

Can Developing Countries Increase Foreign Investments by Sharing Their Taxation Rights? An Economic Analysis of Double Taxation Treaties between Countries in Asymmetric Investment Positions

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This paper examines the effects of double taxation treaties on FDI inflows into both developing and developed countries. A gravity model equation was used to first estimate the general effect of the existence of a tax treaty between symmetric and asymmetric country pairs on FDI. Secondly, indices that indicate the proportion of source taxation rights negotiated in a tax treaty were employed in the same gravity equation as predictors. Both the conclusion of tax treaties in general and in particular those with a high share of source taxation were found to be negatively correlated with FDI inflows (–23.05%). A stronger effect could be estimated for FDI inflows into developing countries (–29.53%), indicating that developing countries face a more severe trade-off between the attraction of FDI from MNEs and the generation of tax revenue from business activities rendered in their territory.

Keywords: double taxation treaty, Foreign Direct Investment, gravity equation, international tax cooperation, developing countries

JEL Classification: C32, F21, K34

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Introduction

Approximately 3,000 double taxation treaties (DTTs) have been concluded globally; therein between 1,000 and 2,000 include at least one developing country (Quak & Timmis, 2018). DTTs distribute taxation rights for bilateral investments between the residence country, where a multinational enterprise (MNE) is located, and the source country, where the economic activities of that

MNE take place (Rixen, 2010). Consequently, the term ‘source taxation rights’ describes the right of the source country to tax the activities and the term ‘residence taxation rights’ describes the taxation rights of the residence country.

Developing countries are typically net capital-importing countries, while higher developed countries often are net capital exporters and thus generate income in the developing country (Neumayer & Barthel, 2012). Thus, tax treaties between

a developing and a developed country are usually characterised by great asymmetry in investment positions, which indicates that the attraction of foreign direct investments (FDI) may be one of the main reasons for the developing country to sign the treaty (Neumayer & Barthel, 2012).

The present research seeks to analyse the impact of DTTs between countries in asymmetric investment positions on FDI inflows. In coherence with the existing literature, a gravity model equation was applied to estimate their impact on bilateral FDI flows.

In the first step, the effect of the mere existence of a DTT between a country pair was estimated by employing a dummy variable equal to 1 as the predictor variable of interest. Further control variables were included as independent variables in order to approximate the true effect of DTTs. Both a (traditional) linear regression analysis and a (refined) PPML estimation were performed in STATA.

In the second step, the same analysis was performed using an index instead of a dummy variable for the share of source taxation as the predictor variable. For obtaining the indices for each country pair, a dataset analysing the agreed treaty provisions of DTTs in a qualitative sense was required. While qualitative studies that aim to analyse specific treaty provisions in depth are usually limited to a small sample of countries, quantitative studies that analyse larger samples of countries are normally limited to numerically defined clauses such as the withholding tax rates (Hearson, 2018). Thus, quantitative studies analysing specific treaty provisions on a large scale for a great number of treaties were missing for many years. In 2016, the International Centre for Tax and Development (ICTD), therefore, addressed this gap in the existing literature by creating the ActionAid Tax Treaties dataset (ICTD, 2020) that codes selected treaty clauses into six indices by comparing them to international standards¹ (Hearson, 2016). One of these indices is called the source index and was used for this paper after being complemented by further treaty data.

¹ International standards are model tax conventions, particularly the OECD and UN model conventions.

Estimation of the effect of concluding DTTs on FDI

The gravity model of international trade was created to predict dyadic trade flows between two countries by controlling for their economic sizes and both geographical and political distance between them (Tinbergen, 1962, as cited in Baier, 2020). Thus, it is a widely used tool for modelling the economic effects of policies in international trade (Shepherd, 2016).

Many empirical studies have assessed whether and to which extent an influence of DTTs on FDI inflows into countries can be determined; however, their findings are inconsistent (Hearson, 2018).

Neumayer et al. (2010) find a positive correlation of DTTs and FDI stocks by using panel data of 30 source countries and 106 residence countries from 1974 to 2004. They conclude that on average a 27.3% increase in FDI stocks can be expected by a source country by signing a DTT (Barthel, Busse, & Neumayer, 2010). A slightly lower increase of 22% on average could be found by Neumayer in the analysis of US FDI outbound stocks (Neumayer, 2007), whereas Petkova et al. find an 18% increase in FDI for DTTs by taking into account that MNEs may also use the DTTs of intermediate countries for investments² (Petkova, Stasio, & Zagler, 2020). Lejour also considers the possibility of treaty shopping and determines a 16% increase in FDI through DTTs in general and a 21% increase for recently concluded DTTs by using bilateral FDI stocks of OECD countries from 1985 to 2011 (Lejour, 2014).

In contrast, other studies have found a negative correlation of DTTs and FDI that may be explained by increased information sharing of the treaty partners through DTTs which could interfere with strategies of MNEs to evade taxes by investing abroad (Blonigen & Davies, 2002). Blonigen and Davies, who use panel data from 1982 until 1992 on OECD countries and FDI stocks, find

² This practice is called 'treaty shopping' and refers to the strategic redirection of FDI through third countries due to more favourable investment treaties (Petkova, Stasio, & Zagler, 2020).

a non-significant negative effect of DTT formation on FDI, suggesting that a treaty's function to avoid tax evasion may be more relevant than its function to promote investments into a country (Blonigen & Davies, 2002). Egger et al. confirmed this negative correlation of DTTs and FDI by finding a significant negative effect of DTTs on bilateral outward FDI stocks of OECD countries (Egger, Larch, Pfaffermayr, & Winner, 2006).

Finally, there are also studies that could not find a statistically significant effect of DTTs on FDI: Coupe et al. did not find consistent effects by analysing FDI flows from OECD countries to transition economies from 1990 to 2001 and explain this inconsistency with the different estimators applied (Coupe, Orlova, & Skiba, 2009). Baker, instead, concludes that no effect could be determined in his econometric model since residence countries have already implemented unilateral double taxation relief mechanisms, thus eliminating tax reasons for their MNEs' investment location choices (Baker, 2014).

Model specification and data

The present research paper used a gravity model dataset prepared in cooperation with the European Institute for International Economic Relations (EIIW) at the Schumpeter School of Business and Economics at the University of Wuppertal (Germany). Bilateral FDI flows were based on data taken from UNCTAD (UNCTAD, 2021), gravity variables as control variables were obtained from CEPII (CEPII, 2021), data on bilateral investment treaties was received from the World Bank (World Bank Group, 2021), and additional political indicators (*World Governance Indicators*) as control variables were also provided by the World Bank (Kaufmann & Kraay, 2020).

Due to the limited availability of dyadic FDI flow data, the present research assesses the effect of the conclusion of DTTs on FDI based on data of 61 countries which had available bilateral inflow and outflow data from 2001 to 2012. The FDI inflows have been determined by compiling inflows and their reported origins by researchers of

the EIIW. Originally, it was planned to specifically target only the least developed countries (LDCs) in this research project based on the Human Development Index (HDI) by the United Nations Development Programme. However, only unilateral FDI inflows were available on UNCTAD for all LDCs (without sufficient information on its origins), which do not allow for analysing the effects of bilateral tax treaties with a gravity model due to its dyadic structure. Thus, the 61 countries with available data were clustered into 'higher developed countries' and 'developing countries' based on the HDI to assess differences between developing and developed countries. Year-fixed effects were used to control for variables that are constant across countries but vary over time. The inclusion of time-fixed effects is a common technique applied for panel datasets (Shepherd, 2016). Country-fixed effects were not applied due to a small expected variance between the variables in a rather short period of time (compare to reasoning of Fischer (2010)).

As the dataset also included negative FDI flows (which can result for example from reinvested earnings if paid out dividends are greater than the recorded income (OECD, 2008)), these negative flows have been coded as zero since the estimators intended to be used cannot take negative values into account and dropping them could have led to a larger bias (Baier & Welfens, 2018). Missing values have further been excluded.

Subsequently, the OLS estimator could not be used for a regression with the dataset since the dependent variable is log-transformed for OLS regressions and zero values consequently would not have been taken into account (Shepherd, 2016). While an OLS regression may still be suitable for datasets with merely few zero values and can be preferred for robustness (Baier, 2020), using the Poisson Pseudo Maximum Likelihood (PPML) estimator in log-linearised form is preferable for the present dataset, which includes 69.67% zero values for FDI flows and thus requires an estimator that is resilient to large proportions of zero values (Tenreyro & Santos Silva, 2011). Besides its strong performance in datasets with many zero values,

another major advantage of the Poisson regression is its consistency regardless of the data distribution (Shepherd, 2016). As independent variables are log-transformed in Poisson models, they can be interpreted as simple elasticities as opposed to semi-elasticities for non-log transformed variables (Shepherd, 2016).

However, for the sake of comparability, a linear regression with the OLS estimator was run in addition to the PPML estimation. Thus, a second dataset was created in which infinitesimal values were added to the FDI inflow data, thus eliminating zero values. This technique to assign small numbers to zero values is a common solution to missing data in OLS estimations (Baier & Welfens, 2018).

Particularly the PPML estimator, which was developed by Silva and Tenreyro in 2006 (Silva & Tenreyro, 2006), is a popular estimator choice for gravity models in the literature (Bobkova, 2012) as it allows for including two important estimation options to reduce biases in the results: It automatically includes the ‘robust’ command that ensures the robustness of standard errors to heteroscedasticity, and it allows for specifying clusters in the data in order to take correlated standard errors within specific groups into account (Shepherd, 2016). In gravity models, country pairs are likely to have highly correlated standard errors since dyadic trade or capital flows are estimated. Thus, it is common to use the distance variable for clustering as the distance between two countries is identical in both directions and unique to a country pair; consequently, it enables the identification of unique groups (Shepherd, 2016).

The gravity model developed for this research is formalised as:

$$\ln FDI_{inflows_{ij}} = \beta_0 + \beta_1 DTT_{existence_{ij}} + \beta_2 \ln_{dist_{ij}} + \beta_3 \ln GDP_{Ti} + \beta_4 \ln GDP_{Oj} + \beta_5 contig_{ij} + \beta_6 comlang_off_{ij} + \beta_7 colony_{ij} + \beta_8 BIT_{dummy_{ij}} + \beta_9 RegQuality_{Ti} + \beta_{10} RuleOfLaw_{Ti} + \beta_{11} CorruptControl_{Ti} + u_{ij}$$

where β_1 measures the effect of the dummy variable for the existence of a DTT in the specific year (*DTTexistence*) on the log-transformed FDI. The model controls for the log-transformed distance between the countries (*ln_dist*), the countries’ log-

transformed GDPs (*lnGDP_T* and *lnGDP_O*), contiguity between the two countries (*contig*), an official common language (*comlang_off*), whether the two countries ever had a colonial relationship (*colony*), the existence of a bilateral investment treaty (*BITdummy*) between the countries, the level of corruption in target country T (*CorruptControl_T*), the regulatory quality in target country T (*RegQuality_T*), and the rule of law in country T, which describes the quality of contractual enforcement, property rights, the crime rate and the reliability of the country’s executive and judicative forces (*RuleOfLaw_T*). It should be noted that the FDI inflows and all gravity model-related variables describe a bilateral relationship between the two countries, while the governance control variables unilaterally refer to target country T.

The model was used to test whether a significant effect of *DTTexistence* on FDI inflows can be determined. The hypotheses are consequently formalised as:

$$H_0: \beta_1 = 0$$

$$H_1: \beta_1 \neq 0.$$

Empirical findings

In order to provide a comprehensive view on the estimated effects and to compare the traditional regression method for the gravity model with the improved PPML estimation, both regression types were run in STATA. Table 1 shows the found estimates for a linear regression using year-fixed effects (for which the dummies are not displayed here for reasons of space).

A negative effect of -0.275 could be estimated for the existence of a DTT which was also statistically significant at the 0.01 significance level ($\alpha = 1\%$). This indicates that the existence of a DTT between two countries decreases FDI inflows by about 24%³ on average, *ceteris paribus*.

Notably, all gravity-related predictors and the governance variables ‘rule of law’ and ‘regulato-

³ The coefficients of non-log transformed regressors have to be interpreted as semi-elasticities: $e^{-0.275} - 1 = -0.2404$ (Shepherd, 2016).

Table 1. Linear regression with time–fixed effects in STATA

First Graph: Linear Regression with Time Fixed Effects with DTT-Dummy

Number of obs = 40,260
 F(11, 40238) = 1325.04
 Prob > F = 0.0000
 R-squared = 0.2538
 Adj R-squared = 0.2534
 Within R-sq. = 0.2495
 Root MSE = 7.3024

lnFDI_nozero	Robust					
	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
DTTexistence	-0.275	0.100	-2.750	0.006	-0.471	-0.079
ln_dist	-2.417	0.048	-50.390	0.000	-2.511	-2.323
lnGDP_O	1.597	0.021	76.810	0.000	1.556	1.637
lnGDP_T	0.851	0.022	38.790	0.000	0.808	0.894
contig	0.605	0.239	2.530	0.011	0.136	1.073
comlang_off	1.627	0.180	9.040	0.000	1.274	1.980
colony	2.327	0.282	8.260	0.000	1.775	2.879
BITdummy	0.183	0.153	1.200	0.232	-0.117	0.484
RegQuality_T	2.384	0.112	21.270	0.000	2.165	2.604
RuleOfLaw_T	-2.552	0.174	-14.630	0.000	-2.894	-2.210
CorruptControl_T	0.070	0.127	0.550	0.584	-0.180	0.319
_cons	-17.885	0.597	-29.960	0.000	-19.055	-16.715

Absorbed degrees of freedom:

Absorbed FE	Categories	-	Redundant	=	Num.	Coefs
year	11	0	11			

Source: own work.

ry quality’ were statistically significant at the 5% level (or better) and showed positive estimates. However, the geographical distance between two countries and the rule of law were negatively correlated with FDI inflows, indicating that FDI inflows decrease with increasing distance between the source country and the investor, and also with increasing quality of the source country’s institutions. The latter finding implies that investors prefer unstable countries for investments, possibly indicating a preference for countries with less formalised taxation systems.

As heteroscedasticity could be observed in the dataset by performing a Breusch-Pagan test in STATA, the PPML estimator is advised to be used since it is consistent in the presence of heteroscedasticity. Thus, the choice of the PPML estimation

technique was confirmed by the heteroscedasticity test for the given model (Silva & Tenreyro, 2006).

Table 2 shows the found results of the PPML estimation.

As for the OLS estimator, a statistically significant negative effect could be estimated (-0.262) with the PPML estimator for the existence of a DTT. The result of the refined estimation technique is thus very similar to the linear regression result and only indicates a slightly smaller effect of about -23%. Again, negative significant effects were found for the rule of law and the distance between two countries and, additionally, also for the existence of a bilateral tax treaty and contiguity between two countries.

By reducing the scope to DTTs that involve at least one developing country, a positive signifi-

Table 2. PPML estimation with time-fixed effects in STATA

PPML Estimation with Time Fixed Effects

FDIinflow	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
DTTexistence	-.262	.067	-3.91	0	-.393	-.13	***
ln_dist	-.825	.043	-19.18	0	-.909	-.741	***
lnGDP_O	.643	.029	22.49	0	.587	.699	***
lnGDP_T	.471	.037	12.68	0	.398	.544	***
contig	-.517	.106	-4.88	0	-.725	-.309	***
comlang_off	.82	.09	9.10	0	.643	.997	***
colony	.687	.127	5.42	0	.438	.935	***
BITdummy	-1.087	.097	-11.23	0	-1.277	-.897	***
RegQuality_T	.938	.126	7.43	0	.691	1.186	***
RuleOfLaw_T	-.74	.168	-4.41	0	-1.069	-.411	***
CorruptControl_T	.225	.12	1.88	.061	-.01	.46	*
Constant	-2.689	.687	-3.92	0	-4.035	-1.344	***
Mean dependent var		309.374	SD dependent var			2332.255	
Pseudo r-squared		0.500	Number of obs			40260	
Chi-square		5819.266	Prob > chi2			0.000	
Akaike crit. (AIC)		3900611.551	Bayesian crit. (BIC)			39006214.788	

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: own work.

cant effect at the 1% level of 0.647 could be estimated in a linear regression, indicating a 90.98% increase in FDI inflows for the existence of a DTT, while a negative significant effect at the 1% level of -0.35 was found with the PPML estimator. The linear OLS estimator assumes homoscedastic error terms since all observations should be included with equal weight. However, if heteroscedasticity is present, the observations with larger variance are weighted more heavily and thus distort the result.

Consequently, as the linear regression is expected to produce biased estimations due to heteroscedasticity, the negative effect obtained from the PPML estimation is assumed to be the true effect observed. Thus, a stronger negative effect of having signed a DTT could be found for FDI inflows into developing countries (-29.53%) compared to the effect found for FDI inflows in general (-23.05%).

Finally, H_0 could be rejected as significant negative effects at the 1% significance level could be found both for all countries in the dataset and for DTTs with developing countries in particular.

Limitations

Although the control variables in the presented gravity model have been selected carefully and with due consideration of previous studies, it cannot be ruled out that further factors that are correlated with both the variable of interest (*DTTexistence*) and the dependent variable (*lnFDIinflows*) were missing in the model and thus changed the estimates obtained. Generally speaking, fixed-effects models are used to minimise omitted variable bias by reducing overall variation as the variation between units (in the given research: time) is eliminated (Hill, Davis, Roos, & French, 2020). However, there may still be variation within the groups (as no country fixed effects were employed) such as FDI-discouraging changing legislation that could not be included in the model due to limited data availability.

Another important limitation to consider for this research is sample selection bias. Due to a limited availability of bilateral FDI flow data that could be used for building the dataset, only very few low developed countries could be included in

the estimation, particularly only two LDCs (Myanmar and the Lao People's Democratic Republic) were included. Thus, as most countries in the dataset (75.41%) belong to the highest developed cluster of the Human Development Index categorisation, the external validity of the model may be limited for comparative approaches between developed countries and developing countries. Including a greater number of developing countries, particularly LDCs, in the sample in order to allow for a broader generalisation of the found effects would be interesting for future research.

Estimation of the effect of the share of source taxation rights on FDI

In order to analyse the influence of the share of source taxation in a DTT on FDI inflows into a developing country, the ActionAid Tax Treaties dataset (ICTD, 2020) was used in this paper. However, the dataset only includes DTTs signed by developing countries; thus, treaties between two developed countries are missing. Since this research addresses the differences between developing and developed countries with regard to asymmetric investment positions, a comparison with the provisions agreed on by developed countries (symmetric countries) was required. Therefore, additional treaty data, namely 14 DTTs concluded between France and further net capital-exporting EU countries, was added to the dataset by the author, adhering to the coding strategy prescribed by the ICTD. This enabled a comparison of the treaty provisions in

1. DTTs between two EU countries (symmetric investment positions);
2. DTTs between an LDC and an EU country (asymmetric investment positions);
3. DTTs between two LDCs (rather symmetric investment positions).

Due to restrictions in time, only the DTTs concluded by France and further capital-exporting EU countries were included in the dataset (instead of all DTTs signed between capital-exporting EU

countries). France was considered a particularly interesting treaty partner due to its high number of DTTs concluded with both LDCs and EU countries.

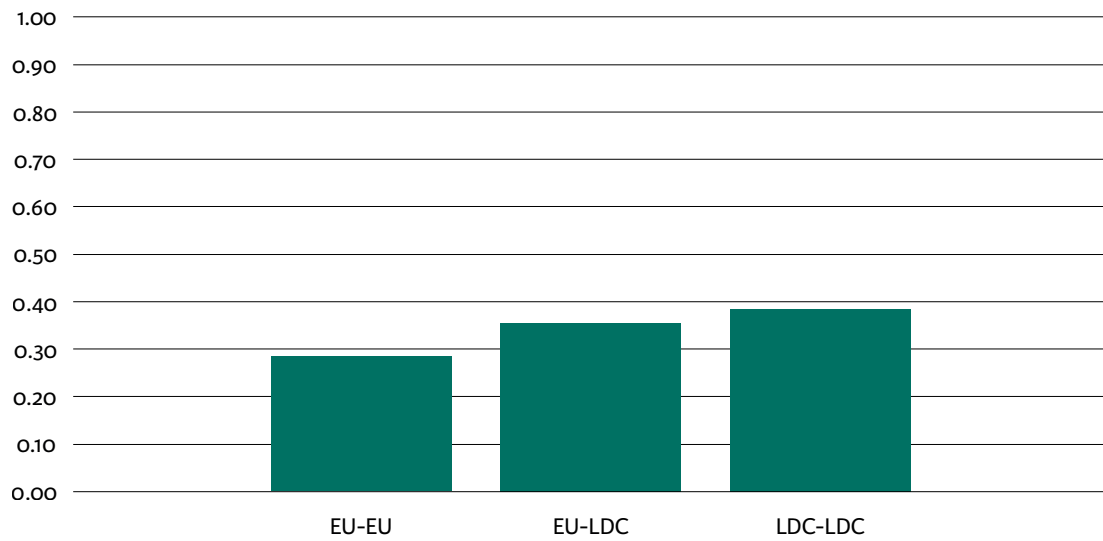
In the first step, own indices similar to the existing ones in the ICTD were calculated (following the ICTD's coding strategy as closely as possible) and analysed descriptively with regard to the differences between symmetric and asymmetric countries. Thereupon, in the second step, the calculated indices were compiled to a superordinate *SOURCEindex*, which was used as a predictor variable in the gravity model described above to determine the influence of source taxation on FDI inflows.

The ActionAid Tax Treaties dataset encodes the treaty provisions of 519 DTTs signed by African and Asian developing countries into quantitative measures and was developed to allow researchers and policymakers to make more informed decisions about their detailed treaty terms (Hearson, 2016). 17 out of 28 clauses in total that are subject to treaty bargaining were encoded into categorical variables based on a binary coding scheme ('YES' and 'NO'), and 11 clauses defining treaty rates (such as the articles 10–12) were encoded as continuous variables.

Based on these encoded clauses, indices taking values between 0 and 1 (which can be interpreted as percentages) were calculated by the author in order to enable comparisons of treaty sections. The indices thereby describe the negotiated treaty provisions clustered by their content. A higher index indicates a higher share of taxation rights remaining in the source country, thus indicating comparably strong negotiations of the capital-importing country (that is more likely to be the source country). Thus, the *SOURCEindex* displays the percentage of source taxation in a DTT. It is calculated as the arithmetic mean of all coded clauses that are subject to treaty bargaining without any weighting factor.

The average *SOURCEindex* rates observed are rather similar and small for all three situations in scope, with the highest average percentage of source taxation (38%) found between two LDCs. Thus, LDCs negotiated a higher share of taxation rights remaining in the source country compared

Figure 1. Comparison of the average *SOURCEindex* for country pairs with different investment positions



Source: own work.

to negotiations between two EU countries (29%) or an LDC and an EU country (36%).

This contradicts the theoretical assumption of Rixen and Schwarz (2009) that countries in asymmetric investment positions agree on higher source taxation on average. However, the low average share of source taxation found for two EU countries confirms the assumption that symmetrical capital exporting countries agree on low source taxation in general.

A second explanation for this distribution of source taxation proportions besides the asymmetry of the countries' investment positions can be provided by looking at the years of treaty conclusion: While the average conclusion year of the selected treaties between two EU countries is 1987, the treaties between two LDCs were on average signed in 1999 and the treaties between an LDC and an EU country were signed in 1997. Thus, the treaties of EU countries are the oldest and those of LDCs are the youngest on average, indicating that DTTs in general become more focused on source taxation over time, most likely influenced by the standardisation of tax treaties through the OECD and UN model conventions.

This temporal explanation can be confirmed by a linear prediction plot in STATA showing an

increasing overall trend for the countries in the dataset over time (Figure 2), which can also be observed for DTTs signed by an LDC and an EU country (Figure 3).

Thus, LDCs have negotiated better conditions in the most recent DTTs on average compared to older ones and a general trend towards more source taxation can be observed for all countries in scope. The trendline also shows the 95% confidence interval (the grey area around the linear trendline) that indicates the area in which the 'true values' could be found with a 95% likelihood, assuming that the amount of source taxation shows a linear increase over time in reality.

Nevertheless, the gravity model-based estimation of the effect of the *SOURCEindex* on FDI inflows showed surprising results: A statistically significant negative coefficient of -1.299 was found for all countries in the dataset (at the 5% significance level) and a significant negative coefficient of -1.991 was found for DTTs involving at least one developing country (at the 1% level). Thus, the results indicate that FDI inflows decrease with an increasing share of source taxation and a stronger negative correlation was found for DTTs with developing countries. It can thus be concluded that countries, especially developing countries, face

Figure 2. STATA visualisation of the development of the *SOURCEindex* over time – all DTTs in the ICTD dataset

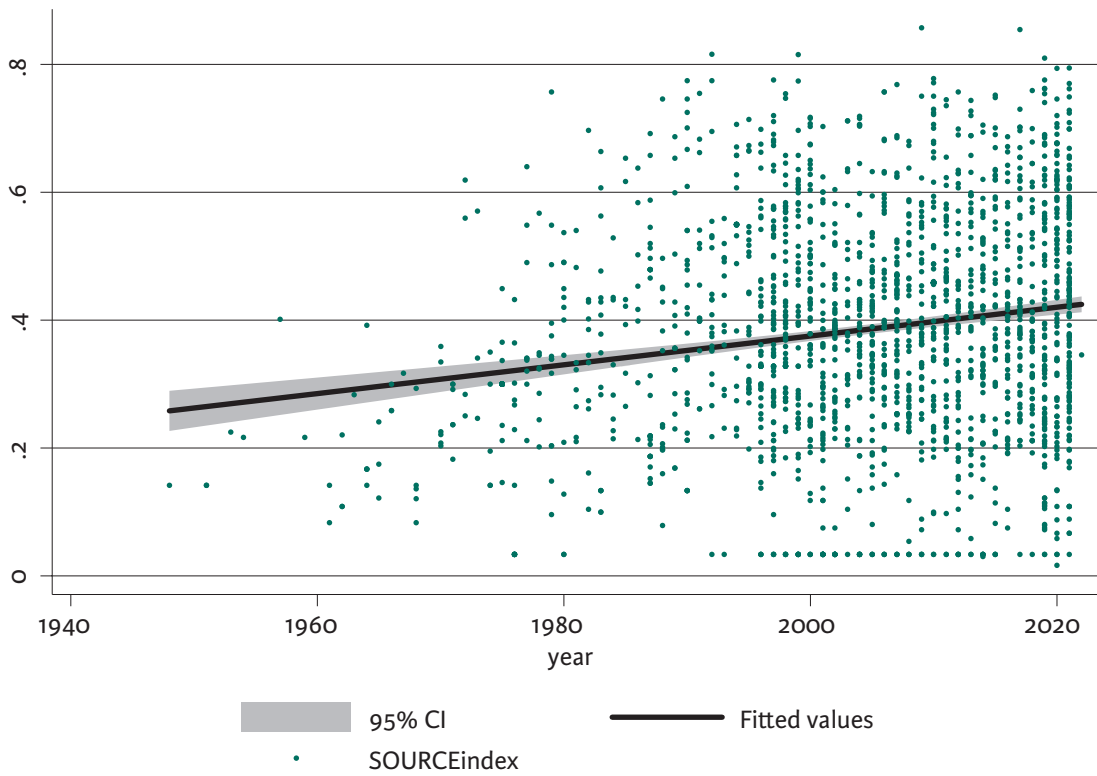
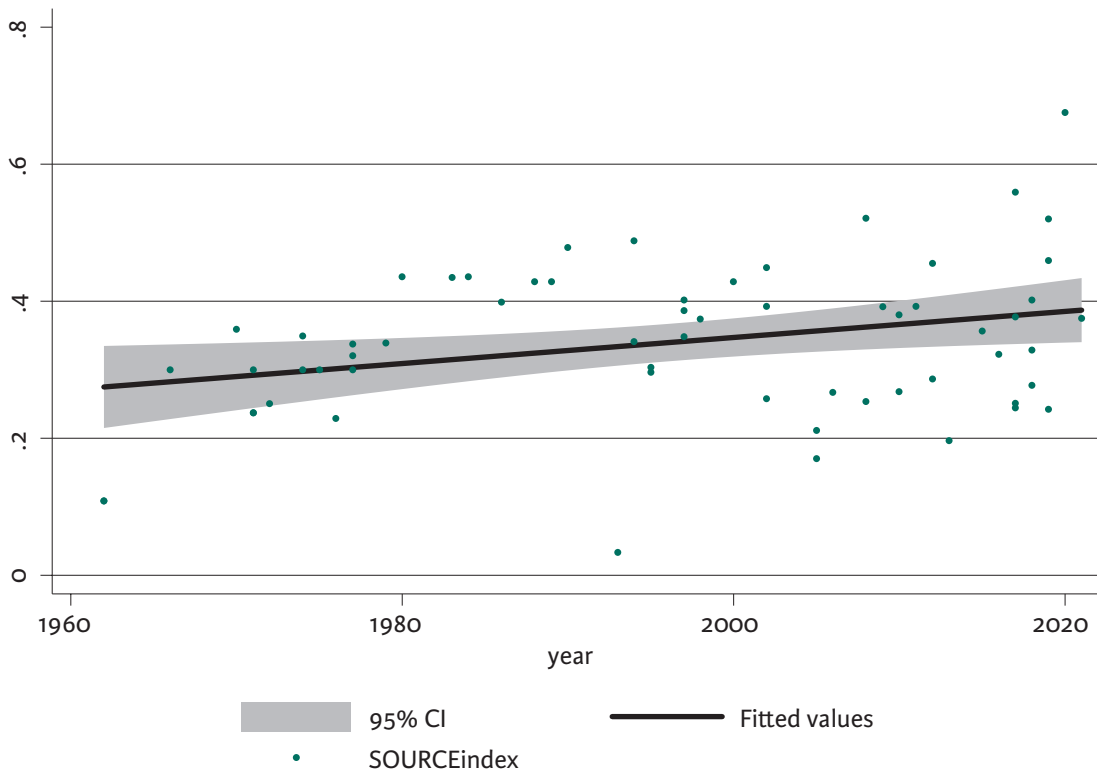


Figure 3. STATA visualisation of the development of the *SOURCEindex* over time – EU-LDC DTTs



Source: own work.

a trade-off between attracting investments and getting a larger share of the taxation rights for taxable business activities of MNEs in their territory.

It is further interesting to note that almost all explanatory variables showed a positive significant effect at the 1% level on FDI inflows except for the distance variable, which is negatively correlated with FDI. This indicates that a higher GDP of both the source country and the residence country, a common language, and a former colonial relationship increase FDI inflows on average (*ceteris paribus*). Only the contiguity variable, which indicates the existence of a shared border between two countries, was not significant for the estimation of all countries in the dataset but significant at the 5% level and positive for DTTs involving a developing country. The dummy variable indicating the existence of a bilateral investment treaty (*BITdummy*), however, was omitted in the estimations restricted to DTTs for developing countries. This is due to only two bilateral investment treaties being concluded by the developing countries used in the dataset.⁴

Conclusion and policy recommendations

Developing countries face a trade-off between generating income tax revenue and attracting foreign investments, which has been widely discussed in the existing literature. By signing a tax treaty, source countries lose taxation rights compared to a non-treaty situation but also expect to become more attractive for investments from MNEs due to legal certainty and lower tax rates. However, a sta-

⁴ Only Laos and Myanmar (2007) and Laos and Cambodia (2009) have concluded bilateral investment treaties; thus, the *BITdummy* indicates 1 for only for very few observations.

tistically significant negative correlation of FDI and the conclusion of DTTs was found in this research, indicating that a developing country is most attractive for MNEs in the non-treaty situation.

The most striking finding of this paper is the negative correlation of the *SOURCEindex* with FDI inflows: Not only does the mere conclusion of DTTs reduce a country's attractiveness to FDI but particularly DTTs with a high proportion of source taxation significantly reduce FDI inflows into developing countries (as even higher negative estimates could be found analysing the model with the *SOURCEindex*).

Consequently, the findings suggest that developing countries with the aim to attract foreign investments should rather focus on specifically designed investment promotion policy programmes⁵ instead of DTTs. However, DTTs may be a suitable instrument for pursuing further targets of developing countries such as the generation of new jobs through project business, the attraction of technical knowledge, or scientific exchange. A potential correlation of these factors with the conclusion of DTTs could be evaluated in future research.

Finally, it needs to be noted that this research has certain limitations with regard to the number of countries and years analysed in the gravity model due to limited data availability. Particularly the compilation of dyadic FDI flow data is a challenging task and effects estimated with it need to be interpreted with caution. Consequently, future research with larger datasets is required to confirm or reject the findings of this new approach to assess the influence of certain treaty provisions of DTTs via quantitative indices on FDI.

⁵ These programmes often include opening up sectors to full foreign ownership, establishing investor grievance mechanisms and investor ombudsmen, and standardisation in accessibility and transparency (The World Bank, 2021).

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