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Tax treaties are often seen as a means to mitigate fierce tax competition. Building on former literature, we challenge this view by arguing that taxes on passive income reduce effective average tax rates; and induce neighbouring countries to react by reducing bilateral tax rates. As opposed to traditional tax competition, where every foreign investor would benefit from lower tax rates, we show that countries also engage in cutting tax rates for investors from a particular country, leaving taxes for everyone else unaffected. We call this bilateral tax competition, and we test these predictions empirically. We focus on the four treaty withholding tax rates on passive income - portfolio dividends, participation dividends, interest, and royalties - and collect these rates for 3,000 tax treaties and amending protocols signed between 1930 and 2012. We find a positive relationship in the negotiated withholding tax rates of a destination country's tax treaty and destination country's competitors' past tax treaties with the same source country. This relationship is strongest for the tax rates on interest and royalties.

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1. Introduction

The practice of countries signing double tax treaties (DTTs) goes back a long way in history. Already in 1899, Prussia and Austria-Hungary entered into the first ever double tax treaty. Although the economic consequences of DTTs remain inconclusive (Blonigen and Davies, 2004; Egger et al., 2006; Neumayer, 2007; Petkova, Stasio and Zagler, 2019), the number of countries entering into DTTs continues to grow. While this trend can be characterised, at most, as a steady rise in the first half of the century, the last two decades have seen a surge in the number of concluded double taxation treaties. Nevertheless, the empirical literature on tax treaty formation is limited to just a few studies and leaves certain parts of the international tax treaty policy unexplored. This paper fills this void by studying spillovers in tax treaty formation.

Tax treaties are often seen as a means to mitigate fierce tax competition. We challenge this view by demonstrating in an analytical framework how withholding taxes on passive income reduce effective average tax rates between two countries; and how this will induce a reaction of competing countries, who in turn will reduce their withholding tax rates. Next, we test these theoretical predictions empirically. We focus on the four distinct treaty withholding tax rates on passive income - portfolio dividends, participation dividends, interest, and royalties - and collect these rates for nearly 3,000 tax treaties and amending protocols signed between 1930 and 2012. We find a positive relationship in the negotiated withholding tax rates of a destination country's tax treaty and destination country's competitor's past tax treaties with the same source country. This relationship is strongest for the withholding tax rates on interest and on royalties. We show that this effect

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is strongest for developing countries, whereas the impact of existing treaties with tax havens is surprisingly limited.

Traditionally, double tax treaties have been serving as an important policy tool to promote international economic activity by preventing international double taxation. However, over the years, DTTs have come to pursue additional goals such as providing legal certainty, preventing tax discrimination in the state of investment and exchange of information for tax matters. Most recently, DTTs serve to mitigate tax avoidance practices and protect domestic tax base.

Against these different goals, Ligthart, Vlachaki and Voget (2011) empirically study the determinants of DTT formation for a large sample of more than 17,000 country pairs covering the 1950 - 2006 period. Using a gravity framework, they conclude that countries sign DTTs primarily to reduce international double taxation and, to a lesser extent, to provide a legal instrument for the exchange of information in tax matters. In support of this finding, Davies (2003), argues that the main role of DTCs lies in the harmonisation and the lowering of withholding tax rates on international capital income. OECD countries are encouraged to conclude a double tax convention for limiting the exercise of taxing powers by the destination state. Reciprocity in flows of income and capital is expected to level out any potential loss of taxing powers between such states.

Yet, many researchers argue that double taxation will often be prevented unilaterally (Rixen and Schwarz, 2009; Petkova, Stasio and Zagler, 2019). Moreover, with an asymmetric investment position, the lowering of withholding tax rates in treaties using the ordinary credit method leads to a revenue transfer from the net capital importer to the net capital exporter (Rixen and Schwarz, 2009).

Chisik and Davies (2004) discuss how these distributional implications can affect withholding taxes in the framework of tax treaty bargaining. They predict that more asymmetric countries will conclude treaties with higher withholding tax rates. This theory is then tested using data on U.S. and OECD bilateral tax treaties, and the results broadly support their predictions. Rixen and Schwarz

(2009) confirm this finding using data on German tax treaties and show that these conclusions also hold for the definition of permanent establishment measured as the minimum number of months necessary to qualify as a "construction permanent establishment".

To our knowledge, Barthel and Neumayer (2012) are the only authors to analyse spatial diffusion in tax treaty formation. They show that the probability of two countries entering into a DTT increases with *specific source* and *target contagion*. In other words, the likelihood of two countries signing a tax treaty raises with the source country's peers having a tax treaty with a given target (destination) country and, conversely, target (destination) country's peers having a tax treaty with the specific source country. These results are robust to specifying the spatial weight matrix as common region, export market similarity and export product similarity.

However, little is known about tax treaty bargaining in a global network of tax treaties. At the same time, recent studies by van't Riet and Lejour (2018), Hong (2018) and Petkova, Stasio and Zagler (2019) underscore the importance of considering tax treaties not merely as bilateral, but rather as part of a global network. Whereas the first two papers show that the international FDI flows can be partially explained by countries' position in the tax treaty network, the last one argues that the impact of DTTs on FDI depends on their relevance vis-á-vis the domestic law of the signatory states and all other treaties in the network. This paper fills this void by studying tax treaty bargaining in a global network of tax treaties.

We build on the work of Devereux and Griffith (1999, 2003) and show in a theoretical framework (see Appendix 1) how withholding tax rates on passive income attribute to lower average effective tax rates. Next, we derive countries' best reaction functions and show a positive relationship between the withholding tax rates concluded between a given source and destination state, and between destination country's peers and the same source state. We then test these predictions empir-

ically extending the spatial diffusion framework of Barthel and Neumayer (2012). We focus on the four treaty withholding tax rates on passive income - portfolio dividends, participation dividends, interest, and royalties and find a positive relationship in the negotiated withholding tax rates of a destination country's tax treaty and destination country's competitor's past tax treaties with the same source country.

This relationship is strongest for the withholding tax rates on interest and on royalties. Moreover, our results are robust to interdependence in tax treaty rates; unobservable treaty characteristics; source-country, destination-country, year; source- and destination-region-year fixed effects; sample selection and model specifications testing for alternative definitions of our key explanatory variable.

In extensions of our main analysis, we analyse the differential effects among three groups of countries, i.e. OECD members, developing countries, and tax havens. We note that the effect is strongest for destination countries that are developing countries, whereas existing treaties with tax havens matter little.

Our paper contributes to various strands of research. First, we advance the literature on treaty formation by studying tax treaty bargaining in a global network of tax treaties. Second, we show that spillover effects in international taxation go beyond treaty shopping and profit shifting, and extend to tax treaty policy as such. Finally, we contribute to the broad literature on the political economy of international institutions.

The remainder of the paper is structured as follows: Section 2 summarises the existing literature and motivates our hypothesis. Section 3 discusses our sample and empirical methodology. We present our main results in section 4, extensions in section 5 and several robustness tests in section 6. The paper concludes discussing its policy implications in section 7. A formal model for our hypothesis is derived in Appendix 1.

2. Bilateral tax competition and tax treaty formation

The canonical models of tax competition are those of Wilson (1986) and Zodrow and Mieszkowski (1986) that consider small open economies with strategic interaction. However, as the countries decide on the tax rate on a fully mobile factor and capital is perfectly mobile, a race-to-the-bottom occurs and the tax rate goes down to zero. These models can be seen as a game similar to a Bertrand competition with a high number of countries, whose results correspond to the perfect competition case. In contrast, Wildasin (1988) and Hoyt (1991) concentrate only on a small number of countries, and find that this leads to a higher tax in setting the rates, as they now have a bigger market power.

More recent literature has been able to find evidence for corporate tax competition and strategic interactions between tax rates (see Egger, Pfaffermayr and Winner (2007), Davies and Voget (2008), Devereux, Lockwood and Redoano (2008) and Redoano (2012)). Many papers also identify a positively sloped tax reaction function in the rate setting. Using OECD data from 1982 to 1999, Davies, Egger and Egger (2010) develop a model in which firms simultaneously allocate capital depending on the effective marginal tax rate and profit depending on the statutory tax rate. The authors find evidence of strategic behaviour in the statutory rates.

Further, a positive reaction function for personal and corporate income tax rates is found also in the paper by Egger, Pfaffermayr and Winner (2007). Heinemann, Overesch and Rincke (2010) focus not only on the tax rate cutting decisions but also on the fact how these are affected by the tax rates in neighbouring countries. The authors consider 32 European countries, and find that a country is more likely to decrease its corporate tax rate if its own rate is high, while the one by its neighbours is low.

We extend this literature by considering tax competition in destination countries' taxes on corporate income, in particular withholding tax rates on passive income. In a theoretical framework - presented in the Appendix - we resort to the

seminal model of Devereux and Griffith (1999, 2003) to indicate how countries can manage the effective average tax rate ($EATR$) through their withholding taxes. Next, we derive destination countries' tax reaction function in the same fashion as Davies and Voget (2008) and show that withholding tax rates on passive income are indeed strategic complements. This predicts a positive peer effect in the empirical part of our analysis, as measured by the *peer rate* variable.

Building on these theoretical predictions, our paper makes a novel contribution. Traditional tax competition literature posits the idea that countries underbid each others corporate income tax rates in order to attract mobile capital. This is a rather crude measure, as it also reduces corporate income tax rates for investors that already see higher tax rates at home, thus giving them a windfall profit. In contrast, this paper shows empirically that countries (also) engage in a more subtle form of tax competition. Destination countries employ double tax treaties to bilaterally reduce tax rates for foreign investors from a specific source country, leaving tax rates with respect to all other source countries untouched - a policy which we label bilateral tax competition.

3. Data and empirical methodology

Having derived the slope of destination country's reaction function theoretically (in Appendix 1), we test these predictions empirically focusing on the four distinct treaty withholding tax rates on passive income - portfolio dividends, participation dividends, interest, and royalties. We collect these rates for nearly 3,000 tax treaties and amending protocols signed between 1930 and 2012. We assume a 100% owned subsidiary for the rate on participations dividends and collect interest rates commonly applied on inter-company loans and rates applicable to patent royalties, as to ensure comparability between observations. We collect data on treaties signed, terminated and renegotiated during our time sample. In this way, our key explanatory variable will include the withholding tax rates negotiated between the source country and other destination countries that are in force at

the signature of the observed tax treaty.

We do not make any prior assumptions about the direction of the source-destination relationship of the two signatory countries. While rare, the treaty signatories can negotiate asymmetric withholding tax rates, each responding to their own peers' rates with the intended treaty partner. This is the reason every treaty appears twice in our sample, both between source country A and destination country B, as well as between source country B and destination country A. As we are interested in withholding tax rates applied to the repatriation of profits from the source to the destination country, we will only consider competing destination countries' withholding tax rates. Thus we collect and analyse withholding tax rates for every pair ij and ji.[1]

All of our control variables, including GDP and GDP per capita, as well as the measure of contiguity used to construct the spatial weights matrix in one of the robustness tests come from CEPII (Head, Mayer and Ries, 2010). We construct the indicators of common intermediate and sub-geographical regions in accordance with the most recent UN M49 standard. We estimate a pooled cross section across all years in our sample in the following form:

$$(1)\quad WHT_{ij,t,k} = \alpha + \rho\omega_j\Omega_{im,t-n} + \beta X_{i,j,t} + \gamma D_{ij,t} + \theta_i + \phi_j + \eta_t + \upsilon_{it} + \omega_{jt} + \epsilon$$

where $WHT_{ij,t,k}$ is the negotiated withholding tax rate of type k between source country i and destination country j in year of treaty conclusion t. $\omega_j\Omega_{im,t-n}$ indicates our key explanatory variable, *peer rate*. We construct the *peer rate* variable by interacting the spatial weight matrix of destination country j with the withholding tax rates matrix between source country i and all other potential destination countries $m \neq j$, n years before treaty year t. We take this interaction term n years before treaty conclusion, i.e. before the withholding tax rate of type k

[1]Barthel and Neumayer (2012) discuss the distinction between directed and undirected dyads. Even though we do not model our dyads as directed, we effectively treat them as such, with the *peer rate* variable in this paper corresponding to the *specific target contagion* variable in Barthel and Neumayer (2012).

between source country i and destination country j is being observed, to mitigate the reverse causality between the dependent variable and our key explanatory variable. Past rates can affect the yet to be negotiated ones, but current and future rates do not affect the already signed ones. Hence, we can estimate our model by OLS and there is no need to resort to ML.

Continuing with model description, $X_{i,t-n}$ is a vector of control variables capturing the bargaining position of source and destination state, especially GDP, GDP per capita and a proxy for both countries' treaty policy. $D_{ij,t}$ is a vector of variables characterising the bilateral relationship between source country i and destination country j; θ_i and ϕ_j are source, respectively destination-country fixed effects; η_t is a vector of year dummies; υ_{it} and ω_{jt} are source-region-year, respectively destination-region-year fixed effects; and ϵ is the error term.[2]

We define two countries to be spatially connected if they share the same geographical region at the intermediate level according to the UN M49 standard.[3] Throughout all of the main results, we estimate our model defining the time lag of the *peer rate* variable with $n = 2$. In our robustness tests, we replicate our analysis also with different values of the time lag.

For the proxy for each of the source and destination country tax treaty policy, we use an average withholding tax rate of type k across all previously existing tax treaties of the source and destination country. In this way, our *peer rate* variable measures destination country's response to withholding tax rates negotiated by its peers, conditional on its preferred withholding tax rate. In other words, our key explanatory variable will measure the effect driven by the spatial dimension.[4]

[2]We construct the source-region-year and destination-region year fixed effects at the same regional level as the *peer rate* variable, i.e. intermediate regions. While we acknowledge that source- and destination-year fixed effects would be more desirable, many countries do not conclude more than a single tax treaty in a given year. Thus, country-year fixed effects would take away most of the variation in our dataset.

[3]Intermediate geographical regions are one level above geographical contiguity. Our findings hold also for spatial weight matrixes based on contiguity or sub-global level - one level above intermediate geographical regions.

[4]Ideally, we would like to proxy for source and destination country preferred withholding tax rate through the withholding tax rates levied under both countries' domestic law. Unfortunately, we can obtain these data in a structured format only as of 2005, thereby severely limiting the time span and number of observations in our analysis. In light of these considerations, we decided to proxy for source and

4. Main results

We estimate our model using only control variables in Table 1. This will serve as a benchmark for the estimations including our key variable of interest. We find that the unweighted average rates across all former treaties signed by source and destination countries is a good predictor for the negotiated withholding tax rates on interest and royalties. The negative coefficients on the source and destination country GDP per capita in the case of withholding tax rates on participations dividends (Column (2)) and royalties (Column (4)) suggest that wealthier countries tend to negotiate lower rates. However, the magnitude of these effect is not large.

We present the full model in Table 2 including all of our control variables and both the unweighted country average withholding tax rates as well as our key explanatory variable. The *peer rate* variable is statistically significant and positive for each type of the withholding tax rate, with the *peer rate* on interest and royalties continuously showing significance at the 1% level. While the source-country's average tax rate is no longer significant for any of the four types of withholding tax rates, the destination country's average tax rate is statistically significant and positive for all rates excluding portfolio dividends. Thus, destination countries' tax treaty policy - as proxied by the average withholding tax rate across all of their previously concluded tax treaties - is a relevant determinant of future negotiations about withholding tax rates. Destination countries that achieved higher withholding tax rates in the past, will continue to negotiate higher withholding tax rates. Furthermore, we continue to observe that the negotiated withholding tax rates increase with destination country's GDP, but decrease with its GDP per capita in the case of royalties.

We interpret these results as indicating tax competition in negotiated withholding tax rates on passive income. Destination countries react to other countries'

destination countries' treaty policy through their past average rates and trace bilateral tax competition over a long period of time.

past tax treaties with the same treaty partner by negotiating lower withholding tax rates with the aim of attracting source-country's mobile capital. This effect goes beyond destination-country's treaty policy and is driven by a geographical dimension. A different - though not exclusive - interpretation of these results is that past tax treaties impose a downward pressure on future tax treaties' withholding tax rates. This spillover effect clearly limits the scope for destination countries' individual treaty policy. This results is statistically robust in the presence of a rich set of fixed effects, including source- and destination-country fixed effects; year fixed effects; and source-region-year and destination-region-year fixed effects.

We continue the analysis addressing the possible interdependence between tax treaties' withholding tax rates. It cannot be excluded that when countries negotiate a double taxation agreement, they agree on a set of withholding rates, rather than on each of them individually. To explore this possibility, we replace the four distinct types of withholding tax rates with their average in Table 3, Column (1); and with the minimum of the four rates in Table 3, Column (2).[5] We find results that are in line with the main results presented in Table 2. In both cases, the *peer rate* is highly significant at the 1% level. Yet, the magnitude of the *peer rate* is on the lower bound and closer to that of portfolio and participation dividends if we use average withholding tax rates (column 1). Meanwhile the *peer rate* approaches the average between the lower bound estimates and higher bound estimates (interest and royalties) when using the minimum withholding tax rate (column 2).

Throughout the main analysis, we assume taxation of participation dividends at the treaty-rate of portfolio dividends, if the former is not negotiated. In Table 3, Column (3) we limit the analysis only to tax treaties that include a negotiated withholding tax rate on participation dividends. The results are statistically

[5]Note that average *peer rate* across the four separate withholding tax rates is different from the source- and destination-country average rates across all of their treaties, but for each type of withholding tax rate separately.

significant, albeit only at the 10% significance level. However, we note that the sample size drops more than half.

Finally, it is not only possible that countries negotiate a set of withholding tax rates, but negotiate their tax rates conditional on other provisions included in the tax treaty. For instance, destination countries may negotiate more aggressively if the tax treaty includes strong provisions on exchange of information for tax purposes and mutual assistance in tax matters. While limiting the withholding tax rates, such a treaty could potentially increase destination-countries tax base to profits that would otherwise escape taxation. Since accurate data on other treaty characteristics is not possible at this scale, we choose a different approach.

We pool the four separate withholding tax rates on passive income into a single sample. In doing so, our sample includes now four observations per tax treaty, which allows us to add to our analysis a tax treaty fixed effect. This fixed effect will control for any unobserved heterogeneity in tax treaty characteristics, including the presence, scope and strength of individual provisions; as well as any country-year characteristics. We further adapt our model by including dummies for observations of participation dividends, interest and royalties, and interaction terms between each of them and the *peer rate* variable. Thus we are able to see the differential effect compared to portfolio dividends.

We note several interesting results. First, the dummies for participation dividends, interest and royalties, are all statistically significant at the 1% level and negative indicating that these rates tend to be lower than the withholding tax rates on portfolio dividends. This effect is strongest for participation dividends and interest rates. Second, the *peer rate* variable is still highly significant and positive pointing to statistically robust tax competition in negotiated withholding tax rates on passive income. Interestingly, the interaction terms suggest that there is no additional effect on participation dividends. In contrast, we observe a strong differential effect in the case of interest and royalties, with the sign of the interaction terms suggesting fiercer tax competition on those rates. These results

are in line with the higher magnitude of the *peer rate* variable in the case of interest and royalties withholding tax rates in Table 2. Finally, we note that both the source and destination-country average rate across all of their former treaties are now highly significant and much larger in magnitude than before. We interpret these findings as indicating that individual countries' treaty policy extends to all treaty aspects and countries negotiate their rates conditional on achieving other treaty policy goals.

5. Extensions

We extend our main analysis in three directions. First, we investigate the position of three distinct groups of countries in tax competition on negotiated withholding tax rates on passive income, namely: OECD countries, developing countries and tax havens. Second, we analyse the network effect of source and destination countries having signed tax treaties with tax havens in their treaty networks, thus other than the observed tax treaty. Third, we allow the spillover effect from past treaties to vary with their age.

We add to our main model dummy variables taking the value of unity for OECD source-country, OECD destination-country, and OECD country-pair in Table 4, Columns (1) to (4), and also their individual interaction terms with the *peer rate* variable in Columns (5) to (8). We note, somehow surprisingly, that destination countries, including OECD members, negotiate higher rates on participation dividends if the source country is an OECD member. This could be either due to the generosity of OECD countries, or because these DTTs are typically older and therefore exhibit higher rates.[6] In contrast, OECD country-pairs agree on lower withholding tax rates on royalties. Once we account for the different interaction terms, the results suggest that OECD countries tend to both negotiate lower withholding tax rates portfolio dividends, interest and royalties;

[6]For example, a closer look at the dataset reveals several cases of primarily Scandinavian countries agreeing on higher destination country withholding tax rates (especially if the destination country is a less developed one), while unilaterally lowering their own withholding tax rates.

and drive destination-country tax competition, except for withholding tax rates on royalties, where the average effect of *peer rate* is still significant.

We repeat this exercise for developing countries instead of OECD members in Table 5. We define countries as developing if they are not in the upper-middle or high-income groups according to the World Bank. Destination countries tend to conclude higher withholding tax rates on interest and royalties income when the source country is a developing one. However, when both the source and the destination state is a developing country, the negotiated withholding tax rates are lower on portfolio dividends, interest and royalties. Nevertheless, we stress that the magnitude of these effects is small. Somehow surprisingly, the interaction terms point to a fiercer tax competition if the source state is a developing country. More interestingly, we observe a strong differential effect in the case withholding tax rates on interest and royalties whenever the destination state is a developing country.

In contrast to the previous two tables, we see little impact of tax havens in Table 6. Neither the dummy for tax haven pairs (note that source and destination tax haven dummies are both absorbed by the fixed effects), nor the interaction terms suggest any differential effect of tax havens countries. The noticeable exception is the strong result on withholding tax rates on interest income when both source and destination state are tax havens.

We account for all three groups of countries in Table 7. In particular, we extend the main model with dummies for OECD destination, source states and pairs; developing destination and source countries and pairs; tax haven pairs; and their interaction terms of the *peer rate*. In a nutshell, we note that tax competition in negotiated withholding tax rates is primarily driven by OECD country-pairs (in the case of interest and royalties); and destination states that are developing countries (all types of passive income except participation dividends). In contrast, tax havens matter little, except for withholding tax rates on interest income when both states are classified as tax havens.

Our second set of extensions focuses of the network effect of source and destination countries having signed tax treaties with tax havens in its treaty network. We add two dummies to our model taking the value of unity if the source state, respectively the destination state, have concluded a treaty with any tax haven prior to concluding the observed treaty with a given source state in Table 8, Columns (1) to (4) and their interaction terms with the *peer rate* in Columns (5) to (8). We note the statistically significant and positive interaction terms on the destination country in the case of interest and royalties and a statistically significant, but negative coefficient on the destination country dummy for participation dividends and royalties income. We interpret these results as suggesting that destination countries that have concluded a treaty with a tax haven prior to the observed treaty, are more aggressive, compete fiercer, and negotiate lower withholding tax rates.

In Table 9, we replace the dummy with a variable indicating the numbering of treaties concluded with tax havens in the source-, respectively destination-country's treaty network. The statistically significant results are now limited to the withholding tax rates on interest and royalties income. We interpret these results in twofold: in line with Table 8, the statistically significant results on the destination country suggest that destination countries that have concluded a treaty with a tax haven prior to the observed treaty, are more aggressive, compete fiercer, and negotiate lower withholding tax rates. Moreover, source countries with tax haven-treaties in their network induce fiercer competition for the conduit capital flowing through these countries from the tax havens.

We conclude the second set of extensions by replacing the tax haven treaties network variable, with the average withholding tax rate concluded by the source-state, respectively the destination-state in their tax treaties with tax havens. The results of the dummies and the interaction terms are again consistent. Destination countries that have higher (lower) negotiated withholding tax rates with tax havens, negotiate higher (lower) withholding tax rates in their observed tax

treaties. Simultaneously, the same destination countries compete much fiercer on their negotiated withholding tax rates on portfolio dividends and interest income.

Our final extension of the main models allows the spillover effect from past treaties to vary with their age. We speculate that more recent treaties concluded by a given destination country's geographical peers may be more relevant as a benchmark to compete against than older tax treaties concluded by the same peers. To this end, we adapt our empirical specification by weighting our *peer rate* variable inversely by the number of years each of the past treaties has been been in force in the signature year of the observed tax treaty. Table 11 presents these results. While we do not notice many differences with the baseline results presented in Table 2, the *peer rate* on both portfolio and participation dividends is now statistically significant at the 1% level, and slightly higher in magnitude. In contrast, the estimates on interest and royalties income are not slightly lower in magnitude, whilst continue to be statistically significant at the 1% level.

6. Robustness tests

We perform a number of robustness tests in Tables 12 to 17 to ensure that our results are not driven by the chosen value of the time lag and are independent of the geographical level of the analysis. First, we alternate the time dimension of the *peer rate*, taking the *peer rate* values 3, 4 or 5 years before the treaty year t in Tables 12 to 14. We note that the *peer rate* on portfolio dividends is no longer significant and that of participation dividends remains statistically significant only for *peer rate* values lagged by 3 years. However, the results on interest and royalties withholding tax rates remain significant across all tested values of the time lag.

In Tables 15 and 16 we change the definition of spatially connected countries to common sub-region (Table 15) and contiguity (Table 16).[7] We find fairly identical

[7]Contiguity, defined as countries sharing a common border, is one geographical level below intermediate regions. Sub-regions are one geographical level above intermediate regions.

estimates to our main results assuming common sub-regions in Table 15. The *peer rate* variable is positive and statistically significant for each of the withholding tax rate types. When we restrict the spatial dimension of the *peer rate* only to neighbouring countries in Table 16, the *peer rate* is no longer significant in the case of portfolio and participation dividends. We continue to observe strong correlation between the *peer rate* and the negotiated withholding tax rates in the case of interest and royalties.

In Table 17, we address another concern. Since negotiated withholding tax rates are observable only for country-pairs with a signed tax treaty, our sample is subject to sample selection. We verify that this restriction does not bias our results by estimating the Heckman sample selection model. We construct the first stage sample by including all country-pairs with a tax treaty in its year of signature, and for the remaining country pairs the observation for the final year in our sample, i.e. 2012. In this way, we allow countries maximum time to conclude a double taxation agreement. For country pairs with multiple tax treaties, we keep only the most recent one. We satisfy the exclusion restriction by including common language as predictor of tax treaty formation in the first stage, but not as of negotiating withholding tax rates.[8] Once we control for sample selection, we observe highly significant and positive correlations between *peer rate* variable and each of the withholding tax rates. Thus, we are confident that our main results are not driven by sample selection.

Finally, we construct placebo *peer rates* assigning countries a random intermediate region and thereby changing its peers.[9] We take 200 random draws and show in Figure 1 the distribution of the t-statistics of the placebo *peer rates* for each of the withholding tax rates across all 200 random draws. We find that the

[8]Ligthart, Vlachaki and Voget (2011) show that common language is a strong predictor of two countries signing a tax treaty. We verify that common language does not influence negotiated withholding tax rates by including this variable as an additional regressor in our main model. Indeed, we find no correlation with our dependent variable - results available upon request.

[9]Since our main results hold using a spatial lag defining similarity at the sub region - see also Table 15 - we condition the random draw on countries being assigned an intermediate region within different world regions that are methodologically equivalent to continents.

peer rate variable is statistically significant in less than 5% of the draws (10% in the case of *peer rate* on interest withholding tax rate). The number of statistically significant, negative *peer rates* varies around 10% for each of the types, with the number of insignificant *peer rates* being more than 80% for all but interest withholding tax rates. Moreover, we note that none of the draws results in all four *peer rate* estimates to be individually statistically significant at the same time.[10] With these results, we are confident that our main results are unique to the real-world distribution of countries across the globe.

7. Conclusions

It has long been established that countries engage in tax competition for internationally mobile capital by setting their corporate income tax rates below their competitors (Wilson, 1986; Zodrow and Mieszkowski, 1986). This paper argues that countries also engage in bilateral tax competition by reducing total repatriation taxes on profits for investors from a particular (source) country of residence, holding all other total repatriation taxes unchanged. We have called this phenomenon bilateral tax competition.

This paper gives ample empirical evidence for the existence of bilateral tax competition. We look at the evolution of withholding tax rates on dividends, interest and royalties (the bilateral component of total repatriation taxes) contained in approximately 3000 double tax treaties signed since 1930. We find - in line with the standard tax competition literature - that withholding tax rates have fallen over time, as previous reductions in withholding tax rates of a country lead to further reductions in new or amended double tax treaties of that country.

More importantly, this paper also demonstrates bilateral tax competition, as countries will further reduce their withholding tax rates if their peers (or competitors) have reduced their withholding tax rates previously. Surprisingly, the strongest effects are not measured from tax havens, and not even among OECD

[10] Results available upon request.

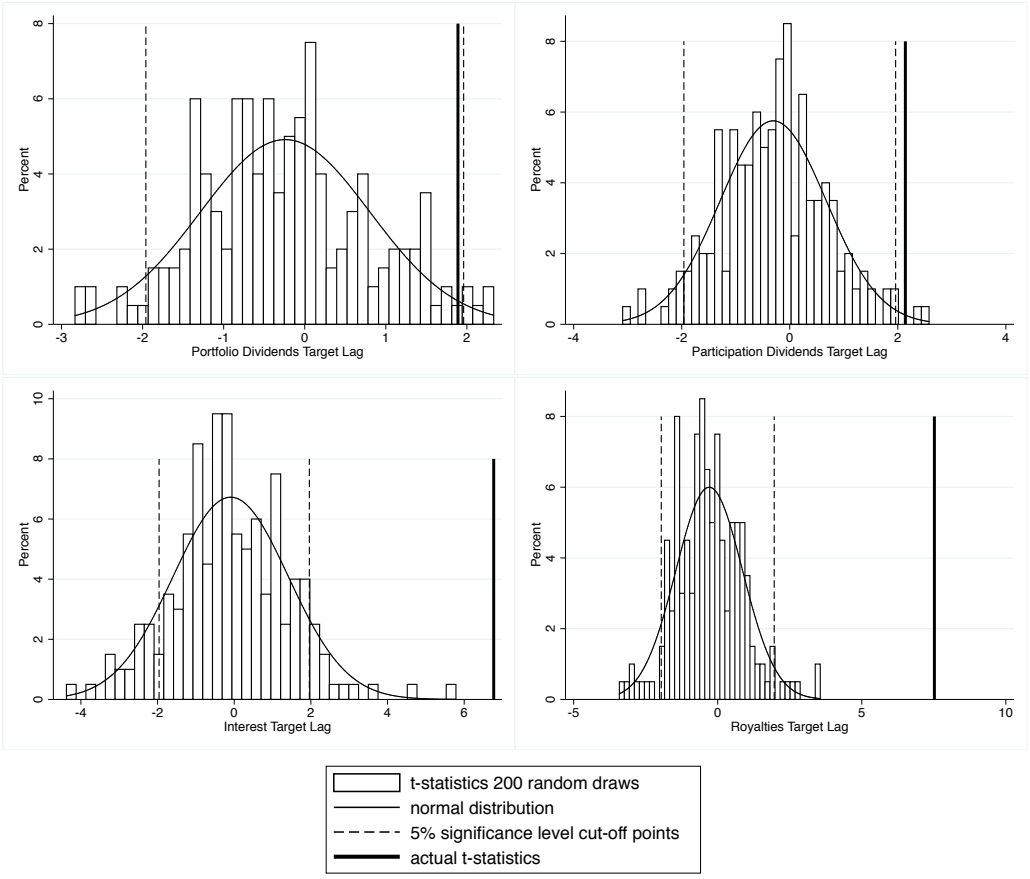

Figure 1: T-statistics placebo peer rates

Note: Distribution of t-statistics of 200 placebo peer rates indicated by bars. Normal distribution indicated by solid curve. The 5% significance level cut-off points and estimation sample t-statistics indicated by dashed, respectively solid, vertical lines.

countries - who otherwise maintain that competition is a force for the good - but rather between developing countries, who apparently compete fiercely over scarce global investment capital. Double tax treaties are not a means to eliminate double taxation, but rather an instrument of bilateral tax competition, which is avidly used around the world.

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Appendix I

Devereux and Griffith (1999, 2003) define $EATR$ for an international investment as:

$$T_l = \frac{R_l^* - R_l}{E(1+\psi_l)p_l(1+i)^{-1}} \tag{2}$$

where R_l^* is the pre-tax economic rent; R_l is the net present value of the economic rent generated by the perturbation of the subsidiary's capital stock; E is the expected exchange rate in period $t+1$; ψ_l is the expected inflation in location l; p represents the financial return; and i is the nominal interest rate in the presence of tax.

The net present value of the economic rent generated by the perturbation of the subsidiary's capital stock, R_l is defined as the sum of: (i) the rent attributable to the investment in the subsidiary financed by the retained earnings (R_l^{RE}); (ii) the additional cost of the parent raising external finance in the source county h (F_h); and (iii) the additional cost of the subsidiary of raising finance from the parent (F_l). Thus, the economic rent earned from an investment by the subsidiary is given by:

$$R_l = R_l^{RE} + F_h + F_l \tag{3}$$

where only R_l^{RE} and F_l depend on cross-border taxes. From Eqs. (2) and (3) it follows that:

$$T_l = \frac{R_l^* - R_l^{RE} - F_h - F_l}{E(1+\psi_l)p_l(1+i)^{-1}} \tag{4}$$

In accordance with Devereux and Griffith (1999, 2003), we define finance from

retained earnings as

$$
\begin{aligned}
R_l^{RE} &= -\gamma(1-\sigma_{hl})(1-A) \\
&\quad + \frac{\gamma(1-\sigma_{hl})}{(1+\rho)}\{E(1+\psi_l)(p_l+\delta)(1-\tau_l) + E(1+\psi_l)(1-\delta)(1-A_l)\}
\end{aligned} \tag{5}
$$

where γ is a term measuring the tax discrimination between new equity and distributions; A is the new present value of tax allowances per unit of investment; ρ is the ultimate shareholder's nominal discount rate; δ is the economic depreciation rate. Most importantly, σ_{hl} is the overall tax rate on dividend payments from the subsidiary located in country l to the parent resident in country h, which in turn, depends on the applicable withholding tax rate in the destination country l and the applicable method of double tax relief in the source country of the parent h.

F_l depends on the source of subsidiary finance: retained earnings, new equity and debt. In particular (with φ standing for tax depreciation),

$$
F_l(retained\ earnings) = 0 \tag{6}
$$

$$
F_l(new\ equity) = \frac{\gamma\sigma_{hl}}{(1+\rho)}(1-\varphi_l\tau_l)[E-(1+\rho)] \tag{7}
$$

$$
F_l(debt) = \frac{\gamma(1-\varphi_l\tau_l)}{(1+\rho)}\{\sigma_{hl}[E(1+i(1-\tau_l))-(1+\rho)] - E\omega_{hl}i\} \tag{8}
$$

Similarly to σ_{hl}, $\omega_{hl}i$ is the overall tax rate on interest payment from the subsidiary to the parent that depends on the withholding tax rate in the country of the subsidiary l and methods of double tax relief in the source country of the parent h.

Assuming a constant exchange rate E, it can be shown that R_l^{RE} and F_l both decrease with the applicable withholding tax rate of the destination country l.

Formally,

$$(9)\quad \frac{\partial R_l^{RE}}{\partial \sigma_{hl}} = -\frac{\gamma}{(1+\rho)}\{E(1+\psi_l)(p_l+\delta)(1-\tau_l)+E(1+\psi_l)(1-\delta)(1-A_l)\} < 0$$

$$(10)\quad \frac{\partial F_l(new\ equity)}{\partial \sigma_{hl}} = \frac{\gamma}{(1+\rho)}(1-\varphi_l\tau_l)[E-(1+\rho)] < 0$$

$$(11)\quad \frac{\partial F_l(debt)}{\partial \omega_{hl}} = -\frac{\gamma E i(1-\varphi_l\tau_l)}{(1+\rho)} < 0$$

Thus, a reduction in destination country's l withholding tax rate on dividends decreases its $EATR$ on inbound foreign investments financed out of retained earnings and new equity.[11] A reduction in destination country's l withholding tax rate on interest payments decreases its $EATR$ on inbound foreign investments financed by debt. Moreover, as long as the personal taxes in the residence country on capital gains are equal to or higher than the personal taxes in the residence country on interest income, a reduction in destination country's l withholding tax rate on dividends decreases also the $EATR$ of a subsidiary financed by debt.[12]

This implies a strategic complementarity of withholding tax rates. In other words, destination countries can compete for inbound foreign investment by re-

[11] Note that when a tax treaty between destination country l and source country h is signed in period t, it becomes effective only in period $t+1$. Hence, the first term of Eq. (9) is not relevant for its derivative. If we disregard the timing of the tax treaty, the theoretical predictions hold unambiguously for a greenfield investment not financed out of retained earnings.

[12] Formally,

$$(12)\quad \frac{\partial F_l(debt)}{\partial \sigma_{hl}} = \frac{\gamma(1-\varphi_l\tau_l)}{(1+\rho)}[E(1+i(1-\tau_l))-(1+\rho)] < 0,$$

with

$$(13)\quad \rho = \frac{(1-m^i)i}{1-\zeta},$$

where m^i is the residence country's personal tax rate on interest income; and ζ is the residence country's personal tax rate on capital gains.

ducing their withholding tax rates.

Next, we want to see how the $EATRs$ driven by a change in the withholding tax rates affect the locational choices of countries. Following Davies and Voget (2008), each firm locates in the region offering it the greatest equilibrium profits. Similar to the derivation of the Logit estimator (see Green (2007)), the probability that any given firm n locates in foreign location l among the set of possible foreign locations K (denoted L_l) is:

$$L_l = \frac{exp[(1-T_l)\tilde{\Pi}_l]}{\sum_{m=1}^{K} exp[(1-T_k)\tilde{\Pi}_m]}, \tag{14}$$

with $\tilde{\Pi}_l$ and $\tilde{\Pi}_m$ standing for the equilibrium gross profits in countries l and m respectively. Differentiating with respect to country's l effective average tax rate T_l and country's m effective average tax rate T_m yields:

$$\frac{\partial L_l}{\partial T_l} = (L_l - 1)P_l\tilde{\Pi}_l < 0 \tag{15}$$

$$\frac{\partial L_l}{\partial T_k} = L_l L_k \tilde{\Pi}_k > 0 \tag{16}$$

i.e. the probability of country l hosting firm n falls with its own effective average tax rate T_l and increases with the other country $k's$ effective average tax rate T_k.

Aggregating across the large number of firms implies that (in expected value) the equilibrium number of firms that location l hosts is L_l and its tax revenues are:

$$T_l L_l N \tilde{\Pi}_l \ , \tag{17}$$

where N is the total number of firms.

Governments simultaneously choose tax rates in order to maximise their own tax revenues. For country l, this yields an optimal value of tax:

$$T_l = (1 - L_l)^{-1}\tilde{\Pi}_l^{-1} \ , \tag{18}$$

where L_l depends on the tax rates of all countries m. From this, the best reaction function for country l with respect to the tax rate of country $k \neq l$ can be defined as:

$$\frac{\partial T_l}{\partial T_k} = \frac{L_l L_k \tilde{\Pi}_k}{(1 - L_l)^2 \tilde{\Pi}_l} > 0 \tag{19}$$

which indicates that tax rates are strategic complements.

Table 1: Control Variables

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_avg	-0.0782	-0.0627	0.137**	0.126**
	(0.0652)	(0.0590)	(0.0535)	(0.0501)
destination_avg	0.0655	0.151**	0.147***	0.169***
	(0.0635)	(0.0603)	(0.0568)	(0.0507)
LNgdp_source	-0.0151	0.0151	0.00650	0.0112
	(0.0117)	(0.00917)	(0.00851)	(0.00941)
LNgdp_destination	-0.00311	0.0241***	0.00919	0.0122
	(0.0117)	(0.00884)	(0.00850)	(0.00940)
LNgdpcap_source	0.00867	-0.0162*	-0.00694	-0.0161*
	(0.0115)	(0.00880)	(0.00827)	(0.00926)
LNgdpcap_destination	0.00297	-0.0208**	-0.00982	-0.0170*
	(0.0114)	(0.00846)	(0.00820)	(0.00927)
Observations	4,336	4,404	4,396	4,493
R-squared	0.682	0.728	0.758	0.740
Source FE	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Column 1); Participation Dividends (Column 2); Interest (Column 3); and Royalties (Column 4). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 2: Main Results - Pere Rate

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
peer_rate	0.0476*	0.0513**	0.170***	0.189***
	(0.0252)	(0.0240)	(0.0252)	(0.0251)
source_avg	-0.0394	-0.0567	0.123	0.124
	(0.0928)	(0.0878)	(0.0885)	(0.0782)
destination_avg	0.0620	0.186**	0.187**	0.149**
	(0.0804)	(0.0786)	(0.0735)	(0.0607)
LNgdp_source	-0.00981	0.0154	0.0102	0.0126
	(0.0154)	(0.0117)	(0.0107)	(0.0131)
LNgdp_destination	-0.00171	0.0183*	0.00805	0.0251**
	(0.0130)	(0.00998)	(0.00939)	(0.0103)
LNgdpcap_source	-0.00269	-0.0176	-0.0135	-0.0209
	(0.0150)	(0.0111)	(0.0103)	(0.0128)
LNgdpcap_destination	0.00168	-0.0132	-0.00794	-0.0275***
	(0.0126)	(0.00940)	(0.00910)	(0.0103)
Observations	3,060	3,114	3,111	3,213
R-squared	0.699	0.746	0.786	0.774
Source FE	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Column 1); Participation Dividends (Column 2); Interest (Column 3); and Royalties (Column 4). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 3: Main Results - Withholding Tax Rates

	(1) Average WHT	(2) Minimum WHT	(3) Reduced Part. Div.	(4) Treaty FE
peer_rate	0.0578***	0.109***	0.0699*	0.102***
	(0.0206)	(0.0223)	(0.0370)	(0.0183)
part.div_dum				-0.0115***
				(0.00221)
interest_dum				-0.0114***
				(0.00259)
royalties_dum				-0.00716***
				(0.00265)
peer_rate*part.div_dum				0.0130
				(0.0164)
peer_rate*interest_dum				0.128***
				(0.0202)
peer_rate*royalties_dum				0.104***
				(0.0200)
source_avg	0.0823	0.0217	0.133	0.380***
	(0.0630)	(0.0821)	(0.169)	(0.0215)
destination_avg	0.0753	0.180**	0.240*	0.550***
	(0.0570)	(0.0740)	(0.137)	(0.0225)
LNgdp_source	0.00347	0.00892	0.00574	
	(0.00835)	(0.00934)	(0.0201)	
LNgdp_destination	0.0143*	0.0185**	0.0360**	
	(0.00748)	(0.00827)	(0.0153)	
LNgdpcap_source	-0.00973	-0.0159*	-0.00337	
	(0.00816)	(0.00918)	(0.0183)	
LNgdpcap_destination	-0.0137*	-0.0204**	-0.0281*	
	(0.00731)	(0.00808)	(0.0146)	
Observations	3,275	3,275	1,362	14,402
R-squared	0.806	0.792	0.802	0.748
Source FE	YES	YES	YES	NO
Destination FE	YES	YES	YES	NO
Year FE	YES	YES	YES	NO
SourceRegion*Year FE	YES	YES	YES	NO
DestinationRegion*Year FE	YES	YES	YES	NO
Treaty FE	NO	NO	NO	YES

Note: Dependent variable: Average treaty withholding tax rate (Column 1); Minimum treaty withholding tax rate (Column 2); Reduced withholding tax rate on Participation Dividends (Column 3); and Treaty withholding tax rates (Column 4). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 4: Extensions - OECD Countries

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties	(5) Port. Div.	(6) Part. Div.	(7) Interest	(8) Royalties
peer_rate	0.0458*	0.0466*	0.169***	0.185***	0.0241	-0.00335	-0.0182	0.0683*
	(0.0252)	(0.0242)	(0.0252)	(0.0251)	(0.0376)	(0.0372)	(0.0404)	(0.0387)
oecd_source	-0.00917	0.0105**	-0.00528	0.000145	-0.0150*	0.00778	-0.0127*	-0.00281
	(0.00632)	(0.00506)	(0.00544)	(0.00552)	(0.00889)	(0.00621)	(0.00693)	(0.00695)
oecd_destination	-0.0116*	0.00940*	-0.00284	-0.00300	-0.0165*	0.00133	-0.0225***	-0.0195***
	(0.00606)	(0.00500)	(0.00571)	(0.00535)	(0.00867)	(0.00662)	(0.00661)	(0.00675)
oecd_pair	-0.00441	-0.00793**	-0.00503	-0.00954***	0.0121	-0.00316	-0.00931	-0.0174***
	(0.00360)	(0.00316)	(0.00320)	(0.00321)	(0.0127)	(0.00692)	(0.00629)	(0.00606)
peer_rate*oecd_source					0.0539	0.0342	0.107**	0.0134
					(0.0543)	(0.0476)	(0.0486)	(0.0481)
peer_rate*oecd_destination					0.0439	0.105*	0.221***	0.160***
					(0.0535)	(0.0564)	(0.0432)	(0.0411)
peer_rate*oecd_pair					-0.130	-0.0613	0.105	0.209***
					(0.0933)	(0.0809)	(0.0643)	(0.0676)
source_avg	-0.0420	-0.0520	0.126	0.130*	-0.0436	-0.0687	0.0746	0.0906
	(0.0933)	(0.0880)	(0.0896)	(0.0790)	(0.0943)	(0.0887)	(0.0864)	(0.0785)
destination_avg	0.0480	0.190**	0.181**	0.143**	0.0483	0.185**	0.196***	0.157**
	(0.0809)	(0.0787)	(0.0743)	(0.0618)	(0.0810)	(0.0790)	(0.0731)	(0.0614)
LNgdp_source	-0.0112	0.0138	0.00913	0.0104	-0.0115	0.0140	0.00767	0.00966
	(0.0155)	(0.0117)	(0.0107)	(0.0131)	(0.0156)	(0.0118)	(0.0105)	(0.0128)
LNgdp_destination	-0.00262	0.0178*	0.00718	0.0241**	-0.00255	0.0181*	0.00665	0.0208**
	(0.0130)	(0.00996)	(0.00940)	(0.0104)	(0.0130)	(0.00999)	(0.00935)	(0.0104)
LNgdpcap_source	-0.000926	-0.0166	-0.0121	-0.0187	-0.000555	-0.0172	-0.0123	-0.0186
	(0.0151)	(0.0110)	(0.0103)	(0.0129)	(0.0152)	(0.0112)	(0.0100)	(0.0125)
LNgdpcap_destination	0.00337	-0.0132	-0.00666	-0.0260**	0.00320	-0.0141	-0.00549	-0.0223**
	(0.0125)	(0.00939)	(0.00912)	(0.0103)	(0.0125)	(0.00944)	(0.00907)	(0.0103)
Observations	3,060	3,114	3,111	3,213	3,060	3,114	3,111	3,213
R-squared	0.700	0.747	0.787	0.775	0.700	0.748	0.795	0.781
Source FE	YES	YES	YES	YES	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Columns 1 & 5); Participation Dividends (Columns 2 & 6); Interest (Columns 3 & 7); and Royalties (Columns 4 & 8). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 5: Extensions - Developing Countries

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties	(5) Port. Div.	(6) Part. Div.	(7) Interest	(8) Royalties
peer_rate	0.0480*	0.0472*	0.126***	0.213***	-0.0567	-0.0427	-0.0765*	0.0346
	(0.0290)	(0.0247)	(0.0266)	(0.0279)	(0.0451)	(0.0444)	(0.0450)	(0.0426)
dev_source	0.00203	-0.00256	0.00910*	0.00953*	-0.0104	-0.0101	-0.00201	-5.53e-05
	(0.00606)	(0.00462)	(0.00536)	(0.00551)	(0.00910)	(0.00637)	(0.00717)	(0.00712)
dev_destination	-0.00706	-0.00850	0.00959*	0.00672	-0.0166*	-0.0148**	-0.0128*	-0.0203***
	(0.00628)	(0.00605)	(0.00520)	(0.00523)	(0.00939)	(0.00749)	(0.00699)	(0.00687)
dev_pair	-0.00916***	-0.00464	-0.0136***	-0.0112***	-0.0133	-0.00281	-0.0106	-0.00566
	(0.00347)	(0.00310)	(0.00302)	(0.00311)	(0.0107)	(0.00664)	(0.00652)	(0.00647)
peer_rate*dev_source					0.114*	0.104*	0.122**	0.0685
					(0.0595)	(0.0559)	(0.0526)	(0.0512)
peer_rate*dev_destination					0.0832	0.0772	0.241***	0.277***
					(0.0567)	(0.0550)	(0.0488)	(0.0483)
peer_rate*dev_pair					0.0282	-0.00960	0.0228	0.0370
					(0.0816)	(0.0752)	(0.0661)	(0.0695)
source_avg	-0.195*	-0.135	-0.0337	0.0460	-0.203*	-0.130	-0.00713	0.0426
	(0.118)	(0.0922)	(0.107)	(0.102)	(0.116)	(0.0920)	(0.107)	(0.105)
destination_avg	0.243***	0.239***	0.0369	0.0697	0.244***	0.233***	0.0330	0.0672
	(0.0906)	(0.0891)	(0.0823)	(0.0718)	(0.0906)	(0.0891)	(0.0809)	(0.0697)
LNgdp_source	-0.00247	0.0162	0.0116	0.0267*	0.00112	0.0172	0.0168	0.0278**
	(0.0161)	(0.0120)	(0.0113)	(0.0143)	(0.0166)	(0.0122)	(0.0113)	(0.0138)
LNgdp_destination	-0.0165	0.00173	0.0103	0.0309***	-0.0165	0.00218	0.0104	0.0306***
	(0.0134)	(0.0106)	(0.00954)	(0.0109)	(0.0133)	(0.0106)	(0.00937)	(0.0108)
LNgdpcap_source	-0.00813	-0.0194*	-0.0171	-0.0332**	-0.0119	-0.0207*	-0.0236**	-0.0354***
	(0.0154)	(0.0111)	(0.0105)	(0.0137)	(0.0159)	(0.0113)	(0.0106)	(0.0133)
LNgdpcap_destination	0.00788	-0.00434	-0.0129	-0.0354***	0.00743	-0.00564	-0.0128	-0.0333***
	(0.0128)	(0.00960)	(0.00910)	(0.0107)	(0.0127)	(0.00963)	(0.00897)	(0.0107)
Observations	2,565	2,588	2,611	2,655	2,565	2,588	2,611	2,655
R-squared	0.698	0.731	0.762	0.740	0.700	0.732	0.771	0.748
Source FE	YES	YES	YES	YES	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Columns 1 & 5); Participation Dividends (Columns 2 & 6); Interest (Columns 3 & 7); and Royalties (Columns 4 & 8). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 6: Extensions - Tax Havens

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties	(5) Port. Div.	(6) Part. Div.	(7) Interest	(8) Royalties
peer_rate	0.0477*	0.0508**	0.170***	0.189***	0.0375	0.0492**	0.168***	0.191***
	(0.0252)	(0.0240)	(0.0252)	(0.0251)	(0.0261)	(0.0245)	(0.0255)	(0.0257)
haven_pair	0.00176	-0.00995	0.00559	-0.00784	-0.0297	-0.0379**	-0.0370***	-0.0342
	(0.0142)	(0.0124)	(0.0115)	(0.00868)	(0.0233)	(0.0167)	(0.0136)	(0.0243)
peer_rate*haven_source					0.121	0.121	0.0634	-0.0288
					(0.103)	(0.0880)	(0.0995)	(0.102)
peer_rate*haven_destination					0.0584	-0.0949	-0.00572	-0.0312
					(0.0929)	(0.0964)	(0.106)	(0.0820)
peer_rate*haven_pair					0.490	0.469	0.476***	0.266
					(0.298)	(0.320)	(0.174)	(0.224)
source_avg	-0.0395	-0.0554	0.122	0.124	-0.0341	-0.0582	0.117	0.124
	(0.0929)	(0.0879)	(0.0885)	(0.0782)	(0.0930)	(0.0879)	(0.0885)	(0.0784)
destination_avg	0.0618	0.188**	0.185**	0.149**	0.0668	0.183**	0.184**	0.150**
	(0.0805)	(0.0786)	(0.0734)	(0.0607)	(0.0807)	(0.0787)	(0.0734)	(0.0609)
LNgdp_source	-0.00982	0.0155	0.0102	0.0127	-0.00894	0.0159	0.0108	0.0126
	(0.0154)	(0.0117)	(0.0107)	(0.0131)	(0.0154)	(0.0117)	(0.0107)	(0.0131)
LNgdp_destination	-0.00169	0.0182*	0.00807	0.0251**	-0.00208	0.0182*	0.00797	0.0249**
	(0.0130)	(0.00998)	(0.00939)	(0.0103)	(0.0130)	(0.00996)	(0.00938)	(0.0103)
LNgdpcap_source	-0.00268	-0.0177	-0.0135	-0.0209	-0.00353	-0.0181	-0.0140	-0.0208
	(0.0150)	(0.0111)	(0.0103)	(0.0128)	(0.0150)	(0.0110)	(0.0103)	(0.0129)
LNgdpcap_destination	0.00165	-0.0130	-0.00798	-0.0274***	0.00204	-0.0129	-0.00790	-0.0272***
	(0.0126)	(0.00940)	(0.00910)	(0.0103)	(0.0126)	(0.00938)	(0.00908)	(0.0103)
Observations	3,060	3,114	3,111	3,213	3,060	3,114	3,111	3,213
R-squared	0.699	0.746	0.786	0.774	0.700	0.747	0.786	0.774
Source FE	YES	YES	YES	YES	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Columns 1 & 5); Participation Dividends (Columns 2 & 6); Interest (Columns 3 & 7); and Royalties (Columns 4 & 8). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 7: Extensions - OECD & Developing Countries & Tax Havens

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties	(5) Port. Div.	(6) Part. Div.	(7) Interest	(8) Royalties
peer_rate	0.0470	0.0412*	0.127***	0.213***	-0.0488	-0.0428	-0.0933**	0.0298
	(0.0291)	(0.0249)	(0.0267)	(0.0280)	(0.0488)	(0.0461)	(0.0455)	(0.0449)
oecd_source	-0.00961	0.0132**	-0.00869	-0.00251	-0.0140	0.0137*	-0.0116	-0.00488
	(0.00652)	(0.00519)	(0.00570)	(0.00598)	(0.0111)	(0.00710)	(0.00793)	(0.00886)
oecd_destination	-0.00733	0.0123**	-0.00592	-0.00631	0.00317	0.0102	-0.0122*	-0.00675
	(0.00665)	(0.00530)	(0.00580)	(0.00578)	(0.0105)	(0.00747)	(0.00738)	(0.00816)
oecd_pair	-0.00232	-0.00535	0.000996	-0.00359	0.0237	-0.00504	-0.0105	-0.0184**
	(0.00399)	(0.00335)	(0.00351)	(0.00343)	(0.0151)	(0.00743)	(0.00725)	(0.00768)
dev_source	0.00364	-0.00575	0.0109**	0.00946*	-0.00549	-0.0124*	0.00276	0.00272
	(0.00621)	(0.00473)	(0.00544)	(0.00559)	(0.0106)	(0.00729)	(0.00804)	(0.00848)
dev_destination	-0.00572	-0.0115*	0.0107**	0.00753	-0.0210**	-0.0157*	-0.00700	-0.0200***
	(0.00660)	(0.00626)	(0.00526)	(0.00528)	(0.0106)	(0.00810)	(0.00766)	(0.00774)
dev_pair	-0.00869**	-0.00293	-0.0140***	-0.0102***	-0.0153	-0.00229	-0.00763	0.00316
	(0.00380)	(0.00324)	(0.00319)	(0.00318)	(0.0109)	(0.00717)	(0.00724)	(0.00773)
haven_pair	0.00334	-0.00762	0.0108	-0.00568	-0.0263	-0.0323*	-0.0223	-0.0185
	(0.0143)	(0.0127)	(0.0124)	(0.00935)	(0.0227)	(0.0177)	(0.0139)	(0.0229)
peer_rate*oecd_source					0.0356	-0.00187	0.0449	0.0203
					(0.0764)	(0.0665)	(0.0680)	(0.0727)
peer_rate*oecd_destination					-0.0911	0.0282	0.0652	-0.0136
					(0.0689)	(0.0701)	(0.0588)	(0.0601)
peer_rate*oecd_pair					-0.189*	-0.00299	0.181**	0.253***
					(0.111)	(0.0916)	(0.0766)	(0.0900)
peer_rate*dev_source					0.0925	0.0886	0.0780	0.0439
					(0.0781)	(0.0728)	(0.0710)	(0.0738)
peer_rate*dev_destination					0.132**	0.0499	0.181***	0.286***
					(0.0670)	(0.0678)	(0.0647)	(0.0644)
peer_rate*dev_pair					0.0445	0.00587	-0.0248	-0.0677
					(0.0851)	(0.0832)	(0.0754)	(0.0827)

peer_rate*haven_source					0.0420	0.0895	0.0625	-0.0932
					(0.115)	(0.0976)	(0.106)	(0.116)
peer_rate*haven_destination					-0.0114	-0.0727	0.0396	-0.0646
					(0.106)	(0.100)	(0.111)	(0.0918)
peer_rate*haven_pair					0.476	0.406	0.414**	0.210
					(0.291)	(0.326)	(0.172)	(0.213)
source_avg	-0.204*	-0.132	-0.0473	0.0373	-0.180	-0.136	-0.0241	0.0498
	(0.118)	(0.0920)	(0.107)	(0.105)	(0.118)	(0.0916)	(0.104)	(0.106)
destination_avg	0.230**	0.250***	0.0201	0.0538	0.234**	0.236***	0.0101	0.0514
	(0.0913)	(0.0891)	(0.0821)	(0.0734)	(0.0912)	(0.0893)	(0.0806)	(0.0719)
LNgdp_source	-0.00372	0.0153	0.0112	0.0248*	-0.00134	0.0167	0.0157	0.0245*
	(0.0162)	(0.0120)	(0.0112)	(0.0143)	(0.0169)	(0.0121)	(0.0111)	(0.0139)
LNgdp_destination	-0.0175	0.00117	0.00988	0.0296***	-0.0166	0.00194	0.00979	0.0279***
	(0.0134)	(0.0105)	(0.00952)	(0.0110)	(0.0131)	(0.0106)	(0.00936)	(0.0108)
LNgdpcap_source	-0.00697	-0.0184*	-0.0168	-0.0312**	-0.00933	-0.0204*	-0.0224**	-0.0315**
	(0.0156)	(0.0111)	(0.0105)	(0.0138)	(0.0162)	(0.0113)	(0.0104)	(0.0133)
LNgdpcap_destination	0.00894	-0.00385	-0.0124	-0.0338***	0.00798	-0.00529	-0.0117	-0.0301***
	(0.0128)	(0.00956)	(0.00908)	(0.0108)	(0.0125)	(0.00968)	(0.00894)	(0.0107)
Observations	2,565	2,588	2,611	2,655	2,565	2,588	2,611	2,655
R-squared	0.699	0.733	0.763	0.740	0.703	0.735	0.775	0.751
Source FE	YES	YES	YES	YES	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Columns 1 & 5); Participation Dividends (Columns 2 & 6); Interest (Columns 3 & 7); and Royalties (Columns 4 & 8). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 8: Extensions - Network Effect Tax Havens: Dummy

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties	(5) Port. Div.	(6) Part. Div.	(7) Interest	(8) Royalties
peer_rate	0.0479*	0.0518**	0.171***	0.189***	0.0674	0.0260	0.131***	0.0755*
	(0.0250)	(0.0240)	(0.0252)	(0.0251)	(0.0428)	(0.0413)	(0.0407)	(0.0405)
s_network_haven_treaty	-0.00449	0.00148	0.00524*	0.00270	-0.00352	0.00199	0.00471	-0.00135
	(0.00364)	(0.00318)	(0.00293)	(0.00277)	(0.00619)	(0.00440)	(0.00452)	(0.00434)
t_network_haven_treaty	-0.0102***	-0.00281	0.00129	0.00117	-0.00696	-0.00716*	-0.00399	-0.0106***
	(0.00327)	(0.00263)	(0.00285)	(0.00271)	(0.00573)	(0.00377)	(0.00388)	(0.00375)
peer_rate*s_network_haven_treaty					-0.00797	-0.00601	0.00835	0.0444
					(0.0435)	(0.0412)	(0.0382)	(0.0357)
peer_rate*t_network_haven_treaty					-0.0281	0.0553	0.0638**	0.141***
					(0.0394)	(0.0368)	(0.0317)	(0.0323)
source_avg	-0.0508	-0.0518	0.134	0.123	-0.0483	-0.0574	0.138	0.139*
	(0.0904)	(0.0874)	(0.0880)	(0.0781)	(0.0919)	(0.0881)	(0.0909)	(0.0807)
destination_avg	0.0435	0.187**	0.192***	0.151**	0.0450	0.184**	0.194***	0.141**
	(0.0806)	(0.0783)	(0.0739)	(0.0606)	(0.0808)	(0.0780)	(0.0740)	(0.0603)
LNgdp_source	-0.00890	0.0150	0.00924	0.0120	-0.00955	0.0151	0.0101	0.0132
	(0.0153)	(0.0116)	(0.0107)	(0.0130)	(0.0154)	(0.0117)	(0.0107)	(0.0129)
LNgdp_destination	0.000776	0.0187*	0.00755	0.0247**	0.000494	0.0188*	0.00765	0.0241**
	(0.0131)	(0.0100)	(0.00940)	(0.0103)	(0.0131)	(0.0100)	(0.00944)	(0.0104)
LNgdpcap_source	-0.00369	-0.0176	-0.0132	-0.0206	-0.00299	-0.0178	-0.0142	-0.0218*
	(0.0149)	(0.0110)	(0.0103)	(0.0128)	(0.0150)	(0.0111)	(0.0103)	(0.0127)
LNgdpcap_destination	9.32e-05	-0.0132	-0.00727	-0.0271***	0.000477	-0.0135	-0.00718	-0.0256**
	(0.0126)	(0.00943)	(0.00909)	(0.0103)	(0.0126)	(0.00942)	(0.00913)	(0.0103)
Observations	3,060	3,114	3,111	3,213	3,060	3,114	3,111	3,213
R-squared	0.701	0.746	0.786	0.774	0.701	0.747	0.787	0.776
Source FE	YES	YES	YES	YES	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Columns 1 & 5); Participation Dividends (Columns 2 & 6); Interest (Columns 3 & 7); and Royalties (Columns 4 & 8). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 9: Extensions - Network Effect Tax Havens: Count

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties	(5) Port. Div.	(6) Part. Div.	(7) Interest	(8) Royalties
peer_rate	0.0484*	0.0515**	0.172***	0.189***	0.0423	0.0204	0.0827**	0.0886***
	(0.0252)	(0.0240)	(0.0252)	(0.0251)	(0.0332)	(0.0337)	(0.0326)	(0.0324)
s_network_haven_treaties	-0.000809	0.000471	0.00245**	0.00148	-0.00117	-0.000169	0.000154	-0.00122
	(0.00143)	(0.00121)	(0.00115)	(0.00108)	(0.00234)	(0.00159)	(0.00148)	(0.00155)
t_network_haven_treaties	-0.00115	0.000108	0.00129	0.00102	-0.00144	-0.00154	-0.00275*	-0.00320**
	(0.00130)	(0.00117)	(0.00113)	(0.00110)	(0.00244)	(0.00156)	(0.00146)	(0.00148)
peer_rate*s_network_haven_treaties					0.00336	0.00858	0.0288**	0.0312**
					(0.0170)	(0.0162)	(0.0126)	(0.0140)
peer_rate*t_network_haven_treaties					0.00259	0.0231	0.0526***	0.0567***
					(0.0168)	(0.0158)	(0.0121)	(0.0129)
source_avg	-0.0481	-0.0540	0.152*	0.129*	-0.0472	-0.0552	0.168*	0.141*
	(0.0937)	(0.0878)	(0.0889)	(0.0783)	(0.0943)	(0.0878)	(0.0890)	(0.0784)
destination_avg	0.0570	0.186**	0.207***	0.159***	0.0568	0.182**	0.206***	0.152**
	(0.0813)	(0.0787)	(0.0746)	(0.0611)	(0.0817)	(0.0788)	(0.0746)	(0.0606)
LNgdp_source	-0.00875	0.0148	0.00699	0.0108	-0.00819	0.0160	0.0129	0.0125
	(0.0155)	(0.0118)	(0.0108)	(0.0130)	(0.0157)	(0.0119)	(0.0108)	(0.0128)
LNgdp_destination	-0.000415	0.0182*	0.00616	0.0240**	-0.000288	0.0188*	0.00633	0.0230**
	(0.0132)	(0.0102)	(0.00952)	(0.0104)	(0.0132)	(0.0102)	(0.00954)	(0.0105)
LNgdpcap_source	-0.00365	-0.0172	-0.0114	-0.0196	-0.00417	-0.0184	-0.0177*	-0.0219*
	(0.0150)	(0.0111)	(0.0103)	(0.0128)	(0.0152)	(0.0112)	(0.0103)	(0.0126)
LNgdpcap_destination	0.000674	-0.0130	-0.00635	-0.0265**	0.000541	-0.0139	-0.00681	-0.0255**
	(0.0127)	(0.00953)	(0.00914)	(0.0103)	(0.0127)	(0.00955)	(0.00916)	(0.0104)
Observations	3,060	3,114	3,111	3,213	3,060	3,114	3,111	3,213
R-squared	0.699	0.746	0.787	0.774	0.699	0.746	0.789	0.777
Source FE	YES	YES	YES	YES	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Columns 1 & 5); Participation Dividends (Columns 2 & 6); Interest (Columns 3 & 7); and Royalties (Columns 4 & 8). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 10: Extensions - Network Effect Tax Havens: Average Rate

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties	(5) Port. Div.	(6) Part. Div.	(7) Interest	(8) Royalties
peer_rate	0.124*	0.136**	0.269***	0.174***	0.318***	0.250**	0.472***	0.243**
	(0.0734)	(0.0609)	(0.0523)	(0.0609)	(0.122)	(0.102)	(0.106)	(0.115)
s_network_haven_avg	-0.132	-0.0649	-0.0318	0.0823	-0.141	-0.0836	0.0481	0.0205
	(0.106)	(0.102)	(0.0931)	(0.0794)	(0.138)	(0.136)	(0.105)	(0.0862)
t_network_haven_avg	-0.00103	0.0139	0.0186	0.107	0.250*	0.108	0.0778	0.169*
	(0.126)	(0.111)	(0.0946)	(0.0867)	(0.137)	(0.130)	(0.0974)	(0.0961)
peer_rate*s_network_haven_avg					-0.124	-0.00637	-1.318*	0.854
					(0.841)	(0.922)	(0.717)	(0.735)
peer_rate*t_network_haven_avg					-2.376***	-1.586	-1.104	-1.391*
					(0.754)	(0.986)	(0.806)	(0.836)
source_avg	0.530*	0.117	0.177	-0.433	0.620**	0.228	0.289	-0.418
	(0.291)	(0.359)	(0.298)	(0.300)	(0.295)	(0.334)	(0.316)	(0.296)
destination_avg	0.891***	0.790***	0.226	-0.382	0.824**	0.817***	0.282	-0.324
	(0.331)	(0.267)	(0.310)	(0.280)	(0.350)	(0.271)	(0.317)	(0.287)
LNgdp_source	0.0197	-0.0370	0.0432*	0.0411	0.0169	-0.0397	0.0465*	0.0452
	(0.0452)	(0.0283)	(0.0246)	(0.0290)	(0.0459)	(0.0273)	(0.0243)	(0.0286)
LNgdp_destination	-0.0500	-0.0295	0.0253	0.0252	-0.0435	-0.0292	0.0253	0.0210
	(0.0451)	(0.0313)	(0.0255)	(0.0307)	(0.0422)	(0.0309)	(0.0254)	(0.0309)
LNgdpcap_source	-0.0485	0.0292	-0.0266	-0.0228	-0.0444	0.0321	-0.0288	-0.0303
	(0.0455)	(0.0287)	(0.0250)	(0.0289)	(0.0464)	(0.0273)	(0.0245)	(0.0289)
LNgdpcap_destination	0.0454	0.0228	0.000573	-0.00447	0.0365	0.0218	0.00319	-0.000741
	(0.0475)	(0.0314)	(0.0261)	(0.0300)	(0.0442)	(0.0309)	(0.0258)	(0.0302)
Observations	770	816	777	818	770	816	777	818
R-squared	0.860	0.898	0.924	0.902	0.865	0.900	0.926	0.904
Source FE	YES	YES	YES	YES	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Columns 1 & 5); Participation Dividends (Columns 2 & 6); Interest (Columns 3 & 7); and Royalties (Columns 4 & 8). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 11: Extensions - Age-Weighted Peer Rate

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
peer_rate	0.0787***	0.0709***	0.157***	0.166***
	(0.0238)	(0.0231)	(0.0245)	(0.0225)
source_avg	-0.0619	-0.0662	0.119	0.134*
	(0.0934)	(0.0877)	(0.0884)	(0.0783)
destination_avg	0.0617	0.184**	0.195***	0.155**
	(0.0802)	(0.0783)	(0.0734)	(0.0606)
LNgdp_source	-0.0101	0.0143	0.00890	0.0126
	(0.0154)	(0.0117)	(0.0107)	(0.0131)
LNgdp_destination	-0.000605	0.0194*	0.00848	0.0250**
	(0.0130)	(0.00999)	(0.00938)	(0.0104)
LNgdpcap_source	-0.00240	-0.0166	-0.0120	-0.0209
	(0.0150)	(0.0110)	(0.0103)	(0.0129)
LNgdpcap_destination	0.000419	-0.0143	-0.00846	-0.0279***
	(0.0125)	(0.00942)	(0.00909)	(0.0103)
Observations	3,060	3,114	3,111	3,213
R-squared	0.700	0.747	0.786	0.774
Source FE	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Column 1); Participation Dividends (Column 2); Interest (Column 3); and Royalties (Column 4). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 12: Robustness - Peer Rate n=3

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
peer_rate	0.0205	0.0463*	0.177***	0.187***
	(0.0261)	(0.0240)	(0.0262)	(0.0262)
source_avg	0.0218	-0.113	-0.0117	0.0128
	(0.0908)	(0.0878)	(0.0868)	(0.0689)
destination_avg	0.0296	0.148*	0.145*	0.103*
	(0.0808)	(0.0817)	(0.0750)	(0.0604)
LNgdp_source	-0.00863	0.0134	0.0140	0.0146
	(0.0159)	(0.0118)	(0.0110)	(0.0135)
LNgdp_destination	-0.00135	0.0222**	0.0105	0.0293***
	(0.0139)	(0.0108)	(0.00995)	(0.0106)
LNgdpcap_source	-0.00308	-0.0170	-0.0162	-0.0227*
	(0.0154)	(0.0111)	(0.0106)	(0.0133)
LNgdpcap_destination	0.000824	-0.0180*	-0.0114	-0.0339***
	(0.0136)	(0.0101)	(0.00959)	(0.0106)
Observations	2,841	2,902	2,883	2,983
R-squared	0.704	0.751	0.789	0.779
Source FE	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Column 1); Participation Dividends (Column 2); Interest (Column 3); and Royalties (Column 4). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 13: Robustness - Peer Rate n=4

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
peer_rate	0.0340	0.0271	0.162***	0.156***
	(0.0268)	(0.0248)	(0.0273)	(0.0287)
source_avg	-0.0504	-0.121	-0.0278	0.0283
	(0.0900)	(0.0926)	(0.0976)	(0.0712)
destination_avg	-0.0808	0.110	0.0423	0.0589
	(0.0798)	(0.0793)	(0.0751)	(0.0587)
LNgdp_source	-0.0118	0.0107	0.0161	0.0216
	(0.0173)	(0.0125)	(0.0119)	(0.0142)
LNgdp_destination	0.00347	0.0208*	0.0131	0.0317***
	(0.0144)	(0.0111)	(0.0103)	(0.0111)
LNgdpcap_source	-0.00157	-0.0145	-0.0189*	-0.0292**
	(0.0168)	(0.0119)	(0.0114)	(0.0139)
LNgdpcap_destination	-0.00384	-0.0173	-0.0128	-0.0378***
	(0.0140)	(0.0106)	(0.00981)	(0.0110)
Observations	2,629	2,686	2,671	2,768
R-squared	0.714	0.761	0.797	0.782
Source FE	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Column 1); Participation Dividends (Column 2); Interest (Column 3); and Royalties (Column 4). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 14: Robustness - Peer Rate n=5

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
peer_rate	0.0192	0.0372	0.176***	0.146***
	(0.0266)	(0.0262)	(0.0288)	(0.0303)
source_avg	-0.0800	-0.0861	-0.116	-0.00299
	(0.0868)	(0.0904)	(0.0945)	(0.0741)
destination_avg	-0.00290	0.171**	-0.0224	0.0834
	(0.0778)	(0.0805)	(0.0826)	(0.0647)
LNgdp_source	-0.0145	0.00970	0.0194	0.0232
	(0.0177)	(0.0130)	(0.0122)	(0.0147)
LNgdp_destination	-0.00136	0.0192*	0.0151	0.0330***
	(0.0154)	(0.0116)	(0.0107)	(0.0118)
LNgdpcap_source	0.00117	-0.0113	-0.0213*	-0.0287**
	(0.0172)	(0.0124)	(0.0115)	(0.0145)
LNgdpcap_destination	0.00237	-0.0136	-0.0144	-0.0381***
	(0.0151)	(0.0109)	(0.0101)	(0.0117)
Observations	2,448	2,503	2,469	2,578
R-squared	0.711	0.764	0.792	0.779
Source FE	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Column 1); Participation Dividends (Column 2); Interest (Column 3); and Royalties (Column 4). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 15: Robustness - Peer Rate Sub-Region

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
peer_rate	0.0571**	0.0510**	0.160***	0.176***
	(0.0250)	(0.0236)	(0.0243)	(0.0242)
source_avg	-0.0243	-0.0590	0.103	0.141*
	(0.0915)	(0.0868)	(0.0874)	(0.0765)
destination_avg	0.0261	0.183**	0.166**	0.134**
	(0.0762)	(0.0752)	(0.0717)	(0.0587)
LNgdp_source	-0.0107	0.0119	0.0101	0.0102
	(0.0152)	(0.0117)	(0.0105)	(0.0128)
LNgdp_destination	-0.00153	0.0173*	0.00911	0.0242**
	(0.0129)	(0.00985)	(0.00939)	(0.0102)
LNgdpcap_source	-0.000463	-0.0142	-0.0137	-0.0191
	(0.0148)	(0.0111)	(0.0101)	(0.0126)
LNgdpcap_destination	0.00144	-0.0121	-0.00885	-0.0270***
	(0.0125)	(0.00927)	(0.00911)	(0.0102)
Observations	3,178	3,233	3,237	3,339
R-squared	0.701	0.748	0.789	0.773
Source FE	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Column 1); Participation Dividends (Column 2); Interest (Column 3); and Royalties (Column 4). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 16: Robustness - Peer Rate Contiguity

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
peer_rate	0.00462	0.0180	0.119***	0.124***
	(0.0235)	(0.0213)	(0.0258)	(0.0255)
source_avg	-0.0517	0.0126	0.0930	0.0967
	(0.100)	(0.0926)	(0.100)	(0.0859)
destination_avg	0.200**	0.221**	0.216**	0.105
	(0.0980)	(0.110)	(0.0946)	(0.0772)
LNgdp_source	-0.0112	0.0269**	0.0209	0.0251*
	(0.0182)	(0.0130)	(0.0135)	(0.0152)
LNgdp_destination	-0.0403**	0.0184	0.00823	0.0103
	(0.0192)	(0.0160)	(0.0136)	(0.0143)
LNgdpcap_source	0.00480	-0.0253**	-0.0193	-0.0285*
	(0.0177)	(0.0123)	(0.0131)	(0.0151)
LNgdpcap_destination	0.0355*	-0.0154	-0.0120	-0.0250*
	(0.0191)	(0.0151)	(0.0133)	(0.0145)
Observations	2,359	2,403	2,370	2,423
R-squared	0.693	0.764	0.789	0.788
Source FE	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Column 1); Participation Dividends (Column 2); Interest (Column 3); and Royalties (Column 4). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.

Table 17: Robustness - Heckman Sample Selection

	First stage probit				Second stage OLS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Port. Div.	Part. Div.	Interest	Royalties	Port. Div.	Part. Div.	Interest	Royalties
peer_rate	-1.9882	-2.0788	-5.5058**	-3.7449	0.0588***	0.0729***	0.1444***	0.2012***
	(2.3344)	(2.4836)	(2.7688)	(2.5117)	(0.0201)	(0.0177)	(0.0188)	(0.0200)
source_avg	-37.7884*	10.7583	-22.2571	-31.9757	-0.0124	-0.0792	0.0398	0.0965
	(21.5451)	(36.9680)	(120.7678)	(26.2294)	(0.0798)	(0.0683)	(0.0701)	(0.0651)
destination_avg	-18.6832***	-17.0524**	-23.6783	-37.5076*	0.1869***	0.2464***	0.1244**	0.1112**
	(6.6938)	(7.1233)	(97.9588)	(22.6829)	(0.0544)	(0.0488)	(0.0568)	(0.0502)
LNgdp_source	1.4278	-3.1011	0.7452	-1.5602	-0.0092	0.0142	0.0066	0.0221**
	(1.8685)	(2.7377)	(13.9945)	(2.1487)	(0.0110)	(0.0101)	(0.0096)	(0.0095)
LNgdp_destination	0.7139	1.0181	6.5407	-0.4149	-0.0130	0.0085	0.0074	0.0299**
	(1.4729)	(1.7652)	(4.5193)	(2.0655)	(0.0087)	(0.0079)	(0.0075)	(0.0073)
LNgdpcap_source	-2.3068	2.1413	-0.5675	1.4017	-0.0032	-0.0171*	-0.0116	-0.0268***
	(1.8706)	(2.5326)	(13.5602)	(2.1249)	(0.0106)	(0.0096)	(0.0093)	(0.0091)
LNgdpcap_destination	-2.0514	-0.7625	-5.0562	0.6588	0.0080	-0.0068	-0.0079	-0.0313***
	(1.5238)	(1.7246)	(7.0130)	(1.9780)	(0.0085)	(0.0076)	(0.0073)	(0.0071)
comlang_off	0.5857**	0.5674**	0.6255**	0.4327*				
	(0.2622)	(0.2612)	(0.2805)	(0.2415)				
Observations	7,279	7,306	7,282	7,363	3,092	3,139	3,146	3,213
Mills ratio	0.0091	-0.0042	0.0016	0.0034				
	(0.0061)	(0.0060)	(0.0077)	(0.0078)				
Source FE	YES	YES	YES	YES	YES	YES	YES	YES
Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
SourceRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
DestinationRegion*Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Dependent variable: withholding tax rate on Portfolio Dividends (Column 1); Participation Dividends (Column 2); Interest (Column 3); and Royalties (Column 4). Robust standard errors clustered by country pairs in parentheses. ***, ** and * denote significance at the 1, 5 and 10 percent confidence level.