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Foreign Direct Investment and Tax: OECD Gravity Modelling in a World with International Financial Institutions

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In this paper, bilateral OECD FDI flow data from 1985 to 2017 is evaluated and compiled to create a new dataset in order to clarify the controversial role (in the literature) of corporate tax levels on the decisions of firms regarding whether or not, and where, to undertake investments. In the course of our research we find the need to control for interaction with international financial institutions: Membership in BIS, EBRD, ADB and MIGA. Quantitative analyses via gravity models firstly provide findings which are consistent with previous studies and, secondly, expand the knowledge about FDI and tax by providing new results relevant for policymakers in the context of globalization and international institutions. It is shown that falling corporate tax rate levels lead to increasing FDI inflows, the effect is, however, smaller than expected; if deviation from international cooperation is chosen as a national strategy (i.e. unilateralism), the tax rate, however, gains in importance. On the other hand, unilateralism triggers various effects decreasing FDI inflows, as trade openness is likely to decrease, the opportunity costs for other nations to deviate decrease, and therefore bilateral tax differences are likely to decrease as well; which will further reduce the effect of low tax levels. Evidence for the phenomenon of implementing low corporate tax levels in order to keep domestic firms within the country and reduce their incentives to invest abroad is not found. (*JEL* C32, E65, F21, F23, G20)

Keywords: *Foreign Direct Investment, Corporate Taxation, International Financial Institutions, Gravity Equation, OECD Countries.*

Introduction and Literature Review

"Big TAX REFORM AND TAX REDUCTION will be announced".

This tweet from US President Donald Trump on April 22nd, 2017, signaled the intention of his administration to reduce firms' incentives to invest abroad and to attract more foreign firms to invest in the US. The tax reform he referred to came into force on January 1st, 2018. However, has the promise of such reform been fulfilled? Will the US attract more investment, creating jobs and wealth?

"Theresa May pledges to slash taxes to lowest rate in G20 to make Britain a post-Brexit economic powerhouse".

This title headline on the British "Telegraph" newspaper on September 26th, 2018, concerned the Prime Minister's plan to mitigate losses due to less foreign

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direct investment (FDI) inflows to the post-Brexit UK economy. Today, the UK is still a full member of the European Union and even though professionals' opinions are divided about how big the effect of Brexit on FDI flows will be, the broad consensus is that there will indeed be a negative impact. To what extent, and under which circumstances, tax rate reductions could oppose a negative impact will be discussed in the present paper.

The effect of corporate tax on FDI has been discussed extensively over the past 30 years (see for example Baccini et al. 2014; Bénassy-Quéré et al. 2000; Bloningen 2005; Bretschger & Hettich 2005; Chisik & Davies 2003; Ghinamo et al. 2007; Nielsen et al. 2017). Although most researchers find a significant impact, the results are, however, mixed; the estimated impacts on FDI related to a 1 percentage point corporate tax rate decrease (see Feld & Heckemeyer 2011) range between -1.26% and +9.80%, strongly varying between the data (source, time period, flow/stock) and modelling approach employed. In order to provide a clear cut picture, frame conditions for both the data and models used have to be set. Moreover, FDI effectively means international economic cooperation at a firm but also at a country level and therefore requires a global framework and rule-setting in order to develop to its full potential. Looking at recent disintegration processes within the EU and increasing instances of unilateralism rather than cooperation grounded in multilateralism globally[1], one can consider whether these developments will rather promote or restrict FDI activities in the future. National interactions with international institutions are necessary in order to reach fair agreements, including seeking to prevent individual nations from deviating strongly in their tax policy in order to reap short term and one-sided benefits. If such a deviation strategy and disintegration is indeed seen to be beneficial, this would stimulate an international downward tax reduction game (similar to a "prisoner's dilemma") reaching a new steady state where all parties are strictly worse off than if they cooperate. In the present study, FDI inflows are analyzed between a set of countries roughly homogenous in terms of national fiscal policy, especially corporate taxation, as well as participation in and interaction with selected international financial institutions.

Using bilateral FDI flow data from 1985–2017 in a gravity model framework[2], the role of corporate tax and financial institutions in firms' investment decisions is analyzed. The findings show significant negative interaction between FDI inflows and the corporate tax rate, however tax evasion strategies rather depend on FDI flow destinations and not on origin countries' fiscal policy, as the home corporate tax rate has no significant effect on the level of outflow. International financial data exchanges via the Bank for International Settlements (BIS) and participation in programs of the European Bank for Reconstruction and Development (EBRD) negatively impact FDI inflows, while memberships of

[1]Here, we abstain from listing specific examples, as several such events can be found detailed in daily media reports (April-July 2019).

[2]Models which use the economic size and distance between interacting countries as major explanatory variables are referred to as gravity models; see Shepherd (2017) for a general introduction and literature review.

other financial control institutions have no significant impact. The total effect of corporate tax on FDI inflows decreases over time between OECD members.

The remainder of this paper is structured as follows: Section 2 gives a short overview on the theoretical FDI aspects and gravity modelling for FDI, corporate taxation and international financial institutions; Section 3 discusses the data and modelling specification; Section 4 presents and interprets the empirical results; Section 5 discusses relevant policy implications of the findings and concludes.

Theory

General FDI Theory and Main Determinants for FDI Inflows

The 21st century has seen an unprecedented rise in the level of economic globalization, most visually in terms of trade and migration, but most persistent in terms of production networks, supply chains and international financial and institutional integration. This process of globalization, which has increasingly been monitored since end of World War II, was originally intended not only to increase global wealth, but also to maintain peace and establish strong free-market economies to counter the spread of socialist ideas in the Cold War era. This increasing industrial and financial globalization can be witnessed particularly when looking at (multinational) firms engaged in foreign countries via direct investments for a) ownership, b) location and c) internalization (OLI) advantages (Dunning 1979). However, the incentives for FDI are much more complex than that. While a broad range of empirical literature exists on the determinants of FDI, including in gravity settings (see, for example, Bloningen 2005, Pandya 2016 or Nielsen et al. 2017, just name but a few), Faeth (2009) gives a review of theoretical models explaining FDI:

- Neoclassical trade theory á la Heckscher-Ohlin factor endowment and specialization models as well as more recent knowledge-capital models in the context of horizontal and vertical FDI; while studies analyzing factor endowments as driving factors for FDI show mixed results, the rationale should nevertheless be considered in the field of horizontal FDI with special importance on (risk) diversification[3].
- A major part of theoretical models centers around the classical OLI-approach, naming "…a combination of ownership advantages, market size and characteristics, factor costs, transport costs, protection and other factors including regime type, infrastructure, property rights and industrial disputes" (Faeth 2009, p. 174). The relative size and growth

[3]Multinational firms engage in several countries with similar amount and size of business. This sort of FDI is mostly driven by production-to-market and incentives are expected to rise with distance and increasing transportation cost and as well target country market size (GDP).

of foreign markets are especially highlighted, as well as ownership advantages in monopolistic terms.[4]

- Policy variables as determinants of FDI are specifically discussed, especially political and investment stability as well as fiscal incentives like corporate tax. While the latter almost always have significant effects on FDI, the magnitude is fairly low and the author advises that those variables shall be used rather as control variables for researchers not including the much stronger policy variables.

Discussing the latter is necessary, as a distinction between countries and economic zones is strongly recommended: While there are close to 200 nations on our planet, only a relatively small number of them are economically large enough to have a significant impact on the global trade and investment networks, also being broadly similar in their individual political endowment (see for example the CPIA database of the World Bank Group, data and indices provided by Transparency International, the Heritage Foundation or V-Dem). So while policy variables are crucial for general FDI theory and theoretical frameworks (see Nielsen et al. 2017 p.65), their utilization is quite restricted in panel gravity FDI studies, especially as policy variables are responsible for little to no variance in major datasets. On the other hand, fiscal incentives, such as the corporate tax rate, can differ significantly between a set of countries with otherwise homogenous political endowments.[5] We choose bilateral FDI flows between all OECD countries as our sample, as those 36 countries account for roughly 70% of global FDI flows and stocks – tackling the homogeneity issue by introducing country as well as dyadic fixed effects in order to control for all time non-varying characteristics.[6]

Other theoretical aspects refer to the role of the size of the source and target economy to promote FDI as well as the (physical and cultural) distance between them to constrain FDI, legitimating analyzing FDI in gravity frameworks. The classical country specific theoretical roots from trade theory are also applicable here, utilizing the CEPII country level data targeting FDI destination and parent firm location, which is discussed in the next sub-section.

Gravity Modelling in FDI

Gravity modelling (as originally applied) for trade is derived directly from Newton's Law of Gravitation, as it uses the economic sizes of and the distance

[4]Contrary to horizontal FDI, vertical FDI does depend on transportation costs and therefore distance, and not necessarily on market size but rather production factors as for example wages/GDP per capita. See also Bergstrand/Egger (2013).

[5]See Table A1 in the Appendix; missing observations are not significant as only immaterial FDI flows relating to respective targets and years are observed.

[6]In many cases, this already includes common policy variables like corruption, safety and investment security, political stability etc.; the "Doing Business Index" developed by the World Bank is also unsuitable for similar reasons, see Anderson/Gonzales (2013).

between trading partners as major control variables (see Tinbergen, 1962).[7] The lack of a sound micro-foundation is successfully tackled by Anderson/van Wincoop (2003) who provide researchers with a theoretical model combining international supply (production) with demand, anticipating iceberg transportation costs. Additionally, the model accounts for multilateral (inward and outward) resistance, taking into account that demand and supply does not only depend on the two interacting partners, but on the whole set of market participants.

Since then, the application of the model has been consistently improved, as illustrated by Shepherd (2017) who compiles and regularly updates a "user guide" for UN-ESCAP (Economic and Social Commission for Asia and the Pacific) researchers. Major developments are the inclusion of sets of country and dyadic fixed effects (Anderson 2011; Head & Mayer 2014) and the adaption of Poisson Pseudo Maximum Likelihood (PPML) estimators in log linearized form for panel data[8] (Baldwin & Taglioni 2007; Martínez-Zarzoso 2011; Silva & Tenreyro 2006). PPML is the first choice for such models with up to 50,000 observations in combination with lower thousands control variables including fixed effects (Head & Mayer 2014; Kareem et al. 2016), even though many researchers use Ordinary Least Squared (OLS) estimators for reasons of robustness.[9] Using more data and/or implementing larger numbers of control variables requires different econometric approaches due to practical issues (see Stammann 2017).

Even though a majority of gravity studies analyzes trade relationships, the approach has proven itself useful for FDI researchers as well, and even finds application in migration and labor economics. A brief literature overview on gravity models which are applied to FDI is given below. One of the more recent reviews by Nielsen et al. (2017), evaluating 153 empirical studies between 1976 and 2015, also examines the role of corporate tax with regard to FDI destination choice, being used as a control variable in 29 studies, functioning along with target country's GDP as a proxy for demand. Both variables are found to be significant in most studies, even though evaluating results for corporate tax does not give a clear-cut picture. The positive effects of target GDP on FDI flows and/or stock in most studies are perfectly in line with FDI market seeking theory. FDI source country GDP, subsequently origin country GDP, is found not to be as straight forward: Gravity theory for trade would predict a positive interaction, as large and strong economies have the potential to serve a larger share of total global demand. FDI gravity might be more complex here, on one hand large origin economies potentially have more economic power and prospects to interact globally, and multinational companies might be more likely to grow from a national to an international competitor from the base of a large domestic market. On the other

[7]This was a rather practically driven approach, as estimation results for distance and GDPs held very high explanatory power in those models.

[8]For Stata implementation, annual fixed effects are a practical solution for non-available panel commands when using PPML estimators such as the xtreg.

[9]Following Kareem et al. (2016) and Silva (discussion forum), OLS results degrade quality-wise with increasing numbers of observations; also note that the OLS estimator does not count "zero" flows between countries and therefore is only suitable if few or no zeroes occur; solutions to this issue can involve re-scaling or assigning small numbers, see Welfens/Baier (2018) for a discussion.

hand, multinational firms in today's world do not necessarily 'belong' to their physical home country, or the country in which they were founded, but place their head office for strategic, financial, legal or political reasons to other countries (examples might be Switzerland, Ireland, Luxembourg etc.). Distance is found to be negatively significant in most studies, supporting vertical FDI theory.

As none of those studies considers dyadic fixed effects, which prove to have very high explanatory power, and as PPML estimators are also barely utilized,[10] it is the goal of the present paper to close this research gap. Leading studies using such models have been published by Bruno et al. (2016), Barrell et al. (2017) and Welfens & Baier (2018) where all analyze the effect of European Union membership and FDI attractiveness (mainly in the context of Brexit), using OECD stock and flow data from 1985-2012. Welfens & Baier (2018) also control for corporate tax, and find similar results as Folfas (2011) and Wojciechovski (2013) for their gravity tax research, who use Hausman-Taylor estimators without dyadic fixed effects, but instead the full set of time non-varying CEPII country and country pair variables such as distance, contiguity, common language or colonial relationship and so on. The fact that all three studies yield similar results despite using different econometrical approaches is picked up subsequently in following sections. The role of tax and international financial institutions for FDI decisions shall be discussed in the following sub-section.

The Role of Tax on FDI

While gravity FDI tax research is limited, there is a broad range of literature on corporate tax rates and FDI; in general, low foreign tax is analyzed in combination with FDI incentive factors rather than discussing a high domestic tax rate as a reason for tax avoidance and therefore increasing investment outflows. As an overview on FDI tax reviews is already given in the introduction of this paper, this aspect will not be stressed further and rather relevant arguments by selected authors on which the hypotheses of the present paper are built are discussed.

Feld & Heckemeyer (2011) point out that the effects of tax or tax differentials between countries on multinational companies' decisions are insufficiently analyzed, and the findings which have been made –especially on degrees of effects– are very heterogeneous. In their meta-study they collect a range of arguments as to why and to what extents findings can be biased.

- *Double taxation treaties:* For most OECD countries, double taxation treaties came in force since the 1980s[11] or earlier (IBFD Tax Treaties Database), implementing either the credit or exemption system. While the latter does not tax foreign income, because such is already taxed by the country where the income was derived and therefore tax avoidance incentives are present, the credit system taxes all income in a double count

[10]This should be no surprise, as the PPML estimator for gravity is still quite new and is currently being developed.

[11]Actually prior to the 1980s as well, but that decade saw continuing (re-)negotiations of older treaties which were previously in place.

(total domestic plus foreign income will be taxed by the home country, foreign income may also be taxed additionally on top, abroad). The firm can offset the foreign-paid tax against the total home country tax bill, and therefore has no incentive for tax avoidance. Thus, the effect of corporate tax on FDI decisions should be rather limited for countries which follow the double taxation credit system (Slemrod 1990). Countries following the exemption system usually counter tax avoidance via national laws.[12] In both cases, thus corporate tax should not significantly affect FDI decisions, even though empirical studies by Jun (1994) and Wijeweera et al. (2007) who explicitly control for double taxation treaties contradict this and find significant effects. In our OECD sample, dyadic fixed effects will control for potential outliers, such as Brazil, which have never signed (or resigned) any tax treaties with several OECD partners. Another solution to double taxation treaties can be the usage of effective average tax rates, which reflect national or bilateral tax incentives, an approach which yields similar results in gravity model settings (Bellak et al. 2009 and Egger et al. 2009) than when using pure corporate tax rates in OECD or EU samples only (Folfas 2011; Welfens & Baier 2018; Wojciechovski 2013).

- *Regional difference in international taxation:* In a global perspective, developing economies face much greater competition pressures concerning FDI attractiveness, and generating corporate tax incentives usually has a higher effect, especially in the absence of (bilateral) tax treaties, where they can use discriminatory tax policy in an "…more targeted and cost efficient manner" (Andersen et al. 2018).
- *Data availability and access:* Studies need to be distinguished on the basis of whether firm level panel data (micro data) or aggregated FDI data (macro data) is used; using micro data limits a global approach in a sense that data is not (sufficiently) available for many countries and/or years, while macro data generally struggles with problems of precision: In theory, macro data is aggregated micro data by institutions as the World Bank (UNCTAD), OECD or the BIS, to name the most popular. Different national and international (institutional) reporting standards, firm sizes etc. also yield different incentives for foreign investment and therefore impact the importance of corporate tax.[13] The tax effects found in studies using micro data are generally lower than in macro studies (Feld & Heckemeyer 2011), indicating that smaller firms do not care as much for tax incentives as bigger firms do. This is a potential bias we will discuss in our results, as those therefore tend to overestimate the degree of the corporate tax effect.

[12]In Germany for example, an actually agreed exemption method in the double taxation treaty with another country will be switched to the credit system according to national law if the company earns certain passive income and if there is a low tax rate applicable in the foreign country (§ 20 para. 2 AStG).

[13]For example, micro data in certain countries covers very small firms which otherwise get dropped in a macro aggregation process as reporting standards differ. Small firms value foreign tax aspects differently to large firms, resulting in heterogeneous estimation results; for reference, see for example the Doing Business Report by Anderson/Gonzales (2013).

- *Discrete and continuous investment choices:* Micro data can distinguish between discrete and continuous investment choices which yields different outcomes in respect to corporate tax as well, where rather continuous arguments are of importance as they proxy real economic activity in terms of property, plant and equipment (Buettner & Wamser 2009; Overesch & Wamser 2010). Reviewing the literature concerning that issue, Feld & Heckemeyer (2011) conclude that studies using micro or macro data can control for firm specific location preferences due to already existing tangible fixed assets via country and time fixed effects, "[which]… can indeed alter the size and particularly the significance of tax effects estimates," (Feld & Heckemeyer 2011).
- *Publication bias:* In their meta-study, the authors find robust results for publication selection, i.e. studies which find higher degrees of tax effect on FDI are more likely to get published; taking this into account drops the overall tax effect coefficient from 2.55 to 2.28; when using only micro data the effect drops even lower, naming to 1.19.

Summing up, a broad range of potential reasons explain why the empirical results of corporate tax on FDI attractiveness deviate. The aforementioned points should be discussed within tax and FDI research in order to receive meaningful information and draw adequate conclusions regarding policy implications, which has, to the author's best knowledge, not been the case for previous research.

When discussing the role of taxation treaties (such as the credit system vis-à-vis double taxation or national tax laws to counter tax avoidance), one should consider why they only prevent firm-level tax optimization to some degree, but not fully; or to put it differently –do such taxation treaties really work and to what extent, what are the restraints and shortcomings? As previously mentioned, taxation treaties are in place between almost all OECD members, so it is important to note the degree of impact on the corporate tax variable in the present study when interpreting the results for global policy implications.[14] The OECD Base Erosion and Profit Shifting (BEPS) project tackles this exact issue, trying to implement an international standard of uniform cross-border taxation, which is a shortcoming of many bilateral taxation treaties. OECD BEPS implementation however also faces the challenge of overcoming significant practical issues, as described in a qualitative study by Taubenheim & Mrkvicka (2018) who rank, for example, the US in place 6 of 43 in "most negative records when taxing affiliated companies", which is quite meaningful regarding the total levels of US FDI. Analyzing BEPS in the framework of tax and FDI, Bolwijn et al. (2018) show that profit shifting FDI results in about 200 billion USD of global revenue losses. Further qualitative issues with the implementation of BEPS, such as the lack of

[14]Quantitatively, this question could be answered by utilizing a diff-in-diff approach in a broader, global dataset such as provided by UNCTAD; unfortunately the quality level of the bilateral data they offer for most countries is quite low (see: Blanchard/Acalin 2016; Wacker 2016; and Welfens/Baier 2018 for a discussion) and, therefore, this analysis will be recommended for future research.

data, information on companies and exhaustive tax variables, were described by Acciari et al. (2015).

The Role of Institutions in FDI

The lack of (qualitatively good) data and information on a) FDI and b) the tax level is a well-known issue, as identified above. This is tackled by using data in a limited country setting (OECD; covering 70% of global FDI) and discussing results in the context of the aforementioned theory and findings. A lack of information and data impacts not only researchers, but in the first instance the strategic decisions of firms, governments and institutions. Investors prefer information which helps them in monitoring and evaluating prospects (locational advantages for production, profit and market potential) as well as risks (political, fiscal, environmental etc.), while they are sometimes not eager that the potential target country shares information with the parent country.[15] Governments and Institutions have incentives for cooperation and information exchange in order to enforce international law and taxation.

International data exchange and international institutions thus are supposed to have an impact on FDI flows; there is a broad range of literature which analyzes the role of international institutions on trade, but also on FDI (see Berger et al. 2012; Buethe & Milner 2008; Dreher et al. 2015; Milner 2014 and many more), where a large share of said studies analyze the role of trade agreements, trade-related institutions and international agreements bolstering stable political systems - as those also target many behind-the-border regulatory issues relevant to multinationals. Controlling for political unobservables and trade via fixed effects and openness, the necessity to additionally control for international financial institutions – who are rather involved in micro-data exchange and project monitoring and planning – when analyzing tax and FDI becomes clear.[16] When evaluating literature reviews on international organizations and FDI, we find that the number of studies which estimate the pure effect of international financial agreements is rather limited. However, Jensen (2004) finds that participation in International Monetary Fund (IMF) agreements actually leads to lower FDI, struggling to offer a convincing explanation and leaving a lot open for further research.[17] Jensen picks up an argument by Vreeland (2003) that international banking programs might entail sovereignty costs for domestic governments in the

[15]The so-called "Panama Papers" leak is a famous example illustrating the lack of international (tax) data exchange.

[16]International financial institutions which collect and evaluate firm level data, like the Bank for International Settlements (BIS), the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD) or the Multilateral Investment Guarantee Agency (MIGA) of the World Bank; in order not to counteract fixed effects, national interaction and membership need to be time variant over the period bilateral FDI data is available, 1985-2017.

[17]Although Jensen (2004) has been cited quite often, his ideas have been primarily picked up for studies in the context of FDI and political or trade agreements, but not for fiscal policy or taxation; however, Jensen (2013) follows up with a tax-FDI study finding that multinationals pay more tax in democracies than in autocracies, who use subsidies and tax as incentives to attract FDI.

form of fiscal self-restriction and restraints which have to be fulfilled in order to avoid international penalization.

While this is not discussed further in the literature, the present study offers a more detailed explanation when linking the cost in terms of sovereignty to tax policy, where international financial organizations serve as fora for data exchange and control institutions for multinational companies. This serves as a basis for the enforcement of international law, fair taxation and rule-setting in order to establish a high level of common welfare and prevent single nations from deviating (thus fostering an international tax reduction game). Leaving this international structure – represented by participation and cooperation with said institutions – thus will result in an inward FDI increase for the individual country concerned and FDI decrease for all other countries. Linking our argumentation to an increasing level of globalization over the last 30 years, this also means that deviation incentives regarding national taxation in order to attract a relatively bigger share of the "global FDI cake" are expected to shrink over time.

We can therefore structure seven hypotheses:

1. An increasing economic size of FDI target country increases the FDI inflow into that country.
2. An increasing GDP per capita of FDI target country decreases the FDI inflow into that country, representing location advantages in vertical FDI theory.
3. An increasing distance between two interacting countries decreases the FDI inflow into that country, following theoretical vertical FDI approaches.
4. Increasing the level of corporate tax for the FDI target country results in decreasing FDI inflows, as location advantages for firms to invest rise.
5. Increasing the level of corporate tax for FDI origin country results in increasing FDI outflows, as this triggers capital flight from the domestic country to foreign countries.
6. The negative corporate tax – FDI flow relationship vanishes over time.
7. Interaction and cooperation with international financial institutions reduces FDI target countries location advantages and thus decreases FDI inflows.

The data and the model are presented in the following section with which it is possible to empirically analyze the present research questions and provide answer to the hypotheses presented below.

Model Specification and Data

Theoretical Foundation

Following Kareem et al. (2016), the PPML estimator developed by Silva & Tenreyro (2006) is used in order to reach consistent results in the presence of heteroscedasticity and values of zero in our dataset (up to 40%), which stands for a significant share. Heteroscedasticity is identified as a common problem for fixed

effects gravity estimations, being needed in order to take into account multilateral resistance and thus satisfy the theoretic micro-foundation by Anderson/van Wincoop (2003), which was originally developed for trade, but recently updated for FDI as well (Anderson et al. 2016, 2017); in this perspective, FDI is viewed in a knowledge-capital framework and can therefore be interpreted similar to trade in technology service. Technological capital (viewed as a "mobile good") can be used in several countries on a non-rival basis, whereas its value (in combination with capital, and therefore investment) differs across countries. Due to the insubstantial nature of knowledge capital, FDI flow or stock is used as measurement.[18]

As is usual amongst FDI gravity researchers, structural gravity with country fixed effects is chosen as a practical approach to FDI estimation where multilateral resistance is controlled for as unobservable, following Shepherd (2017). FDI inflows from origin *o* to destination country *d* in time period *t* depends on economic sizes *Y* of countries and trade cost. Time varying country and dyadic fixed effects (i.e. one dummy for each possible combination of two partner countries; direction matters) control for all kinds of time invariant variables as well as unobservables, which includes many policy variables in the OECD sample, as discussed above. Time fixed effects, i.e. one dummy for each year, are included in order to satisfy norms for panel estimations, since when estimating PPML in Stata, the program does not operate with common panel commands which are usually performed using OLS only. Distance as a time non-varying bilateral variable has to be excluded when introducing dyadic fixed effects. The dependent variable FDI inflow from origin to target country is therefore defined as follows:

$$lnFDI_{odt}^{inflow} = \alpha_0 + \alpha_1 lnX_{ot} + \alpha_2 lnX_{dt} + \alpha_3 Z_{od} + \delta_o + \delta_d + \delta_{od} + \tau_t + e_{odt}$$

with the following notation:

α_0 = regression constant (α_{1-x} are regression estimators respectively),
X_{ot} = origin country time variant characteristics (GDP, GDP per capita, corporate tax etc.),
X_{dt} = destiny country time variant characteristics (GDP, GDP per capita, corporate tax etc.),
Z_{od} = characteristic of the relationship between country-pairs, time invariant (distance between countries, contiguity, common language, cultural and colonial ties etc.),
$\delta_o, \delta_d, \delta_{od}$ = time invariant country and country-pair fixed effects (δ_{od} zeroize Z_{od}),

[18]An adaption of transportation costs might, however, make sense for future research, as we see in our literature review that direction and degree are fundamentally different when looking at horizontal or vertical FDI; as neither micro nor macro FDI data distinguishes here, application in empirical research is however questionable up to this point; Multilateral Resistance in terms of considering all possible locational factors (for horizontal and vertical FDI) should however be applied.

τ_t = time fixed effects,

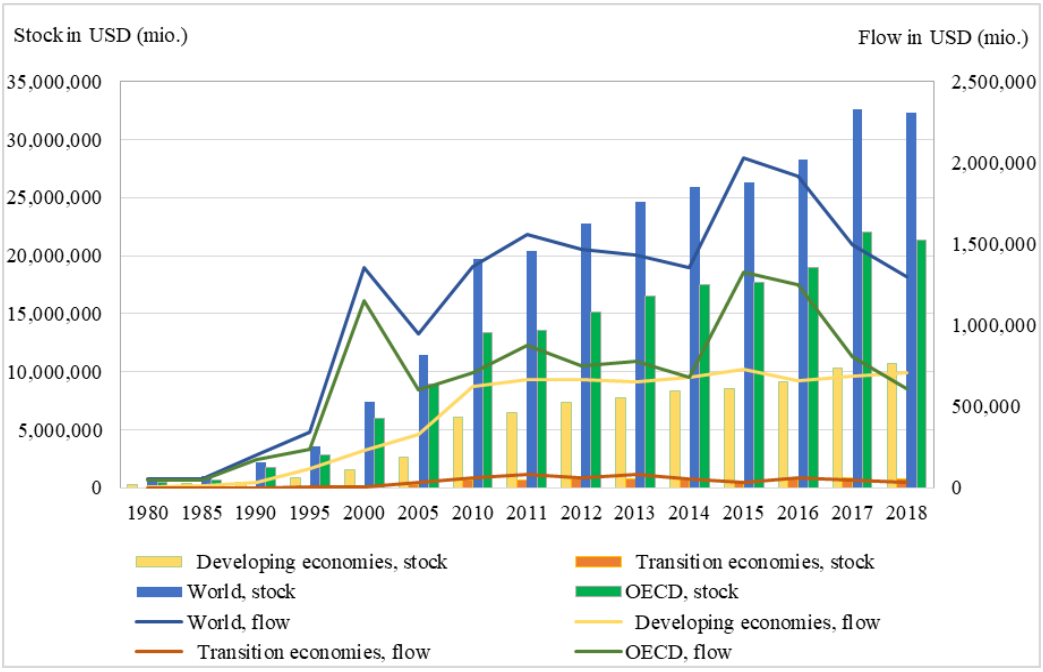
e_{odt} = error term.

It shall be noted that δ_{od} is not included in a pure country fixed setting, where we control for bilateral time invariant relationship via a different set of Z_{od} control variables provided by CEPII.

Data

Figure 1 shows the proportion of flows and stocks into OECD countries respective to global, transition and developing economies. With our OECD dataset, we cover a decreasing fraction of global FDI flows, which is mainly due to an overall decrease of FDI flows in 2017 and 2018, but also due to an increase to developing economies over the past years. It has to be noted, however, that numbers are constantly updated and corrected upward for the past one to three years due to delays in national data collection, which blurs data quality to some extent.

Figre 1. *FDI Flow and Stock for World, OECD, Developing- and Transition Economies*



Source: UNCTAD

Bilateral FDI flow data provided by the OECD is used as our dependent variable, even though UNCTAD aggregated data is used for descriptive (global) reasons. Flow rather than stock data is chosen in order to picture annual FDI decisions and relate them to same-year determining economic and political occurrences. Authors such as Dellis et al. (2017) and Wei (2019) argue that flows should be analyzed for FDI-entering decisions primarily, and also due to a book-value bias where FDI stock suffers from discrepancies between the original book

value and current market value. Stocks also face higher distortions due to exchange rate volatilities, which cannot be statistically proven for FDI flow analyses (Welfens & Baier 2018).

Following previous gravity FDI studies, annual lagging is not adequate as we suppose the processes towards national changes in corporate tax levels or engagement with international organizations are initiated with a period of a number of months or even years prior to enactment and ratification, respectively, and thus do not come as a surprise to decision makers in multinational companies. FDI data quality can in general be challenged a lot: whereas trade data is reliable up to a high degree as it is gathered and aggregated via global customs supervision, FDI data gathering is still somewhat in its infancy. National banks collect domestic firms' data on financial activities abroad, an international uniform approach is however not enforced.[19] National micro-databanks are usually of a better quality, but are also not gathered in a uniform manner when we examine micro databanks by the BIS or EUROSTAT and compare them with raw data they gather from national institutions as the Bundesbank for Germany, to name but one example.[20] In addition, raw data material gathered by national institutions are usually confidential and inaccessible to external researchers. We conclude that no general trend has emerged amongst researchers on what data type is the most appropriate, but the work of Baltagi et al. (2007), for example, points out that results are sensitive to the use of different types of data.

Evaluating the two common sources of bilateral FDI data, UNCTAD data is not used for several reasons; firstly, the time-frame only covers 2001-2012 which is perceived as being insufficient for general gravity panel studies, origin-destination reports differ too much for a large share of developing- and tiger states but also for industrialized countries, and a large number of no-observations is found for implausible country-pairs.[21] In opposition to that, OECD macro-data is compiled in a more uniform matter and available from 1985-2017, however the dataset is gathered with two different benchmark definitions (1985-2012 BMD3 and 2013-2017 BMD4) and therefore the two datasets have to be merged. The difference for the BMD4 is the introduction of splitting FDI on the basis of Special Purpose Entities (SPE) and non-SPE FDIs, where an SPE is defined as an entity with little or no physical presence in the respective country and which serves primarily for holding assets and liabilities or raising capital for the multinational firm (OECD 2015). Discussing the SPE FDI split in general makes sense for FDI gravity research, especially in the field of tax (avoidance), however this has to be left open for future research as most countries do not report splits as recommended by the OECD but instead report total FDI equal to non-SPE, indicating that the BMD4 guideline has not yet been successfully implemented. This however

[19]Even within the OECD, national banks vary in their requirements for reporting firms concerning business volume, amount of foreign investment activities, or treatment of multinationals with international shareholders.

[20]We gratefully acknowledge the opportunity to work with the Bundesbank MiDi-databank in 2018 and 2019.

[21]US-outflows to Japan are, for example, reported as being multiples of what Japan reports to receive from the US as inflows, while Belgium or the Netherlands barely receive any inflows, etc.

simplifies merging both datasets; in addition, a trend-break variable is introduced to control for a potential bias. We convert negative flow values to zero and exclude missing values, as explained in Welfens/Baier (2019).

Our independent variables are defined as described in table 1:

Table 1. *List of Variables*

Variables	Definition	Source
inflow	FDI inflow, from origin to target in current USD; Negative values to zero, excluding missing values	OECD FDI database; BMD3 data 1985-2012, BMD4 data 2013-2017
dist	Bilateral distance between two countries	CEPII GeoDist dyadic dataset; Mayer/Zignago (2011)
target_gdp	GDP of FDI target country, in current USD	World Bank
origin_gdp	GDP of FDI origin country, in current USD	World Bank
target_gdp_per_capita	GDP per capita of FDI target country, in current USD	World Bank
origin_gdp_per_capita	GDP per capita of FDI origin country, in current USD	World Bank
target_tax	General FDI target country corporate tax rates, including average/typical local taxes	Mintz/Weichenrieder (2010); KPMG (2017)
origin_tax	General FDI origin country corporate tax rates, including average/typical local taxes	Mintz/Weichenrieder (2010); KPMG (2017)
openness	total import plus total export of FDI target country, divided by its GDP	World Bank
contig	Dummy describing whether two countries are contiguous	CEPII GeoDist dyadic dataset; Mayer/Zignago (2011)
comlang_off	Dummy describing whether two countries share a common official language	CEPII GeoDist dyadic dataset; Mayer/Zignago (2011)
colony	Dummy describing whether two countries have had a common colonizer	CEPII GeoDist dyadic dataset; Mayer/Zignago (2011)
comcol	Dummy describing whether two countries have ever had colonial links	CEPII GeoDist dyadic dataset; Mayer/Zignago (2011)
bis	Target reports and provides (consolidated) data to the Bank for International Settlement[22]	Bank for International Settlements
ebrd	Target is shareholder country of the European Bank for Reconstruction and Development[23]	European Bank for Reconstruction and Development
adb	Target Regional and non-regional membership in the Asian Development Bank group	Asian Development Bank
miga	Target participation in programs ensured by the Multilateral Investment Guarantee Agency	Multilateral Investment Guarantee Agency

[22]Whether a country starts reporting in the first or fourth quarter is disregarded and only the year in which it started data interaction with the BIS is counted.
[23]The level of funds is not accounted, just whether interaction occurs.

We use the classical bilateral gravity variables identified and provided by CEPII researchers "contiguity", "common official language", "colony" and "common colony" as cultural barriers, as well as "distance" for physical barrier in country-fixed models as additional control variables. As those are time invariant, they are dropped for dyadic fixed effects where dummies for each possible country-pair are introduced. Institutional variables are dummies describing whether interaction/membership is in place or not; yearly fixed effects are utilized in all models.

Following Anderson & Yotov (2010, 2012), country and dyadic fixed effects validate our structural gravity estimations by dealing with issues of unobserved costs and potential data imprecisions; Fally (2012) adds that PPML estimators in fixed effects gravity perfectly fits the multilateral resistance terms and therefore our theoretical model, which is defended by Head & Mayer (2014) for the case of *heteroscedastic* data as ours (according to White- and Breusch-Pagan testing). Therefore from OLS estimators are forgone. Furthermore, tax, openness, GDPs per capita and GDPs are checked for endogeneity via the Durbin-Wu-Hausman test and are found to be *exogenous*. No serious *correlation* issue is found between our set of independent variables, however all models are also tested without "openness", as a correlation coefficient of 0.51 regarding "target_tax" is found; the effect on tax is found to be fairly small (the coefficient for tax changes from -1.97 (model (5), see below) to -2.11 when excluding trade openness as control variable). Therefore, "openness" is included as a control variable in all models presented subsequently. The following section presents all empirical findings.

Empirical Findings

Country-Fixed and Dyadic Fixed Estimations

In a first step, the data is split into several time periods beginning with 1985-2011 and then the data is extended by two years for each subsequent model, as widely varying results are found when evaluating previous research where data for various time frames was used.[24] Therefore, how the coefficients change over time is observable – as in Table 2.

Country and year fixed effects were included in models (1)-(4) but are not displayed for reasons of space. Standard errors were clustered by each possible country-pair in all models. We find a significant negative effect of distance, a significant positive effect of target country GDP and a significant negative effect of GDP per capita on FDI inflows across all time periods. Neither significances nor coefficient sizes change in a critical manner.

Regarding target country corporate tax level, the following is observed: An effect of -3.984*** (std.error 0.977) for the data period 1985-2011 (1), an effect of

[24]Many current FDI gravity researchers use OECD data up to 2012 only (BMD3), as the BMD4 data up to 2017 has just currently been released at the beginning of 2019, and merging BMD3 with BMD4 data has, according to the best of this author's knowledge, not been done so far; however, this is viewed this as unproblematic, as described below.

-3.653*** (std.error 0.914) for 1985-2013 (2), an effect of -2.298** (std.error 0.950) for 1985-2015 (3) and no significant effect in model (4) which covers the time period 1985-2017. Therefore, an increasing effect of corporate tax level as FDI attracting variable over time is noted.

Table 2. *PPML Panel Country-Fixed-Effects Estimation Results for FDI Inflow, by Time Periods*

	(1)	(2)	(3)	(4)
VARIABLES	inflow_11	inflow_13	inflow_15	inflow_17
ln_dist	-0.406***	-0.399***	-0.388***	-0.387***
	(0.0681)	(0.0661)	(0.0632)	(0.0612)
ln_target_gdp	4.521**	5.178***	4.821***	3.634**
	(1.852)	(1.642)	(1.430)	(1.419)
ln_origin_gdp	2.593*	2.785*	2.358	2.680*
	(1.549)	(1.442)	(1.577)	(1.394)
ln_target_gdp_per_capita	-3.699*	-4.297**	-3.868**	-2.581*
	(1.901)	(1.713)	(1.526)	(1.530)
ln_origin_gdp_per_capita	-1.716	-2.109	-1.638	-1.961
	(1.652)	(1.486)	(1.659)	(1.464)
target_tax	-3.984***	-3.653***	-2.298**	-1.165
	(0.977)	(0.914)	(0.950)	(0.927)
origin_tax	0.104	0.247	0.745	0.216
	(1.130)	(1.066)	(0.939)	(0.910)
openness	0.0804	1.210***	1.712***	1.800***
	(0.305)	(0.317)	(0.291)	(0.260)
contig	0.201	0.178	0.111	0.0783
	(0.157)	(0.155)	(0.156)	(0.161)
comlang_off	0.202	0.136	0.198	0.129
	(0.142)	(0.140)	(0.133)	(0.127)
colony	0.240**	0.313***	0.188	0.209*
	(0.120)	(0.110)	(0.115)	(0.110)
comcol	5.791***	5.694***	5.405***	5.357***
	(0.480)	(0.480)	(0.419)	(0.423)
bis	-0.342**	-0.396***	-0.420***	-0.376***
	(0.158)	(0.150)	(0.139)	(0.138)
ebrd	-0.591**	-0.646***	-0.567**	-0.501**
	(0.258)	(0.247)	(0.244)	(0.244)
adb	-0.285	-0.479	-0.591	-0.629
	(0.366)	(0.408)	(0.424)	(0.425)
miga	-0.0573	-0.0950	-0.0963	-0.0745
	(0.124)	(0.141)	(0.144)	(0.145)
Constant	-26.42**	-28.42***	-17.38*	-21.95**
	(10.49)	(9.240)	(10.54)	(10.14)
Observations	15,678	17,522	19,425	21,357
R-squared	0.484	0.481	0.466	0.461

*Hint: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

When viewing results for trade openness, the opposite effect is found: While in model (1) openness is not significant, it becomes significant in (2) (coefficient 1.210***, std.error 0.317), and the coefficients grow in model (3) (1.712***, std.error 0.291) and (4) (1.800***, std.error 0.260), indicating that trade openness of target country becomes an increasingly important FDI determinant.

While the dyadic gravity control variables seem not to be affected by the choice of data framework, relatively constant effects for our financial institutions are found: ADB and MIGA membership have no significant effect on FDI, while EBRD shareholder target countries and target countries which exchange data and cooperate with the BIS attract significantly less FDI in all models, albeit varying little between different time periods.

It is also interesting to comment on the R-squared in this framework, as with increasing observations from model (1) to model (4), a decreasing R-squared is observed which indicates that the additional observations increase the variance of the data and therefore decrease the fit of the model (Head & Mayer 2014; Shepherd 2017). If this is viewed in the context of observed FDI flow decrease in the more recent years, part of that effect could also be an unsatisfactory quality level of data, as data for the latter years gets constantly updated by gathering and aggregating micro data, a process which takes time. Therefore, the time frame from 1985-2015, i.e. model (3), is chosen and the variables added in a cumulative manner in order to observe potential interactions between the independent variables. Results are presented in Table 3.

At first sight, no noticeable incidents or major changes are observed, supporting the choice of control variables. It is, however, worth noting that when switching from model (5) to model (6), where the BIS variable is introduced, a minor increase of the magnitude of "target_tax" from -1.966** (std.error 0.950) to -2.222** (std.error 0.325) is observed.[25] This indicates two things: a) countries who are NOT cooperating and exchanging data via the BIS profit more, respectively, from a fall in the corporate tax rate, and b) as soon as countries exchange data and cooperate, corporate tax becomes a less important determinant for FDI. In addition, "openness" changes from model (7) (1.593***, std.error 0.325) to model (8) (1.713***, std.error 0.291)[26] and a minor increase of R-squared is observed as well; therefore, ADB and MIGA are included as control variables even though they have no significant impact on FDI flow. The fact that EBRD interaction has a negative effect on FDI inflows could be interpreted as an indication that EBRD as an institution works in the sense that the joint profit maximization of the OECD multinationals can take into account a broader range of investment opportunities abroad, naming in 49 post-socialist transition economies whose institutional reforms and infrastructure projects – often relevant for profitability – are reinforced by EBRD activities; the negative coefficient thus reflects enhanced investment opportunities abroad due to EBRD presence and is a special aspect that deserves further analysis in future research.

[25]The correlation coefficient between tax and BIS is noted with 0.20.
[26]The correlation coefficient between openness and ADB is noted with -0.19.

Table 3. *PPML Panel Country-Fixed-Effects Estimation Results for FDI Inflow, Cumulative, 1985-2015*

	(5)	(6)	(7)	(8)	(3)
VARIABLES	inflow	inflow	inflow	inflow	inflow
ln_dist	-0.389***	-0.388***	-0.388***	-0.388***	-0.388***
	(0.0633)	(0.0633)	(0.0633)	(0.0632)	(0.0632)
ln_target_gdp	3.996***	4.512***	4.542***	4.779***	4.821***
	(1.412)	(1.407)	(1.409)	(1.406)	(1.430)
ln_origin_gdp	2.320	2.353	2.354	2.357	2.358
	(1.582)	(1.579)	(1.578)	(1.578)	(1.577)
ln_target_gdp_per_capita	-3.081**	-3.593**	-3.620**	-3.823**	-3.868**
	(1.510)	(1.495)	(1.497)	(1.501)	(1.526)
ln_origin_gdp_per_capita	-1.582	-1.632	-1.633	-1.637	-1.638
	(1.664)	(1.659)	(1.659)	(1.659)	(1.659)
target_tax	-1.966**	-2.222**	-2.244**	-2.290**	-2.298**
	(0.950)	(0.946)	(0.948)	(0.947)	(0.950)
origin_tax	0.723	0.739	0.738	0.740	0.745
	(0.933)	(0.936)	(0.936)	(0.938)	(0.939)
openness	1.566***	1.591***	1.593***	1.713***	1.712***
	(0.323)	(0.325)	(0.325)	(0.291)	(0.291)
contig	0.110	0.110	0.110	0.111	0.111
	(0.156)	(0.156)	(0.156)	(0.156)	(0.156)
comlang_off	0.198	0.198	0.198	0.198	0.198
	(0.134)	(0.133)	(0.133)	(0.133)	(0.133)
colony	0.187	0.188	0.188	0.187	0.188
	(0.115)	(0.114)	(0.115)	(0.115)	(0.115)
comcol	5.392***	5.403***	5.403***	5.404***	5.405***
	(0.421)	(0.420)	(0.420)	(0.419)	(0.419)
bis		-0.427***	-0.428***	-0.459***	-0.420***
		(0.154)	(0.154)	(0.151)	(0.139)
ebrd			-0.553**	-0.567**	-0.567**
			(0.244)	(0.244)	(0.244)
adb				-0.590	-0.591
				(0.424)	(0.424)
miga					-0.0963
					(0.144)
Constant	-17.72*	-17.06	-17.34	-17.45*	-17.38*
	(10.56)	(10.54)	(10.55)	(10.53)	(10.54)
Observations	19,425	19,425	19,425	19,425	19,425
R-squared	0.463	0.464	0.464	0.466	0.466

*Hint: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

In Table 4 the results for the country-fixed model (3) are compared with the dyadic-fixed model (9), as proposed as an alternative (or even improved) methodology in literature.

Table 4. *PPML Country-Fixed Versus Dyadic-Fixed Results, 1985-2015*

	(3)	(9)
VARIABLES	inflow	inflow
ln_dist	-0.388***	
	(0.0632)	
ln_target_gdp	4.821***	4.793***
	(1.430)	(1.461)
ln_origin_gdp	2.358	2.104
	(1.577)	(1.640)
ln_target_gdp_per_capita	-3.868**	-3.864**
	(1.526)	(1.560)
ln_origin_gdp_per_capita	-1.638	-1.469
	(1.659)	(1.730)
target_tax	-2.298**	-2.417**
	(0.950)	(0.946)
origin_tax	0.745	0.101
	(0.939)	(0.914)
openness	1.712***	1.655***
	(0.291)	(0.289)
contig	0.111	13.46***
	(0.156)	(3.275)
comlang_off	0.198	7.282
	(0.133)	(4.753)
colony	0.188	-1.265
	(0.115)	(3.325)
comcol	5.405***	6.688***
	(0.419)	(2.368)
bis	-0.420***	-0.362***
	(0.139)	(0.135)
ebrd	-0.567**	-0.513**
	(0.244)	(0.251)
adb	-0.591	-0.609
	(0.424)	(0.412)
miga	-0.0963	-0.0678
	(0.144)	(0.144)
Constant	-17.38*	-36.83***
	(10.54)	(7.800)
Observations	19,425	18,710
R-squared	0.466	0.541

*Hint: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Model (9) excluded 157 regressors (country-pair dummies) to make sure that the estimates exist (too few observations), leaving 18,710 observations instead of 19,425 observations for model (3); Distance as a time non-varying variable is also excluded in the dyadic model. For model (3) it should be noted that the coefficient is in line with the literature, the same holds for GDP and GDP per capita of the FDI receiving country in models (3) and (9). It is however very surprising that the results, and even R-squared, for both models vary only slightly; this comparison

has – according to author's knowledge – not been done so far in previous gravity FDI flow research.[27] The result for corporate tax is slightly higher in model (9) with a coefficient of -2.417** (std.error 0.946), the coefficients for BIS and EBRD are slightly smaller than in (3); further control variables remain basically the same.

Empirical Findings

We use model (3) and model (9) for evaluating our country and dyadic results, and will additionally critically discuss the findings in model (4).

- GDP of target country, our proxy for economic size, is found positive in model (3) with a coefficient of 4.821*** (std.error 1.430) and positive in model (9) with a coefficient of 4.793*** (std.error 1.461).

  ➔ **Hypothesis 1 is accepted**; an increasing economic size of the FDI target country increases the FDI inflow into that country.

- GDP per capita is as well almost equal in model (3) and model (9) with a coefficient of -3.868** (std.error 1.526) in the country fixed case; increasing GDP per capita therefore decreases FDI inflows into that country, representing locational advantages for FDI in the producing sector where wages play an important role.

  ➔ **Hypothesis 2 is accepted**; an increasing GDP per capita on the part of the FDI target country decreases FDI inflows into that country.

- Distance is only measured in model (3) where it is found to be highly negatively significant with a coefficient of -0.388*** (std.error 0.063), meeting previous findings in the literature.

  ➔ **Hypothesis 3 is accepted**; an increasing distance between two interacting countries decreases the FDI inflows into that country.

- The corporate tax rate of the target country is found to be negatively significant in model (3) with -2.298** (std.error 0.950) and in model (9) with -2.417** (std.error 0.946); the corporate tax level is therefore proven to be an important determinant for FDI inflows; a drop of 1 percentage point of corporate tax will lead to approximately 2.3% -

[27]This is very useful for gravity researchers, as dyadic fixed effects estimations with many countries and observations are associated with sometimes quite high operating expenses in the sense of time and computing power, not speaking of frequently occurring failures or infinite iterating when calculating in Stata; for an econometric discussion see Stamman et al. (2016) and Stammann (2018).

2.4% more FDI inflows, which meets the result frame of a majority of previous studies targeting corporate tax and FDI.

➔ **Hypothesis 4 is accepted**; increasing the level of corporate tax for the FDI target country results in decreasing FDI inflows.

- The variable "origin_tax" which describes the corporate tax level in the FDI sending country is not found to be significant in any of our models.

  ➔ **Hypothesis 5 is rejected**; a high domestic corporate tax level does not lead to significantly more FDI outflows. Corporate tax therefore has no effect on whether or not FDI decisions are made, but does have an effect on the decision to which country the FDI will go.

- Looking at the results for "target_tax" in Table 2, a strongly decreasing effect of corporate tax over time is found, which however is still significant in models (1)-(3) but loses significance in model (4). Especially when extending the data from 2013 to 2015, the variable experiences a vast drop. There is a variety of reasons why this might be the case, which is discussed in below; nevertheless, it can be speculated that the tax variable will regain its significance when the time frame is extended up to 2019 or 2020.

  ➔ **Hypothesis 6 is accepted**; the negative corporate tax-FDI relationship vanishes over time.

- The BIS variable is found to be highly significant with -0.420*** (std.error 0.139) in model (3), and -0.362*** (std.error 0.135) in model (9); we as well find EBRD shareholders with -0.567** (std.error 0.244) in (3) and 0.513** (std.error 0.251) in (9) respectively; ADB and MIGA are not found to be significant.

  ➔ **Hypothesis 7 is accepted**; it is found that especially interaction with institutions is what matters here, and simple membership is a rather bad proxy; in addition, it is found that exchanging financial data via the BIS has an effect on the tax variable, as the degree of the effect on FDI inflows increases for countries who do not share data with the BIS. The effect is however decreasing as well, and expected to vanish with political disintegration in other fields as trade for example; while trade openness is only included as control variable in the underlying research, it is nevertheless important to note an increasing and quite impactful effect on FDI over time.

Conclusion and Policy Implications

Bilateral FDI flow data from 1985-2017 for all OECD countries is evaluated, and a dataset – which has not been utilized for gravity equations up to this point – is compiled in order to clarify the role of corporate tax levels on firm decisions whether and where to invest. In the course of the research, the need to control for interaction with international financial institutions is identified. The empirical findings are consistent with a majority of previous findings and additionally expand the available knowledge about FDI and tax by providing new results relevant for policy makers.

The results assert that the role of corporate tax has been overestimated so far on FDI target decision, and additionally has no significant impact at all on the question of whether or not to invest, but rather on where to invest. While this research is almost entirely consistent with the numbers proposed by Feld & Heckemeyer (2011), after controlling for an (overestimating) publication bias, of a 2.28% FDI increase with 1 percentage point drop of corporate tax level, whereas model (3) presented herein determines a 2.298% FDI increase, there is sufficient reason to argue that the actual impact is even lower when considering a macro-data bias.[28] In addition, it is found that the impact of corporate tax decreases over time, and in fact has no impact on FDI when utilizing the dataset up to 2017. It is however reasonable to question the data quality of newer observations (2017) as the BMD4 databank is currently still getting updated almost weekly. The corporate tax reduction conducted in the US in 2018, for which data is not yet available, however, has the potential to reflect a comeback of significance for the tax variable; the reason might primarily lie in the leading role the US has as FDI attractor in the data, but also the current "America First" strategy by president Trump.

Increasing unilateralism, along with economic and political disintegration encourage aberrations in terms of national strategies vis-á-vis fiscal politics and retreating engagement in international cooperation and institutions, which is proxied in the present research with several financial institutional dummies. While pursuing this kind of unilateralist and individualist approach will attract additional FDI as long as it is an international outsider strategy, the effect will vanish as soon as more and more countries "drop out" of the global cooperation network.[29] Furthermore, it is shown that international cooperation leads to a decreasing effect of FDI attractiveness via a low corporate tax level, or put differently, fights/ prevents micro-level tax avoidance strategies and tax havens, assessed as being damaging to the global economy (Bolwijn et al. 2018). The choice of proxies for international financial cooperation works with regard to capturing unobservables which can be described by the OECD BEPS program as well, which analyzes shortcomings and aims to improve enforcement of international law, fair taxation and rule-setting.

[28]The usage of macro data is likely to overestimate the effect of tax, as this is mainly relevant for larger multinationals which stand for a major share of the data.

[29]The same accounts for corporate tax levels; as soon as an international downward tax reduction begins, the effect for single deviator vanishes and everyone will be worse off.

From a qualitative perspective, Taubenheim & Mrkvicka (2018) rank the US in particular as being problematic case for taxing foreign facilities in 2017/2018, even though various international tax cooperation laws are in force. This might also indicate that the willingness for implementation is not always fully present in bilateral relationships, and the target country's corporate tax level can be an investment incentive – even in the presence of double-taxation-credit treaties, a discussion started by Slemrod back in 1990 but still lacking in theoretical explanation.

As a concluding remark, the reader is referred to the two quotations in the beginning of this paper: While it is statistically proven that reducing corporate tax levels leads to increasing FDI inflows, this effect is smaller than expected and vanishes over time due to other gains from international cooperation; if deviation from international cooperation is chosen as a national strategy (unilateralism), tax however gains importance. Unilateralism on the other hand trigger various effects decreasing FDI inflows, as trade openness is likely to decrease (and is of increasing importance for FDI, see Table 2), the opportunity costs for other nations to themselves deviate decrease and therefore bilateral tax differences are likely to decrease as well; which will further reduce the effect of low tax levels in the long run (see Footnote 29). Implementing low corporate tax levels in order to keep domestic firms within the country and reducing their incentives to invest abroad are not found to be relevant.

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Appendix

Table A1. *Average Corporate Tax Rates in OECD Countries, in %*

Countries	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**
Australia	39	36	34	30	30	30
Austria	30	34	34	25	25	25
Belgium	40	40.2	40.2	33.9	33.9	33.9
Canada	41.5	42.9	42.4	36.1	31	26.5
Chile			15	17	17	24
Czech Republic		41	31	26	19	19
Denmark	40	34	32	28	25	22
Estonia			26	24	21	20
Finland	44.5	25	29	26	26	20
France	42	36.7	37.8	33.83	33.33	33.33
Germany	54.4	55.1	52	38.31	29.41	29.72
Greece	46	35	40	32	20	29
Hungary	40	18	18	16	19	19
Iceland			30	18	18	20
Ireland	43	38	24	12.5	12.5	12.5
Israel			36	34	25	25
Italy	46.4	53.2	37	37.25	31.4	31.4
Japan	50	50	40.9	40.69	40.69	33.86
Korea			30.8	27.5	24.2	24.2
Latvia				15	15	15
Lithuania				15	15	15
Luxembourg			37.5	30.38	28.59	29.22
Mexico	36	34	35	30	30	30
Netherlands	35	35	35	31.5	25.5	25
New Zealand	33	33	33	33	30	28
Norway	50.8	28	28	28	28	27
Poland		40	30	19	19	19
Portugal	40.2	39.6	35.2	27.5	25	21
Slovak		40	29	19	19	22
Slovenia			25	25	20	17
Spain	35	35	35	35	30	28
Sweden	53	28	28	28	26.3	22
Switzerland	30.6	28.5	24.9	21.99	18.75	17.92
Turkey			33	30	20	20
UK	34	33	30	30	28	20
USA	38.7	39.6	39.3	40	40	40

Source: Mintz & Weichenrieder (2010), KPMG (2017)