. DTTs act in combination and are an extension of domestic tax legislation (Lang, 2013). If laws, legal concepts, and tax authorities are less well developed, signing a DTT could also have little impact. Domestic development of laws and legal concepts are needed for a straightforward application of DTT provisions. This includes legal concepts not explicitly defined in DTT, domestic procedures applicable to DTT provisions, such as methods to avoid double taxation, and exchange of information on taxpayers (Nakayama, 2011). Therefore, three sub-samples are made to examine the effect of a DTT on the different income level groups. In line with hypothesis 1, a DTT is expected to increase FDI inflow for the different income groups.

Hypothesis 2A: low income developing countries experience a positive influence of signing DTTs on FDI inflow.
Hypothesis 2B: Lower-middle-income developing countries experience a positive influence of signing DTTs on FDI inflow.
Hypothesis 2C: Upper-middle-income developing countries experience a positive influence of signing DTTs on FDI inflow.

2.4 FDI decisions, taxing rights allocation and institutional quality of developing countries

Although extensive research has been done on the effect of a DTT on FDI inflow, there has been little research analysing the impact of the allocation of taxing rights within DTTs on FDI inflow.

MNEs include tax rates and taxation as essential drivers of their investment location choice. In doing so, they optimise their tax burden and structure their investments so that investments are made through a tax haven. Often, this is done in combination with a country with an extensive treaty network whereby the taxing rights are as much as possible in the country of residence. For example, a company can invest in a developing country from the Bahamas via the Netherlands. Through treaty provisions, the source country's taxing rights are limited. In addition, the tax levied in the Netherlands may be offset against the tax liability there. Because no corporate tax is charged in The Bahamas on income, the tax burden is extremely low. As stated earlier, through these practices, developing countries are missing out on $100bn in tax revenues a year (Oxfam Novib, 2016a). If governments wish to recoup these losses in tax revenue, it is essential to consider how the allocation of taxing rights comes about during treaty negotiations. Besides, suppose countries would like to partially make up for lost tax revenues through increased investments and economic development. In that case, it is crucial to understand how this allocation of taxing rights affects location choice. High taxing rights allocation is not necessarily beneficial for attracting FDI. Companies could be deterred from entering a country through FDI if they are faced with taxes in the source country (for a more extensive elaboration, see, e.g., Bellak & Leibrecht, 2009).

Due to the confidentiality of treaty negotiations, little research has been done on how the allocation of taxing rights in DTT negotiations comes about. However, several noteworthy results have emerged from Brauner's (2020) survey among DTT negotiators on negotiation goals, negotiators' training and preparation, and how specific provision within a DTT come about. First, accommodating FDI is not the most important driver during treaty negotiations. Based on an anonymous survey concerning the international tax policy and drivers of DTT negotiations among treaty negotiators, Brauner (2020) concludes that countries are mainly

driven by wanting to complement foreign policy and accommodate trade and the needs of individual MNEs. The latter is especially the case for OECD countries. It is unclear if this is mainly to serve companies with a current interest in a specific country or companies that are exploring options and are planning to invest.

Second, on average, OECD countries' treaty negotiators are higher trained. However, there are also several non-OECD countries with highly trained treaty negotiators due to the number of treaties concluded by these countries in the past years. During training, the focus is on the OECD Model and accompanying OECD Commentaries. At the same time, the UN Model and Commentary are viewed as complementary.[3]

Third, during the preparation for treaty negotiations, most attention is given to the negotiators' home country's policies and economic position and the OECD Model. Some attention is given to counterparties' domestic laws and treaties, but little attention is given to understanding the economic situation and policies of the counterpart. This is remarkable given that the literature marks promoting FDI as one of the main drivers of DTT conclusion. How is one supposed to promote FDI inflow from a country through a DTT if little attention is given to the specific economic situation of that country?

Fourth, during the negotiations, the better-trained negotiation party is, on average, better prepared and therefore dominates the negotiation and gets more taxing rights allocated. Besides, during tax treaty negotiations, countries will have priorities and getting rights assigned in the DTT to levy specific taxes will be given away more quickly than others. For example, some developing countries' tax authorities lack the administrative capacity to tax corporate income and focus mainly on VAT (Bird, 2008). Thus, it could be that the different groups would have other priorities when negotiating the DTTs, and some taxing rights are given away more quickly. This is expected to be especially the case for low-income countries, as they are most deprived of the institutional capacity and financial means to train their negotiators and develop tax policies properly. Also, in the survey (Brauner, 2020), almost 50% of respondents from non-OECD countries indicated that their policy on treaty negotiations

[3] The Commentaries discuss the interpretation of Articles and provisions in specific situations.

was set ad hoc, while for respondents from OECD countries, more than 60% indicated that they adhered to pre-established guidelines. Therefore, being better trained and having better institutions in place will result in more taxing rights allocated.

Finally, the negotiations focus on whether a specific provision will follow or deviate from the OECD model, while a more comprehensive discussion on the actual purpose of a DTT and its possible economic impact on both parties is lacking. This may limit the effect of taxing rights distribution, as the OECD model is, by its very nature, heavily biased in favour of the country of residence. Therefore, a relatively large deviation from the standard model could not be as pronounced in practice.

As a result of the above, weak institutions and, consequently, poorly trained and prepared negotiators could lead to fewer tax rights being granted to a country, and that country cannot tax foreign MNEs. As this lowers the local tax burden of those MNEs, tax-optimising companies could use this relatively attractive treaty for their investments. In this way, weak institutions could increase in FDI inflows through a lower allocation of taxing rights in a DTT. Therefore, a lower taxing rights allocation is expected to increase FDI.

Hypothesis 3: A lower allocation of taxing rights during DTT negotiations results in higher FDI inflow for developing countries.

3. Data

This section will discuss the dataset and the individual variables used. Besides, the expected effects of the control variables on the dependent variable *FDI inflow* will be examined.

The dataset includes the FDI inflows of all country pairs (resident and source states) from 2003 to 2020 based on the OECD database, where at least the source state is a developing country. See Appendix A for the lists of countries included in the dataset. Table A.1 denotes the countries included as source countries, Table A.2 shows the countries included as resident countries, and Table A.3 elaborates on the financial offshore countries in the Caribbean. In total, there are 28.611 observations with bilateral FDI inflows. This results in 3.615 possible country pairs. Besides, 2.500 DTTs from the TTE are used for analysis, comprising all DTTs

signed by 118 countries that are or were until recently low-income, lower-middle-income, and upper-middle-income countries, all countries in Africa, and all members of the Intergovernmental Group of 24. Also, all other variables are retrieved from the United Nations World Bank's database.

3.1 Variables

Dependent variable

To analyse the effect of DTTs on FDI, the total amount of FDI inflow in million US dollars in a given development country each year is used as the dependent variable of interest.

Independent variables

The primary explanatory variable is *Tax Treaty*, which is a dummy variable that indicates whether a pair of countries has concluded a DTT or not. It displays 0 if no DTT is concluded and 1 if it is. Some papers use the date when a DTT is signed, whereas others use the date when a treaty becomes effective. This thesis focuses on when a treaty becomes effective because this is most important for companies deciding whether to perform FDI in a country.

When countries negotiate a DTT, provisions are drafted that distribute the taxing right on FDI inflows between the resident and source states. Multiple indices based on the TTE database to examine the impact of a favourable taxing rights distribution on FDI inflows (Hearson, 2021) will be used to indicate how favourable the allocation of taxing rights for a source country is within a DTT. These indices are based on general provisions dealing with treaty access and conditions on definitions of specific terms and concepts, taxation of income and capital, and methods for eliminating double taxation. This allows for a more precise estimation of heterogeneous effects within concluded DTTs on FDI activity.

Hearson (2021) has rated the associated treaty articles and provisions on how favourable the allocation of taxing rights in those articles is to the source country to make these index variables. A deliberate interpretation was used in developing the variables, considering the intention of non-standard wording rather than simply checking whether a specific language is present. Each of the treaties was independently coded by two different members of the TTE project team. If they did not match, advice was sought from an advisory group of tax

professionals and several experienced treaty negotiators (Hearson, 2021). The indices are unweighted because it was impossible to ascertain the weight given to specific provisions by countries during treaty negotiations.

Based on the individual provisions of the DTTs, five indices are defined that combine specific provisions of a DTT into an expression of how favourable the treaty is for either the resident or source state. Each clause in the treaty has been assigned a value between 0 and 1 to create the indices. Where 1 represents a higher allocation of taxing rights over inward investment for the source state.

The overall *Source* index is used to analyse the effect of a favourable taxing rights allocation on FDI. The variable contains all articles in the dataset related to the distribution of taxing rights and provides the most general overview of a DTT. The Source index shows on a scale from 0 to 1 the degree of taxing rights distribution in a DTT. 0 means full rights allocated to the resident country, and 1 means taxing rights fully assigned to the source country. Once a treaty is signed, the taxing rights distribution remains the same, and so there is no variation over time unless there has been a treaty change. This is included in the observations in the years after the treaty change for that specific country pair.

The included provisions address the permanent establishments, business profits, passive income, fees for top-level managerial officials, source taxation on other income, mandatory binding arbitration, assistance in tax collection, and the general anti-abuse rule. Low-income countries are expected to be most limited in supplying enough resources for their tax authorities. Therefore, they will give away more easily taxing rights during the negotiation.

Control variables

The variable *GDP per capita* is added to this analysis to control country pairs' economic similarity. Hakizimana (2015) and Alshamsi and Salam Field (2015) found a positive relationship between GDP per capita and FDI. Besides, the openness of an economy is used as an indicator of (dis)similarity as a more liberalised economy has been found to positively impact FDI inflows for developing countries (Sekkat & Veganzones-Varoudakis, 2007). Based

on Tiwari et al. (2022), the variable *Openness* is calculated as the sum of the total imports and exports divided by GDP.

Also, good infrastructure is essential for the productivity of investments and therefore stimulates FDI inflows. In the literature, the *number of telephones* per 1,000 inhabitants is used as a proxy. A good proxy for infrastructure development must include both availability and reliability (Asiedu, 2002). However, if this variable only considers availability and not reliability, it is not a perfect variable. But for lack of better, this will have to do.

In addition, the rule of law and certainty around legislation can be an important factor in the location of FDI. In this analysis, the *Rule of Law* estimator of the World Bank. This variable measures the quality of contract enforcement, property rights, the police, and the courts. In addition, it measures the likelihood of crime and violence. Staats and Biglaiser (2012) show for Latin America that a higher rule of law and judicial strength result in increased FDI inflow. Additionally, Alexander (2014) shows that law-based governance increased FDI in China. The variable gives the percentile rank, indicating a country's rank among all countries covered by the indicator, with 0 denoting the lowest rank and 100 the highest rank.

Since this thesis mainly focuses on the effects of international tax policy, specifically DTTs, the variable for corporate tax is added. When choosing the location of MNEs, both the effective corporate tax rates of source countries and the withholding tax rates on dividends, interest and royalties paid to the country of residence play a role. Ideally, these would be included. However, corporate income tax and withholding tax rates are not readily available for many developing countries. Therefore, they have been left out of the analysis. Instead, in line with Egger et al. (2006), Baker (2014) and Braun & Fuentes (2016), total final *government expenditure* as a percentage of GDP was used as a proxy for corporate tax rates.

Besides, to further address the economic development of developing countries, the year-on-year *growth rate of GDP* and the average *inflation* in the five years before the year of investment average CPI (Asiedu, 2002) and the growth rate of the ratio of the M2 money supply to GDP *M2 growth rate* (Naudé & Krugell, 2007) are added. All are based on the World Bank Development Indicators database.

Several dummy variables on *income level* have been added to distinguish between the income groups of countries, denoting the different types of income country pairs. The World Bank distinguishes four income groups: low, low-middle, upper-middle, and high-income.

3.2 Descriptive statistics

Table 3.1 shows the descriptive statistics of the variables used in this research. There are, in total, 28.611 observations for FDI inflow divided over 3.615 country pair combinations over 15 years. In only 5.66% of the observations (1,717 observations), a DTT has been concluded before the year of interest. Unfortunately, the number of observations where a country pair has concluded a DTT is low. Overall, there are roughly 3,000 DTTs concluded worldwide. Only those related to developing countries drafted in English, French, or Spanish are analysed and coded by Hearson (2021). As a result, a relatively high number of observations in the dataset are without a Source index score. Thus, the total amount of observations with a *TTE* index score decreases drastically. For 291 country pairs (1.620 country pair-year observations), the TTE indices were coded by Hearson (2021). The TTE indices show the distribution of taxing rights within DTTs ranging from 0 to 1, whereby a higher score allocates a larger share of the taxing rights to the source country. Due to this method, it is not possible to, for instance, artificially enter a 0 for all country pair year observations for the years in which no treaty has been concluded between the two countries. This would result in all resident countries having full taxing rights, whereas the source countries would not be granted any taxing rights.

A different option would be to assume that the taxing rights allocation is balanced and enter 0.5 for every country pair without a DTT. However, this would not be in line with reality because without a treaty. It is unclear what the tax jurisdiction ratio is for that year for that country pair. If no DTT is in place, the tax liability of an MNE with an FDI abroad is based on the domestic tax legislation of the two countries involved. Both countries do not account for the legislation of the other country. Therefore, there could be double taxation or double non-taxation of cash flows (dividend, interest, or royalties). The domestic tax legislation of the countries analysed is not quantified similarly to the TTE database. Therefore, for country pairs without a DTT, the taxing rights allocation cannot be determined without analysing the domestic legislation. As this is not feasible due to language constraints, the country pair year

observations without a DTT are reported as missing values. The Source index's minimum is .1, and the maximum is 0.83, indicating that no DTT wholly allocates taxing rights to either of the treaty countries. The number of country pair observations over the total period of interest, the distribution of country pair income levels and the number of DTTs closed by those groups of country pairs are shown in Table 3.2. Most of the FDI flows are between country pairs consisting of a developing source country with a high-income (level 4) resident country. Additionally, most of the DTTs closed are by a high-income resident country. This is in line with evidence found by Brauner (2021) that DTTs are mostly concluded by OECD countries.

Table 3.1 Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Log FDI	28,611	37.035	512.323	-15806.701	34551.586
Tax treaty	28,611	.057	.231	0	1
Source	1,620	.356	.142	.1	.83
Log Openness	24,848	77.89	37.776	1.219	347.997
Log GDP per capita	27,956	4,032.522	3,404.784	128.337	21,139.064
Log Telephone	27,682	9.355	9.933	0	49.306
Political Stability	28,067	-.068	1.037	-3.181	1.965
Log Governmental expenditure	23,652	16.589	10.251	2.047	115.932
Log GDP growth rate	27,854	3.72	5.16	-50.339	86.827
Log Inflation	19,944	5.49	5.411	-2.574	185.165
Log M2 growth	25,102	13.053	14.59	-54.685	249.835
Common official language	27,166	.037	.189	0	1
No. DTTs signed by source country	23,344	21.262	23.392	1	101

Table 3.2 Total number of country pairs and the distribution of DTTs concluded by country-level income pairs.

	Source country income level	Resident country income level	Total number of observations	Number of observations with a DTT signed	Number of observations without a DTT signed
Income-level country pairs	L	UM	878	19	859
	L	H	6,156	96	6,060
	LM	UM	1,134	100	1,034
	LM	H	9,476	536	8,943
	UM	UM	998	79	919
	UM	H	9,966	833	9,113
Total			28,611	1,620	26,991

Note: the income level country pairs show the combination of a source and resident country. The low-income countries are denoted by L, the lower-middle- income countries are denoted by LM, UM denotes the upper-middle-income countries, and the higher-income countries are denoted by H.

4. Methodology

This section elaborates on the empirical methods used to examine the effect of DTTs on FDI inflows for developing countries and the impact of a favourable allocation of taxing rights within the DTT on FDI inflows to developing countries.

To analyse this effect, several issues must be overcome. As values in previous years influence the current value of variables, the error terms are correlated over time, and standard multiple OLS regression will lead to inefficient estimates. In addition, due to endogeneity, obtaining unbiased parameters from the OLS regression is impossible as the error term is correlated with the dependent variable.

To address the serial correlation, a Random Effects model can be used. A Random Effect model uses the between and within variation of countries through a quasi-demeaning transformation of the data to account for serial correlation of the error terms. This model assumes the individual unobserved heterogeneity is uncorrelated with the independent variables at any time. Additionally, a Fixed Effects model could also be used. However, if a Fixed Effects model is used, the hypotheses cannot be tested due to two issues. First, the main independent variables (*Tax treaty* and the TTE indices) are time-invariant from when a DTT is concluded, resulting in the omission of these variables when estimating the effect.[4] Also, Fixed Effects estimates the impact based on the within variation of the countries over time. This is problematic because many available variables related to FDI inflow show slight variation over time and mainly differ between countries. Also, the estimates may be biased due to endogeneity. A possible solution could be estimating a model with Instrumental Variables (IV) to account for this. Therefore, the Random Effects with IV model is preferred.

$$FDI_{ijt} = \alpha_{ijt} + \beta \boldsymbol{X}_{it} + \varepsilon_{ijt} \quad (1),$$

where i denotes the source countries, j the resident countries, and time t = 2005, …, 2020. FDI_{ijt} is the FDI inflow from the country j to country i. $\boldsymbol{X}_{it}$ is a vector of the independent variables. ε_{ijt} the error term. Due to skewness in the data, the natural logarithm of the variables *Openness, GDP per capita, Telephone,* and *Governmental expenditure* are taken. In

[4] In theory, DTTs can be cancelled by the contracting parties, but this hardly ever happens. Only two DTTs out of 3,000 have been terminated in the past twenty years, and two have been renegotiated (Braun & Fuentes, 2016).

addition, to avoid loss of observations with negative values or zeros and normalise the data, for the variables *FDI*, *Inflation, M2 growth* and *GDP growth*, the lowest negative observation and 0.0001 is added to all observations. The latter is done to prevent the lowest observation from becoming 0, as this would result in an omitted variable when log transforming these variables. Introducing an arbitrary 0.0001 is not ideal as its effect is not linear for all observations due to the non-linear nature of the natural logarithm. However, other options were of no avail.[5] Since firms will not invest immediately when a DTT is signed, the effects of a DTT on FDI inflows may take some time to materialise. Therefore, all independent and control variables are lagged one year from the year of interest. Finally, country and year fixed effects are included to account for unobserved between variation.[6]

A Random Effects model with IV addresses endogeneity by introducing a third variable (or group of variables) highly correlated with the primary independent variable but uncorrelated with the dependent variable. The IV method has several important assumptions. The first assumption is the relevance assumption, which implies that the instrumental variable must be correlated with the endogenous variable. The more relevant the instrument, the more variation in the dummy variable tax treaty is explained by the instrument. In addition, the first-stage regression, based on an F-test, checks whether it is a strong instrumental variable. If the F-test is higher than the minimum threshold of 10, there is a strong instrumental variable. Besides, the instrumental variables must not influence FDI inflow through any other determinants of FDI inflow. Finally, the instrumental variable must not correlate with the error term of the standard OLS regression to be valid.

For hypotheses 1 and 2, on the conclusion of DTTs, several instrumental variables are used to estimate the effect on FDI; the geographical distance between the capitals of the countries, the number of treaties concluded, whether there is a historical colonial relationship and if the partner countries had the same coloniser (Lejour, 2014). Table 4.1a shows the correlation

[5] E.g., arc sine and hyperbolic arc sine transformations as used in Neumayer (2007), Barthel, Busse, and Neumayer (2010), and Baker (2014) would result in a high number of observations being omitted due to the range limits of these transformations. Therefore, the decision was made to log transform the data and introduce an arbitrary number.

[6] This results in a log-level model. To interpret this data, a transformation is needed. For the log-transformed variables, this is done using the following formula.

matrix between the variables used. Table B.1 in Appendix B shows the first-stage Chi^2, which indicates that these IVs are strong. Under the null hypothesis that the added variables are jointly zero, the different test statistics suggest that this hypothesis should be rejected at a 1 % significance level. Therefore, the relevance assumption is met. Besides, Table B.2a lists the first-stage summary statistics for hypotheses 1 and 2. These instruments are valid and strong based on the Kleibergen Paap (2006) statistics for under-identification and weak instruments and the Hansen J (2008) statistic for over-identification.

For hypothesis 3, concerning the allocation of taxing rights within DTTs, Brauner (2020) showed that the training and preparedness of negotiators drive who has the upper hand during treaty negotiations and, ultimately, how the balance of taxing rights is determined. However, no variable denoting the level of training and preparedness of negotiators is publicly available. However, the number of DTTs closed by a country could be used as a proxy for training and preparedness. Besides, Brauner (2020) also noted that the level of training and preparedness was correlated with whether a country was part of the OECD during the negotiations. Unfortunately, it is impossible to use this as an instrumental variable because the dataset consists solely of FDI outflows to developing countries reported by OECD countries. Therefore, two different IVs are performed.

First, countries that have signed more DTTs in the past will have more experience with the negotiation process. Thus, the number of DTTs signed by a source or resident country could be used as an IV for the Source variable. Table 4.1b denotes the correlation matrix between the variables used and the IV. However, as shown in columns 1 to 3 in Table B.2b, the first-stage summary statistics show that these are not valid and weak instruments.

Second, countries with high trade volumes possibly have concluded more trade agreements to enhance free trade with their partner countries. Thus, countries' authorities possibly have more experience with trade agreement negotiations. The discussions on a free trade agreement are often combined with negotiations on DTTs (Brauner, 2020). Therefore, experience and preparedness could spill over to DTTs negotiations. The variable *Openness* is used as IV for the Source variable to account for this. Table 4.1b denotes the correlation.

Table 4.1a Correlation matrix Tax Treaty

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) FDI	1.0000											
(2) Source	0.2200	1.0000										
(3) GDP per capita	-0.0846	-0.1032	1.0000									
(4) Telephone	0.1968	0.1051	0.2269	1.0000								
(5) Rule of Law	0.1625	0.1075	0.2546	0.7554	1.0000							
(6) Governmental expenditure	0.0037	0.0267	0.0144	0.0990	0.0587	1.0000						
(7) GDP growth	-0.0181	-0.0515	0.2536	0.2424	0.2254	0.1292	1.0000					
(8) Inflation	-0.0003	0.0085	0.0129	-0.0511	-0.0095	-0.0401	-0.1018	1.0000				
(9) M2 growth rate	0.0278	-0.0304	-0.1732	-0.2445	-0.1861	0.0379	-0.1759	-0.0121	1.0000			
(10) Common official language	0.0081	-0.0058	-0.1193	-0.1324	-0.0574	0.0368	-0.1108	0.0248	0.3133	1.0000		
(11) Colonial relationship	0.1209	0.1160	0.0074	0.0090	-0.0311	-0.0261	0.0211	0.0017	-0.0328	-0.0191	1.0000	
(12) No. DTTs closed	0.3118	0.2764	-0.0513	0.2491	0.3731	0.0247	-0.0972	0.0181	0.0053	0.0182	-0.0402	1.0000

Table 4.1b Correlation matrix TTE Indices

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) FDI	1.0000											
(2) Source	0.2207	1.0000										
(3) GDP per capita	0.1968	0.0225	1.0000									
(4) Telephone	0.1625	-0.1870	0.7554	1.0000								
(5) Rule of Law	0.0037	0.0595	0.0990	0.0587	1.0000							
(6) Governmental expenditure	-0.0181	-0.2040	0.2424	0.2254	0.1292	1.0000						
(7) GDP growth	-0.0003	0.0329	-0.0511	-0.0095	-0.0401	-0.1018	1.0000					
(8) Inflation	0.0278	0.3088	-0.2445	-0.1861	0.0379	-0.1759	-0.0121	1.0000				
(9) M2 growth rate	0.0081	0.0738	-0.1324	-0.0574	0.0368	-0.1108	0.0248	0.3133	1.0000			
(10) Common official language	0.1209	-0.0173	0.0090	-0.0311	-0.0261	0.0211	0.0017	-0.0328	-0.0191	1.0000		
(11) Colonial relationship	0.1773	-0.0546	0.0232	0.0058	-0.0368	0.0118	-0.0007	-0.0090	0.0038	0.5003	1.0000	
(12) No. DTTs closed	0.3118	0.1243	0.2491	0.3731	0.0247	-0.0972	0.0181	0.0053	0.0182	-0.0402	-0.0025	1.0000

matrix between the variables used and the IV. Besides, Table B.1 in Appendix B shows the first-stage Wald-test. As the Chi^2 is higher than 10, the IV is strong. Also, Table B.2b shows the first-stage summary statistics for hypothesis 3. Based on the Kleibergen Paap (2006) statistics for under-identification and weak instruments and the Hansen J (2008) statistic for over-identification, the instrument is valid and strong.[7]

Second, countries with high trade volumes possibly have concluded more trade agreements to enhance free trade with their partner countries. Thus, countries' authorities possibly have more experience with trade agreement negotiations. The discussions on a free trade agreement are often combined with negotiations on DTTs (Brauner, 2020). Therefore, experience and preparedness could spill over to DTTs negotiations. The variable *Openness* is used as IV for the Source variable to account for this. Table 4.1b denotes the correlation matrix between the variables used and the IV. Besides, Table B.1 in Appendix B shows the first-stage Wald-test. As the Chi^2 is higher than 10, the IV is strong. Also, Table B.2b shows the first-stage summary statistics for hypothesis 3. Based on the Kleibergen Paap (2006) statistics for under-identification and weak instruments and the Hansen J (2008) statistic for over-identification, the instrument is valid and strong.[8]

For the first model, the instrumented variable Tax Treaty is a dummy. To correctly estimate the first-stage regression of this model, a probit model must be used which estimates the instrumented variable based on the identified IVs. Next, the probit fitted values are used as an IV for the second stage model to estimate the effect of a DTT on FDI inflow. This results in a more precise estimate than using the standard OLS first-stage regression. (Wooldridge, 2010a). In addition, for the first-stage regression in the second model testing hypothesis 3, the observed range of the dependent variable Source is between 0 and 1. It is impossible to have less then 0 as this denotes the taxing rights within the DTT to be allocated in full to the resident country. Similarly, 1 denotes the taxing rights within the DTT to be allocated

[7] In columns 2 to 4 of Table B.2b, variations of the number of tax treaties signed by a source country as IV are analysed as possible options. However, the first-stage summary statistics show that these instruments are not valid and weak.

[8] In columns 2 to 4 of Table B.2b, variations of the number of tax treaties signed by a source country as IV are analysed as possible options. However, the first-stage summary statistics show that these instruments are not valid and weak.

completely to the source country. Thus, the first-stage regression should be estimated with a tobit model, taking into account that the data is censored, instead of a standard OLS first-stage regression. (Wooldridge, 2010b)

Furthermore, there is little multicollinearity as the control variables show only low correlation with the DTT dummy. As seen in the correlation matrices in Tables B.1a and B.1b, this is the case for the variables used. Lastly, robust standard errors are added to the regression to circumvent heteroskedasticity.

5. Results

This section discusses the main results and robustness checks.

5.1 Main Results

Hypothesis 1 states that the conclusion of a DTT negatively influences the FDI inflow of developing countries. To test this hypothesis, the FDI inflow is regressed on three models, shown in Table 5.1a. The first model shows the control variables without the tax treaty dummy. The second model shows the Random Effects regression results of concluding a DTT on FDI inflow without an IV estimator. The third model shows the results with an IV estimator. Model (2) shows that concluding a DTT increases FDI inflow by 9.8%, ceteris paribus. This result is not significant at a 10% significance level. When using an IV estimator in model (3), concluding a DTT increases FDI inflow by 59.68%, ceteris paribus. This result is significant at a 5% significance level. This result is in line with hypothesis 1, as a positive impact of a DTT on FDI inflow was expected. As the Random Effects model without IV is biased, and the model with IV is expected to estimate the effect correctly, the latter is preferred. The results of hypothesis 1 indicate that the theoretical grounding of countries to increase FDI through DTT is correct.

Hypothesis 2 looks to differentiate between income levels of source countries. First, the Random Effects model without IV for each sub-sample is discussed. Second, the Random Effects model with IV is analysed for each sub-sample. In model 1 in Table 5.1b, if a low-income country concludes a DTT, the FDI inflow increases by 11.74%, ceteris paribus. This result is not significant at a 10% significance level. In model (2) in Table 5.1b, if a low-income

country concludes a DTT, the FDI inflow increases by 18.53%, ceteris paribus. This result is not significant at a 10% significance level. Therefore, hypothesis 2A is rejected, low-income countries do not receive an increase in FDI inflow after concluding a DTT.

Table 5.1a Random Effects regression results with FDI inflow as the dependent variable

VARIABLES	(1)	(2)	(3)
Tax treaty		0.0937	0.468**
		(0.0655)	(0.187)
Openness	0.0183	0.0187	0.0688
	(0.0365)	(0.0366)	(0.0574)
GDP per capita	0.0914**	0.0852**	0.0566
	(0.0369)	(0.0371)	(0.0500)
Telephone	-0.00784	-0.00827	-0.0369*
	(0.0145)	(0.0145)	(0.0198)
Rule of Law	0.0189	0.0195	0.00927
	(0.0381)	(0.0381)	(0.0414)
Governmental expenditure	0.0228	0.0224	0.0318
	(0.0363)	(0.0363)	(0.0560)
GDP growth	-0.0107	-0.0104	-0.0102
	(0.0100)	(0.0100)	(0.0145)
Inflation	0.000309	-0.000668	-0.0145
	(0.0124)	(0.0123)	(0.0172)
M2 growth rate	0.0770**	0.0790**	0.0672
	(0.0309)	(0.0309)	(0.0596)
Constant	1.312***	1.330***	1.344**
	(0.408)	(0.407)	(0.619)
Observations	14,986	14,986	8,613
Number of country pairs	2,176	2,176	1,199
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1Notes: In column (1) the independent control variables are shown; in Columns (2) and (3) show the Random Effects and Random Effects with IV regressions for the tax treaty dummy.

For hypothesis 2B, model (3) and model (4) in Table 5.1b show the results. If a lower-middle-income country sings a DTT the FDI inflow will increase by 10.96%, ceteris paribus. This result is not significant at a 10% significance level. For the Random Effects model with IV in model (4), low-middle-income countries that conclude a DTT increase their FDI inflow by 158.57%, ceteris paribus. This result is significant at a 5% significance level. In line with hypothesis 1, the Random Effects model with IV is preferred over the model without IV. The results above indicate that hypothesis 2B is not reject. Lower-middle-income countries receive more FDI inflow after signing a DTT.

Similarly, in model (5) in Table 5.1b, signing a DTT as an upper-middle-income country results in a 14,9% increase in FDI inflow, ceteris paribus. This result is not significant at a 10% significance level. Finally, in model (6), signing a DTT as an upper-middle-income country results in a 22.26% increase in FDI inflow, ceteris paribus. This result is not significant at a 10%

significance level. Therefore, hypothesis 2C is rejected, albeit with less confidence due to the lower significance threshold.

Table 5.1b Random Effects regression results with FDI inflow as the dependent variable for different income level groups

	(1) L	(2) L	(3) LM	(4) LM	(5) UM	(6) UM
Tax treaty	.111	.172	.104	.952**	.139	.201
	(.101)	(.199)	(.086)	(.384)	(.094)	(.303)
Openness	-.001	.072	.018	.021	.042	.104
	(.041)	(.086)	(.079)	(.097)	(.11)	(.144)
GDP per capita	.022	.157	-.008	-.107	.08	.046
	(.054)	(.097)	(.065)	(.087)	(.083)	(.113)
Telephone	.005	-.028	.029	.034	-.013	-.04
	(.016)	(.019)	(.025)	(.042)	(.041)	(.09)
Rule of Law	.03	.088	.051	.066	-.025	-.133
	(.033)	(.091)	(.073)	(.071)	(.07)	(.09)
Governmental expenditure	-.016	-.029	.061	.143	.042	.009
	(.034)	(.074)	(.083)	(.106)	(.076)	(.144)
GDP growth	-.076	-.084	.247	.344	-.01	-.013
	(.054)	(.057)	(.174)	(.23)	(.011)	(.019)
Inflation	-.021	-.031	.002	.006	-.008	-.026
	(.021)	(.036)	(.04)	(.048)	(.016)	(.025)
M2 growth rate	.04	-.025	-.058	-.148	.232***	.23**
	(.038)	(.098)	(.045)	(.092)	(.069)	(.114)
Constant		1.698*	1.542*	2.032*	.577	.676
		(.881)	(.829)	(1.227)	(1.033)	(1.409)
Observations	3,158	1,217	5,530	3,882	6,298	3,514
No. Country pairs	539	233	1,008	698	1,104	610
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 Notes: In Column (1), the Random effects model without IV results are shown for the low-income countries. In Column (2), the Random effects model with IV results are shown for the low-income countries. In Column (3), the Random effects model without IV results are shown for the lower-middle-income countries. In Column (4), the Random effects model with IV results are shown for the lower-middle-income countries. In Column (5), the Random effects model without IV results are shown for the upper-middle-income countries. In Column (6), the Random effects model with IV results are shown for the upper-middle-income countries.

For hypothesis 2, some evidence is found in line with literature presented by Blomström et al. (1994) and Narula & Zanfei (2005). Lower-middle-income countries tend to benefit from the conclusion of a DTT and have a relatively higher inflow of FDI afterwards.

Hypothesis 3 explores the effect of the allocation of taxing rights within a DTT on FDI inflow. In model (1) in Table 5.1c, a higher allocation of taxing rights within a DTT to the source country decreases developing countries' FDI inflow, ceteris paribus. This result is not significant at a 10% significance level. Model (2) estimates the effects of the taxing rights allocation for lower-middle-income countries. If a lower-middle-income country has a higher allocation of taxing rights, FDI inflow increases by 203.444%, ceteris paribus. This result is not significant at a 10% significance level. Based on model (3), if an upper-middle income country

receives a higher allocation of taxing rights, this decreases FDI inflow by $2.756*10^6$%, ceteris paribus.[9] The size of the coefficients and standard errors, combined with the failure to meet the 10% significance threshold, causes the results not to be very plausible.

The results are such that this does not seem to be in line with reality. The results show the difference between an allocation of taxing rights wholly allocated to the country of residence (= 0) and an allocation of taxing rights entirely assigned to the source country (= 1). If the coefficient were to be converted for analysis, the estimated effect would be a 113,129.29% decrease in FDI inflows if the source country is allocated all levy rights, ceteris paribus. Due to the size of the estimated coefficient, this does not appear to be a plausible result. In addition, a complete allocation of taxing rights to the source country is not something that happens in practice, as seen in Table 3.1. This casts doubt on how relevant the results are.

One option would then be to calculate, for example, a shift in taxing rights distribution of 0.1. However, the results would then be ambiguous because the variable FDI inflow is not linear. A change of 0.01 in the levy distribution immediately causes a relatively much lower impact on FDI inflow compared to a change of 0.1 (7.29% decrease compared to 102.02% decrease in FDI inflow, ceteris paribus). Assessing in what order of magnitude a shift occurs in practice during negotiations of new treaties is challenging. Negotiations are often done in secret making it not possible to assess how the process of distributing taxing rights works. Generally, the starting point is the OECD or UN model; from there, the distribution is negotiated (Brauner, 2020). In addition, it is unclear exactly how a change of specific treaty articles would translate to a change in the allocation of taxing rights. Thus, it is unclear what order of magnitude should be used to analyse the coefficients.

An attempt was made to get around this issue by demeaning and rescaling the index variables. This would allow analysing of a standard deviation increase in levy rates allocated to the source country. However, the results obtained remain of such magnitude that the estimated coefficient does not seem plausible in practice. Therefore, for the models related to

[9] In addition, splitting the Source index in to different sub-indices on specific groups of DTT provisions did not show any different results than the results obtained above.

hypothesis 3, the choice was made to weigh only the sign and significance of the result and not the magnitude when assessing hypothesis 3. The above shows that a lower allocation of taxing rights within a DTT does not increase FDI inflow for developing countries, contrasting expectations.

Table 5.1c Random Effects regression results with FDI inflow as the dependent variable

	(1)	(2) LM	(3) UM
Source	-7.032	1.11	-10.224
	(7.564)	(7.366)	(11.376)
Openness	.149	-.257	.419
	(.166)	(.324)	(.265)
GDP per capita	.235*	.5**	.466
	(.125)	(.234)	(.308)
Telephone	-.097	.404	-.574
	(.22)	(.453)	(.385)
Rule of Law	.865**	1.379**	.328
	(.338)	(.573)	(.663)
Governmental expenditure	.762	1.644	-.399
	(.534)	(1.074)	(.939)
GDP growth	.126	.314	.152
	(.139)	(.285)	(.228)
Inflation	.077	-.771*	.426
	-7.032	1.11	-10.224
Constant	(7.564)	(7.366)	(11.376)
	.149	-.257	.419
Observations	1230	477	709
No. of country pairs	245	124	159
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 Notes: In Column (1), the results for the Random effects model with IV are shown. In Columns (2) and (3), the results for the Random effects model with IV are shown for the low-middle-income and upper-middle-income countries, respectively. Due to a low number of observations on low-income countries and a lack of degrees of freedom it was not possible to estimate the effect of a higher allocation of taxing rights on FDI inflow for those countries.

5.2 Robustness checks

Several robustness checks have been performed to assess whether the results found in section 5.1 hold under different circumstances.

In addition to the control variables used in the main analysis, various other control variables have been found to impact the FDI inflow of developing countries. As a robustness test, the log-transformed variables; the number of *internet* users, *fuel* exports as a percentage of total exports (Phung, 2016), *energy* consumption per capita, percentage 15+-year-old inhabitants with higher *education* (Saini & Singhania, 2018), *R&D* expenditure as a percentage of GDP (1996), and the average *Tax* burden for companies and households (Braun & Fuentes, 2016)

are added to the Random Effects with IV models in Table 5.2. When swapping the number of internet users for the number of telephone poles, the effect of signing a DTT is an increased FDI inflow of 110.85%, ceteris paribus. This result is significant at a 1% significance level. Also, if the variable R&D is included, the estimated effect of concluding a DTT on FDI inflow is 94.83%, ceteris paribus. This result is significant at a 5% significance level. The other estimated effect of signing a DTT range between 23.37% and 57.30%, ceteris paribus. However, these results are not significant at a 10% significance level. These results indicate that the results presented in Table 5.1 should be met with caution. The magnitude of order and sign remain the same. However, depending on the variables used, the results may or may not be significant.

Table 5.2 Random Effects regression results for the Tax Treaty dummy with additional control variables

VARIABLES	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI	(6) FDI
Tax treaty	0.746***	0.321	0.667**	0.256	0.453	0.216
	(0.223)	(0.196)	(0.302)	(0.226)	(0.413)	(0.233)
Internet	-0.0121					
	(0.0312)					
Fuel		0.00984				
		(0.00989)				
Energy						
R&D			0.0941			
			(0.0955)			
Education				-0.0485		
				(0.0303)		
Tax					-0.211	
					(0.366)	
Openness	0.0978	0.0529	0.139	0.0789	0.0578	0.164*
	(0.0674)	(0.0690)	(0.0955)	(0.0971)	(0.157)	(0.0936)
GDP per capita	-0.0142	0.0445	-0.0489	0.00952	-0.00268	0.0957
	(0.0602)	(0.0659)	(0.0898)	(0.0852)	(0.126)	(0.0783)
Telephone		-0.0539**	-0.103**	-0.0736*	-0.00976	-0.0203
		(0.0255)	(0.0427)	(0.0385)	(0.0630)	(0.0409)
Rule of Law	0.0316	0.0188	0.0689	-0.0554	-0.103	-0.0126
	(0.0457)	(0.0471)	(0.0598)	(0.0564)	(0.0980)	(0.0562)
Governmental expenditure	0.0203	0.0801	0.00472	0.0292	0.0756	0.173
	(0.0664)	(0.0690)	(0.0914)	(0.0960)	(0.215)	(0.105)
GDP growth	0.0598	0.358**	-0.00816	0.164	0.290	0.187
	(0.0657)	(0.168)	(0.0153)	(0.205)	(0.317)	(0.212)
Inflation	-0.0118	0.0111	-0.0183	0.0384	-0.00791	0.0153
	(0.0173)	(0.0344)	(0.0187)	(0.0461)	(0.0633)	(0.0434)
M2 growth rate	0.0424	0.0457	0.0279	0.0624	0.146	0.0311
	(0.0664)	(0.0715)	(0.0815)	(0.0866)	(0.123)	(0.0919)
Constant	1.517**	-0.00567	1.858*	1.568	0.968	-0.434
	(0.738)	(0.900)	(1.083)	(1.254)	(2.322)	(1.152)
Observations	6,283	7,437	4,318	5,049	3,482	5,684
Number of country pairs	1,141	1,094	908	790	710	908
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 Notes: Each column shows the Random Effect with IV regression output for the Tax Treaty dummy with additional control variables.

Concerning the Source index-related models in Table C.1 in Appendix C, the results are again high in magnitude and insignificant. Depending on the variables used, the sign switches from negative to positive. Combined with the results discussed earlier, this indicates that FDI inflow does not increase due to a lower allocation of taxing rights.

6. Conclusion, limitations, and further research

This section will conclude the research based on the above results and examine several research limitations. Also, multiple avenues for future research are explored.

6.1 Conclusion

This paper researched the effect of concluding a DTT and the effect of a favourable taxing rights allocation within a DTT on developing countries' FDI inflow based on OECD data between 2005 and 2020. It is concluded that signing a DTT results in increased FDI inflow for lower-middle-income developing countries. However, the taxing rights allocation in DTTs does not influence developing countries' FDI inflow.

Support is found for hypothesis 1, concluding a DTT leads to increased FDI inflow for developing countries. However, the robustness checks show that depending on the variables used, the results are significant or insignificant, but the sign and magnitude of the estimates remain the same. This indicates that although the results should be met with caution there is some evidence pointing to an increase in FDI inflow due to signing a DTT. These results align with the developing countries' primary motivation to become more attractive to FDI inflows through their international tax treaty policy. By signing a DTT, developing countries eliminate double taxation, lower statutory tax rates, and grow economic relations. Also, they signal to the international community their willingness to accept internationally accepted standards and economic openness. As a result, FDI inflow increases (Dagan, 2003).

Additionally, hypothesis 2 is partially substantiated. In line with evidence found by Barthel et al. (2010), Braun and Fuentes (2016), and Neumayer (2007), there is no significant effect on FDI inflow when low-income and upper-middle income countries sign a DTT on their FDI inflow. In contrast, low-middle-income countries see an increase in FDI inflow due to signing

a DTT. A possible explanation for this difference could be lower-middle-income countries' higher overall institutional development. Domestic development of laws and legal concepts are needed for a straightforward application of DTT provisions. This includes legal concepts not explicitly defined in a DTT, domestic procedures applicable to DTT provisions, e.g., methods to avoid double taxation, and the exchange of information on taxpayers (Nakayama, 2011). As DTTs act in combination and are an extension of domestic tax legislation, upper-middle-income countries thus benefit more from signing a DTT (Lang, 2013). However, no significant results were found for upper-middle income countries. This causes the line of reasoning elaborated above to be questioned. If the above would indeed explain an increase in FDI by signing a DTT, upper-middle-income countries should also see an increase in FDI. However, this is not the case. Possibly other issues come into play whether drawing a DTT causes an increase in FDI after all.

Finally, for hypothesis 3, there is no evidence found in section 5 supporting the claim that a lower allocation of taxing rights increases FDI inflow. In combination with the results obtained in Table C.1, it is unclear how MNEs respond to different allocations of taxing rights within DTTs. MNEs seem to ignore to what extent they are liable to tax in the source country based on the allocation of taxing rights in a DTT when making a location choice. This shows that DTTs mainly signal to MNEs regarding a developing country's tax certainty and economic openness. In line with evidence presented by Davies (2009), Egger & Merlo (2011), Lejour (2014), and Loukota et al. 2004).

In contrast to Bellak and Leibrecht (2009), no evidence is found for MNEs to be deterred from investing in a country due to a higher allocation of taxing rights within a DTT to the source country. As developing countries are often the relative capital-importing country and will act as the source country, they should focus on the UN Model when negotiating DTTs. The UN Model gives source countries more taxing rights by default, enabling developing countries to retain taxing rights within a DTT and better tax economic benefits made in their country when they are relative capital importing countries.

6.2 Limitations

Although this thesis has been performed with analytical rigour, several important remarks must be made on this research. First, the results found have limited external validity as it only includes FDI inflows into developing countries. As Blonigen and Wang Field (2004) discussed, developing and developed countries should not be analysed together as the variables influencing FDI inflow differ for both groups. Therefore, the results are invalid for the FDI inflow to developed countries. Comparably, the results found are not externally valid for FDI flow from developing countries to developed or developing countries.

This thesis has used a Random Effects model due to a lack of variation in the independent variables over time. From a theoretical perspective, it would have been preferable to estimate the effect with a Fixed Effects model. As a result of using a Random Effects model, there is a risk of fitting noise into the estimations. Therefore, the results should be met with caution.

Additionally, several caveats must be made on the *TTE* database. Because of how the indices are created, some of the nuance and heterogeneity of DTTs are lost as each provision is converted into a single number or word. These nuances are abstracted from by only looking at the indices and not the specific underlying provisions.[10] When Hearson (2021) constructed the index scores, the intention of the provisions was considered as much as possible, and an attempt was made to go beyond the literal text. However, specific interactions between provisions have not been considered, or a provision formulated differently in practice could have the same effect as one of the provisions included. Besides, the TTE database only includes DTTs drafted in either English, Spanish, or French. Therefore, there could be underreporting of the effect of a DTT and the allocation of taxing rights within a DTT of FDI inflow for countries that draft their treaties in different languages.

Also, the analysis does not consider how domestic legislation affects the DTTs. For example, the absolute withholding tax rates are compared. However, a 10% maximum tax rate on dividends in a treaty can result in a large part of the tax revenue being lost if the domestic

[10] This is appropriate because only the relatively uniform provisions are analysed. However, there are some exceptions where, for example, a provision consists of two withholding tax rates and requires different qualifications for entitlement to the lower rate.

rate is 20%, while this would not be a problem if the domestic rate is 8%. Of course, this effect is not automatically permanent, as countries are free to adjust their domestic rates as they see fit. Finally, several important provisions are not included in the dataset due to a large variety of drafting methods, making comparisons and coding the distribution of taxing rights within these provisions complex (Hearson, 2021).

6.3 Further research

Several options for further research are open. First, research can analyse what causes the difference between the lower-middle and upper-middle-income countries. Based on the results found in this thesis, current literature does not give a sufficient answer on why different results are found. Second, further research could focus on differences between specific industries and how they might benefit from the conclusion of DTTs and the allocation of taxing rights. Industries with a relatively high amount of intangible assets (e.g., digital services companies) can use DTT networks more easily for tax planning. They are less bound to specific countries than industries with a relatively high tangible-to-intangible asset ratio (e.g. mining or consumer goods). As a result, the conclusion of a DTT and the allocation of taxing rights could have different effects on FDI inflows for these industries. Besides, follow-up research could determine whether similar effects are found for DTTs of developed countries. However, currently, no database exists on the allocation of taxing rights of DTTs between developed countries. Thus, advances in mapping the distribution of taxing rights in DTTs between developed counties must be made first.

Also, future research might examine if the found effect is persistent over time. Possibly a DTT has an effect in the years directly after its conclusion and tempers out over time (Lejour, 2014). Finally, Nakayama (2011) shows that a clear relationship between domestic legislation and DTTs is essential for the straightforward application of DTT provisions. This includes legal concepts not explicitly defined in DTT, domestic procedures applicable to DTT provisions, such as methods to avoid double taxation, and the exchange of information on taxpayers. Thus, it could interest researchers and policymakers to assess the interaction between changes in local legislation and DTTs. In addition, specific (groups of) provisions in a DTT, in combination with particularities in domestic tax legislation, could have different effects on FDI inflow, possibly resulting in different effects than the ones found above.

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Appendix A: Country lists

Table A.1 Source countries in dataset (148)

Afghanistan	Dominican Republic	Lithuania	Samoa
Albania	Ecuador	Macedonia	Sao Tome and Principe
Algeria	Egypt	Madagascar	Senegal
American Samoa	El Salvador	Malawi	Serbia
Angola	Equatorial Guinea	Malaysia	Seychelles
Argentina	Eritrea	Maldives	Sierra Leone
Armenia	Estonia	Mali	Slovakia
Azerbaijan	Ethiopia	Marshall Islands	Solomon Islands
Bangladesh	Fiji	Mauritania	Somalia
Belarus	Gabon	Mauritius	South Africa
Belize	Gambia	Mexico	South Sudan
Benin	Georgia	Micronesia, Federated States of	Sri Lanka
Bhutan	Ghana	Moldova, Republic of	Sudan
Bolivia	Guatemala	Mongolia	Suriname
Bosnia and Herzegovina	Guinea	Montenegro	Swaziland
Botswana	Guinea-Bissau	Morocco	Syrian Arab Republic
Brazil	Guyana	Mozambique	Tajikistan
Bulgaria	Haiti	Myanmar	Tanzania, United Republic of
Burkina Faso	Honduras	Namibia	Thailand
Burundi	Hungary	Nauru	Timor-Leste
Cambodia (Kampuchea)	India	Nepal	Togo
Cameroon	Indonesia	Nicaragua	Tonga
Cape Verde	Iran, Islamic Republic of	Niger	Trinidad and Tobago
Central African Republic	Iraq	Nigeria	Tunisia
Chad	Jamaica	Northern Mariana Islands	Turkmenistan
Chile	Jordan	Oman	Tuvalu
China	Kazakhstan	Pakistan	Turkey
Colombia	Kenya	Palau	Uganda
Comoros	Kiribati	Palestine	Ukraine
Congo	North Korea	Panama	Uruguay
Congo, the Democratic Republic of the	Kyrgyzstan	Papua New Guinea	Uzbekistan
Costa Rica	Lao People's Democratic Republic	Paraguay	Vanuatu
Croatia	Latvia	Peru	Venezuela
Cuba	Lebanon	Philippines	Viet Nam
Czech Republic	Lesotho	Poland	Yemen
Cote d'Ivore	Liberia	Russian Federation	Zambia
Djibouti	Libya	Rwanda	Zimbabwe

Table A.2 Resident countries in dataset (27)

Austria	Greece	Luxembourg	Sweden
Belgium	Hungary	Netherlands	Switzerland
Czech Republic	Iceland	Norway	Turkey
Denmark	Ireland	Poland	
Estonia	Italy	Portugal	
Finland	Korea	Slovak Republic	
France	Latvia	Slovenia	
Germany	Lithuania	Spain	

Table A.3 Excluded offshore financial centres in the Caribbean (16)

Anguilla	Cayman Islands, the	Saint Kitts and Nevis
Antigua and Barbuda	Curacao	Saint Lucia
Aruba	Dominica	Saint Vincent and the Grenadines
Bahamas, the	Grenada	Sint Maarten
Barbados	Monserrat	Turks and Caicos Islands
British Virgin Islands, the		

Appendix B: Instrumental variable statistics

Table B.1 Chi tests of Random Effects and Random Effects IV models

Hypothesis	Model	Test	Probability
H1	RE IV first-stage	chi2(135) = 1,278.76	Prob > chi2 = 0.0000
H2	RE IV first-stage	chi2(140) = 8,995	Prob > chi2 = 0.0000
H3	RE IV first-stage	chi2(29) = 343	Prob > chi2 = 0.0000

Table B.2a First-stage summary statistics hypotheses 1 and 2

		(1)	(2)	(3)	(4)
Underidentification	Kleibergen Paap	141.28*	139.30*	16.24	135.2*
		(0.000)	(0.000)	(0.000)	(0.0000)
Weak identification	Kleibergen Paap	56.32*	81.37*	10.50	82.01*
Overidentification	Hansen J	1.421	0.049	0.536	0.459
		(0.493)	(0.464)	(0.464)	(0.498)

P-values in parentheses * p<0.1. Note: Critical values are based on Stock-Yogo (2005). Column (1) shows the summary results for first-stage regressions with common language, colonial relationship, and the number of DTTs concluded by the source country as IVs; Column (2) shows the summary results for first-stage regressions with common language and the number of DTTs concluded by the Source country as IVs; Column (3) shows the summary results for first-stage regressions with common language and colonial relationship as IVs; Column (4) shows the summary results for first-stage regressions with colonial relationship and the number of DTTs concluded by the source country as IVs;

Table B.2b First-stage summary statistics hypothesis 3

		(1)	(2)	(3)	(4)
Underidentification	Kleibergen Paap	13.57	15.54	15.11	38.02*
		(0.000)	(0.000)	(0.000)	(0.000)
Weak identification	Kleibergen Paap	14.96	8.54	7.89	35.38*
Overidentification	Hansen J	-	35.707	2.617	-
		(0.000)	(0.000)	(0.106)	(0.000)

P-values in parentheses * p<0.1. Note: Critical values are based on Stock-Yogo (2005). Column (1) denotes the summary results for first-stage regressions for total DTTs concluded by the source country as IV; Column (2) denotes the summary results for first-stage regressions for the total DTTs concluded by the source country and resident country as IVs; Column (3) denotes the summary results for first-stage regressions for the total DTTs concluded by the source country and the squared difference between the total number of DTTs concluded by the source and resident country as IVs. Column (4) denotes the summary results for first-stage regressions for the openess of the Source country.

Appendix C: Additional analyses

Table C.1 Additional variables Source index

VARIABLES	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI	(6) FDI
Source	185.4	28.89	110,072	-39,599	-11.05	102.0
	(590.3)	(177.2)	(2.846e+07)	(4.217e+06)	(101.7)	(399.1)
Lower-middle income	0.936	0.556	0.988	-5.328	2.511	0.644
	(2.127)	(2.257)	(186.8)	(636.1)	(1.943)	(1.472)
Upper-middle income	1.284	0.835	1.192	-4.937	2.725	0.861
	(2.168)	(2.120)	(146.8)	(617.2)	(1.931)	(1.281)
GDP per capita	-0.366	0.118	-0.264	0.381	-0.0931	0.122
	(0.872)	(0.343)	(39.89)	(39.66)	(0.365)	(0.794)
Telephone		0.366	-0.150	0.775	0.270	0.455
		(0.300)	(96.03)	(44.91)	(0.281)	(0.682)
Rule of Law	-0.307	-0.0969	-0.262	-1.174	-0.193	-0.0109
	(1.142)	(0.868)	(60.15)	(116.7)	(0.370)	(1.573)
Governmental expenditure	0.718	0.591	1.378	0.664	0.486	0.444
	(1.718)	(1.099)	(210.0)	(53.74)	(0.716)	(1.703)
GDP growth	0.490	0.866	1.130	1.313	-0.0387	0.520
	(2.009)	(0.757)	(74.84)	(84.20)	(0.896)	(2.685)
Inflation	-0.125	0.154	-0.0954	0.336	-0.142	0.250
	(0.628)	(0.191)	(33.69)	(19.01)	(0.236)	(0.493)
M2 growth rate	0.228	0.0263	0.303	0.0191	0.195	-0.0684
	(1.205)	(0.362)	(39.74)	(31.66)	(0.393)	(0.901)
Internet	-0.253					
	(0.636)					
Fuel		0.0461				
		(0.0794)				
Energy			-1.292			
			(233.4)			
R&D				0.224		
				(53.77)		
Education					-0.0654	
					(1.185)	
Tax						0.118
						(0.677)
Constant	-53.02	-14.59	-29,929	14,979	2.589	-35.51
	(166.5)	(53.20)	(7.740e+06)	(1.595e+06)	(34.85)	(132.1)
Observations	773	1,134	556	743	585	1,015
Number of country pairs	206	235	178	172	145	204
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 Notes: Each column shows the Random Effect with IV regression output for Source index with different control variables.