Anchors, not Havens
Spillovers in Tax Treaty Bargaining
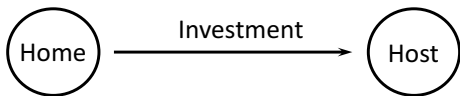
Kunka Petkova[a], Andrzej Stasio[a], Martin Zagler[a,b]

[a]WU Vienna University of Economics and Business
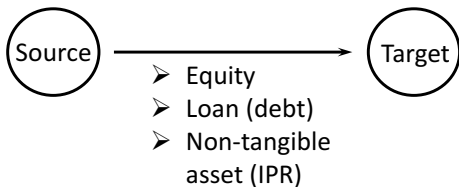[b]UPO University of Eastern Piedmont

March 2019

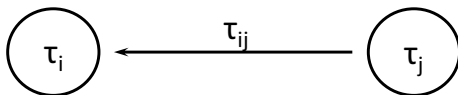Corresponding author: martin.zagler@gmail.com

Foreign Direct Investment

Foreign Direct Investment

Repatriating Earnings: Double Taxation (actually, triple)

τ_i ... Source country income tax τ_j ... Target country income tax

τ_{ij} ... Withholding tax for income (from target back to source)
- Participation dividends   - Interest
- Portfolio dividends   - Royalties

158.

Staatsvertrag vom 21. Juni 1899

zwischen Österreich-Ungarn und Preußen zur Vermeidung von Doppelbesteuerungen, welche sich aus der Anwendung der für die im Reichsrathe vertretenen Königreiche und Länder, beziehungsweise für das Königreich Preußen geltenden Steuergesetze ergeben könnten.

(Abgeschlossen in Berlin am 21. Juni 1899, von Seiner k. u. k. Apostolischen Majestät ratificirt am 24. Juni 1900, die Ratificationen ausgewechselt in Berlin am 9. Juli 1900.)

Seine Majestät der Kaiser von Österreich, König von Böhmen 2c. und Apostolischer König von Ungarn

und

Seine Majestät der Deutsche Kaiser, König von Preußen,

geleitet von dem Wunsche, Doppelbesteuerungen zu beseitigen, welche sich aus der Anwendung der für die im Reichsrathe vertretenen Königreiche und Länder, beziehungsweise für das Königreich Preußen geltenden Steuergesetze ergeben könnten, haben beschlossen, zu diesem Behufe eine Convention zu schließen und zu Ihren Bevollmächtigten ernannt:

Seine Majestät der Kaiser von Österreich, König von Böhmen 2c. und Apostolischer König von Ungarn:

Den Herrn Ladislaus Szögyény-Marich v. Magyar-Szögyén und Szolgaegyháza, Allerhöchst Ihren Kämmerer und wirklichen Geheimrath 2c. 2c., außerordentlichen und bevollmächtigten Botschafter bei Seiner Majestät dem Deutschen Kaiser, König von Preußen,

Seine Majestät der Deutsche Kaiser, König von Preußen:

Den Dr. Freiherrn von Richthofen, Allerhöchst Ihren wirklichen Geheimen Legationsrath und Unterstaatssecretär des auswärtigen Amtes,

welche, nachdem sie ihre in guter und gehöriger Form befundenen Vollmachten sich mitgetheilt, über Folgendes übereingekommen sind:

Artikel 1.

Österreichische, beziehungsweise preußische Staatsangehörige sollen vorbehaltlich der Bestimmungen in den Artikeln 2 bis 4 zu den directen Staatssteuern nur in dem Staate herangezogen werden, in welchem sie ihren Wohnsitz haben, in Ermanglung eines solchen nur in dem Staate, in welchem sie sich aufhalten.

Österreichische, beziehungsweise preußische Staatsangehörige, welche in beiden Staaten einen Wohnsitz haben, sollen nur in ihrem Heimatstaate zu den directen Staatssteuern herangezogen werden.

Ein Wohnsitz im Sinne dieser Vereinbarung ist an dem Orte anzunehmen, an welchem Jemand eine Wohnung unter Umständen innehat, welche auf die Absicht der dauernden Beibehaltung einer solchen schließen lassen.

Artikel 2.

Der Grund- und Gebäudebesitz und der Betrieb eines stehenden Gewerbes, sowie das aus diesen Quellen herrührende Einkommen sollen nur in demjenigen Staate zu den directen Staatssteuern herangezogen werden, in welchem der Grund- oder Gebäudebesitz liegt, oder eine Betriebsstätte zur Ausübung des Gewerbes unterhalten wird. Als Betriebsstätten gelten Zweigniederlassungen, Fabricationsstätten, Niederlagen, Comptoire, Ein- oder Verkaufsstellen und

The Double Tax Treaty Network (1970)
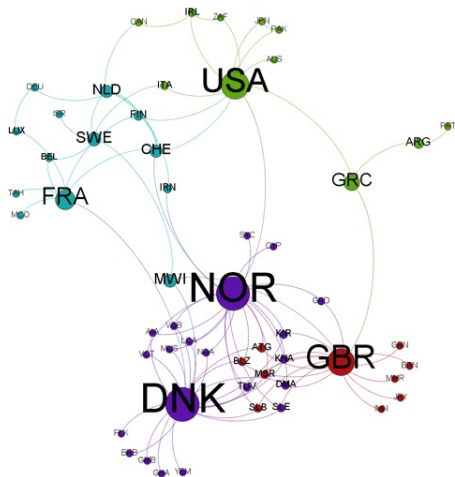
The Double Tax Treaty Network (2011)
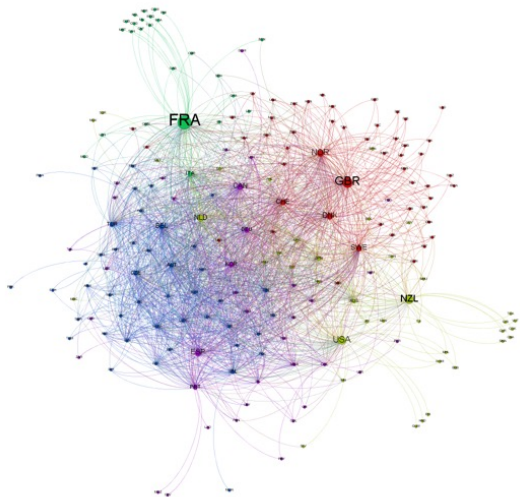
Tax Competition

Multilateral tax competition

- Corporate income tax rates τ_i, τ_j
- Untargeted tax competition: beneficial to foreign investors and domestic firms alike

Bilateral tax competition

- Withholding tax rate τ_{ij} `Withholding taxes`
- Relief method $m_i(\tau_j)$ `Treaty benefit`
- Targeted tax competition: only foreign investors from a specific source country benefit (FDI diversion)
- Countries (country pairs) engage in bilateral tax competition with their tax treaty against their mutual neighbors
- Peer treaties are a valid reference point due to emulation and/or leverage in treaty bargaining (DTT Spillovers) `Contagion`

Global withholding taxation
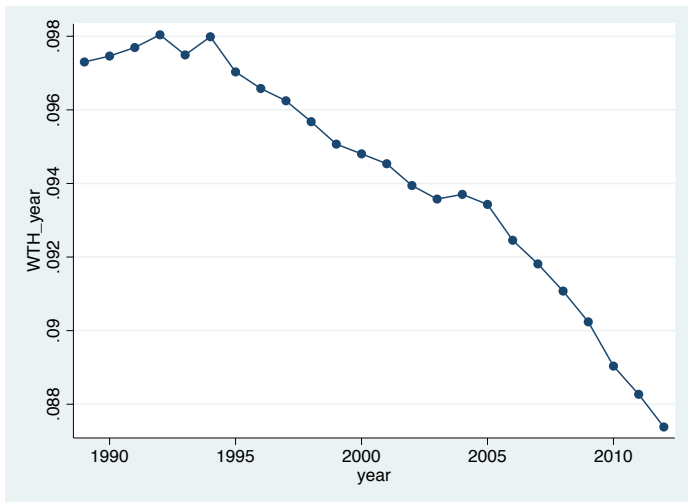
Source: Petkova (2019)

Global withholding taxation: treaty benefit
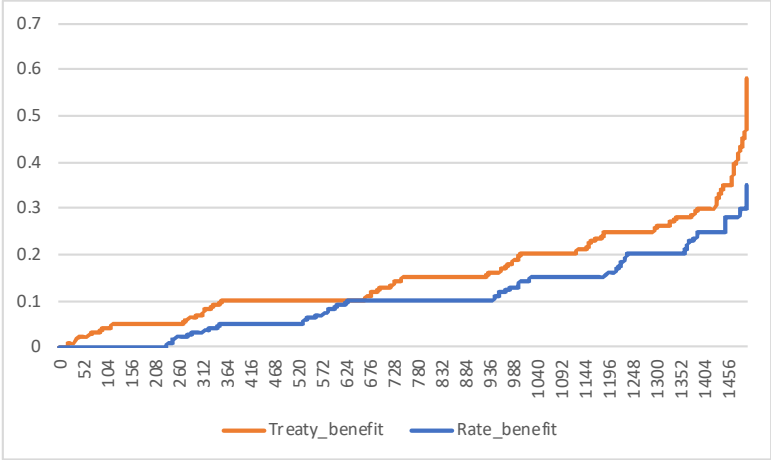
No Splendid Isolation: Target Country Neighbors
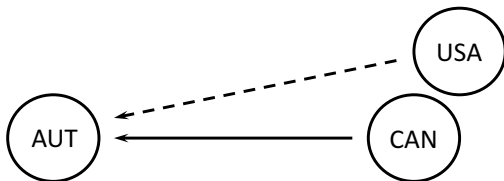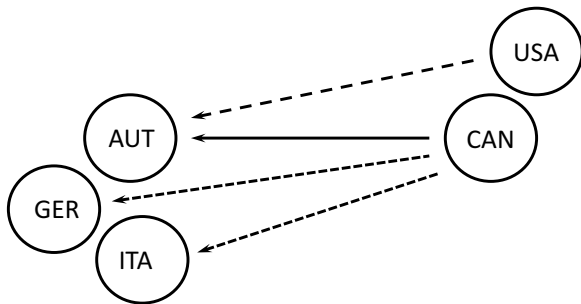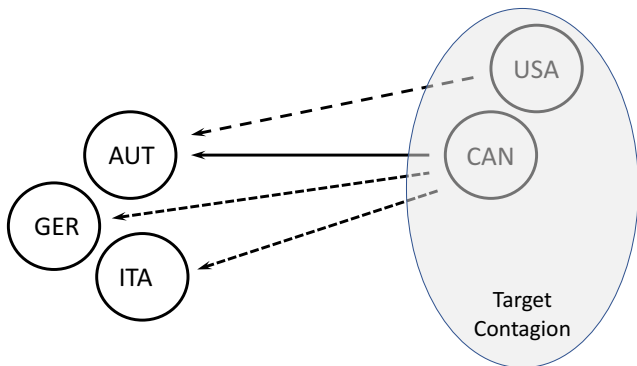
Target Contagion
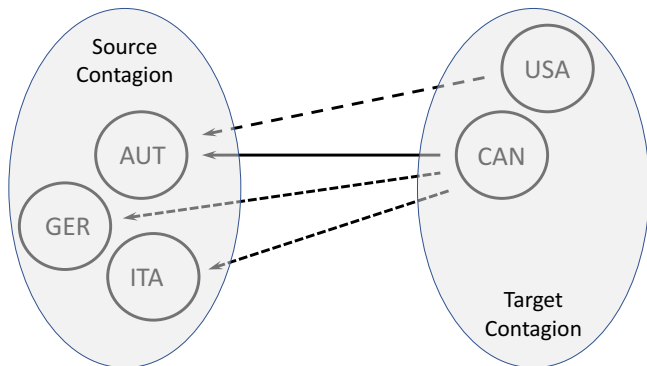
Contribution

- Spillovers in (global) tax treaty bargaining
  - Asymmetric FDI and tax treaty bargaining (Chisik & Davies, 2004; Rixen & Schwarz, 2009)
  - Spatial diffusion of tax treaties (Barthel & Neumayer, 2012)
- Tax treaties as an instrument of tax competition
  - Determinants of treaty formation (Ligthart, Vlachaki, & Voget, 2011; Davies, 2003)
  - Spatial-lag models of capital-tax competition (Hays, 2003; Basinger & Hallerberg, 2004; Franzese & Hays, 2007)
- Research question:
  - Are there spillover effects in tax treaty bargaining?
  - If so, what are their drivers?

Data

- More than 3.000 tax treaties and amending protocols signed between 1930 and 2012 (IBFD)

- Four types of withholding tax rates (dependent variables):
  - Portfolio dividends (definition of the tax base is an issue)
  - Participation dividends (assume 100% owned subsidiary)
  - Interest rates (commonly applied on inter-company loans)
  - Royalties (from intellectual property rights)

- Specific source (target) contagion:
  - Tax treaty rates are a product of past withholding taxes between one country's peers and the (intended) treaty partner

- Spatial Weights (UN M49)

- Gravity Data (CEPII)

Identification

- Dyadic data: two individual units form a pair - the dyad

- Directed dyadic data

  - Interaction between two dyad members ij initiates with i and directed toward j
  - Source and target; origin and destination $=>$ home and host countries

- Undirected dyadic data

  - Unclear from the data which of the two dyad members initiated the interaction
  - One can still distinguish i from j; one either cannot distinguish between ij and ji or one does not want to make such a distinction
  - Variable of interest identical for dyads ij and ji $=>$ typically keep only one or the other in their dataset to avoid "double counting"

- In the paper: Directed dyads; both for ij and ji country pairs, as treaty rates might be asymmetric (despite treaties being undirected dyads)

- Define the same geographical region at the intermediate level according to the UN M49
  - ▸ Geographic regions based on continental regions
  - ▸ Further subdivided into sub-regions and intermediary regions (to obtain greater homogeneity in sizes of population and demographic circumstances)
  - ▸ Contiguity at the outset of most disaggregated level

Spatial Weights: Intermediate Geographical Region II

- Pooled cross-section across all years:

$$
\begin{aligned}
WHT_{ij,t,k} = {} & \alpha + \lambda_{ij}\theta_{j,t-n}W_i + \lambda_{ji}\theta_{i,t-n}W_j \\
& + \beta_i X_{i,t} + \beta_j X_{j,t} + \gamma D_{ij,t} + \rho_i + \psi_j + \eta_t + \upsilon_{it} + \omega_{jt} + \epsilon
\end{aligned}
\tag{1}
$$

- $WHT_{ij,t,k}$: the negotiated withholding tax rate of type k between source country i and target country j in year of treaty conclusion t

- $\theta_{j,t-n}W_i$: the spatial interaction term between the spatial weight matrix of the source country i and a withholding tax rates matrix of the target country j with all other potential sources l, n years before treaty year t (source lag)

- $\theta_{i,t-n}W_j$: the spatial interaction term between the spatial weight matrix of the target country j and a withholding tax rates matrix of the source country i with all other potential targets m, n years before treaty year t (target lag)

$$WHT_{ij,t,k} = \alpha + \lambda_{ij}\theta_{j,t-n}W_i + \lambda_{ji}\theta_{i,t-n}W_j$$
$$+ \beta_i X_{i,t} + \beta_j X_{j,t} + \gamma D_{ij,t} + \rho_i + \psi_j + \eta_t + \upsilon_{it} + \omega_{jt} + \epsilon \qquad (2)$$

- $X_{i,t}$, $X_{j,t}$: vectors of source, respectively target specific factors affecting their bargaining power position (e.g. GDP and GDP per capita)

- $D_{ij,t}$: a vector of variables characterising the bilateral relationship between source i and target j

- Source (ρ_i), target (ψ_j) and year (η_t) fixed effects

- Source-region-year (υ_{it}) and target-region-year (ω_{jt}) fixed effects

- ϵ: error term

- robust standard errors

- Worldwide average WHT rate: long-term treaty policy
- Main results: Spatial-lag model
- Treaty average and minimum rates
- Dynamic spillovers
- OECD model convention as an **anchor**
- The OECD: a competitive bunch
- Tax **havens**, not so much
- Robustness tests

Worldwide average WHT rate

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_avg	**-0.0739**	**0.0889**	**0.128****	**0.129****
	(0.0652)	(0.125)	(0.0527)	(0.0501)
target_avg	**-0.00688**	**0.192**	**0.125****	**0.126****
	(0.0697)	(0.125)	(0.0529)	(0.0489)
LNgdp_source	-0.0158	0.00824	0.00707	0.0112
	(0.0118)	(0.0158)	(0.00851)	(0.00943)
LNgdp_target	-0.00118	0.00899	0.00886	0.0123
	(0.0118)	(0.0156)	(0.00847)	(0.00939)
LNgdpcap_source	0.00941	-0.00222	-0.00704	-0.0162*
	(0.0116)	(0.0169)	(0.00827)	(0.00929)
LNgdpcap_target	0.00248	-0.00304	-0.00938	-0.0164*
	(0.0117)	(0.0160)	(0.00817)	(0.00925)
Observations	4,348	2,218	4,401	4,499
R-squared	0.683	0.730	0.759	0.742
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Main Results: Spatial Lag Model

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties	(5) Avg.Rate	(6) Min.Rate
source_lag	**0.0326**	**0.0511**	**0.171*****	**0.161*****	0.0895***	0.125***
	(0.0361)	(0.0710)	(0.0304)	(0.0300)	(0.0258)	(0.0300)
target_lag	**0.0464**	**0.0682**	**0.170*****	**0.167*****	0.0759***	0.103***
	(0.0305)	(0.0739)	(0.0297)	(0.0296)	(0.0236)	(0.0270)
source_avg	-0.107	0.418	0.135	0.171*	0.0832	0.0175
	(0.0933)	(0.295)	(0.0983)	(0.0898)	(0.0681)	(0.0976)
target_avg	-0.0286	0.392	0.128	0.194**	0.115	0.184*
	(0.107)	(0.313)	(0.0984)	(0.0908)	(0.0743)	(0.0982)
LNgdp_source	-0.00849	-0.0538	0.0210*	0.0327**	0.00978	0.0170*
	(0.0159)	(0.0508)	(0.0114)	(0.0141)	(0.00844)	(0.0100)
LNgdp_target	0.0185	-0.0413	0.0222*	0.0338**	0.0214**	0.0290***
	(0.0172)	(0.0529)	(0.0114)	(0.0141)	(0.00901)	(0.0108)
LNgdpcap_source	-0.00626	0.0581	-0.0221**	-0.0390***	-0.0157*	-0.0239**
	(0.0154)	(0.0536)	(0.0107)	(0.0137)	(0.00815)	(0.00974)
LNgdpcap_target	-0.0211	0.0460	-0.0220**	-0.0396***	-0.0236***	-0.0339***
	(0.0165)	(0.0522)	(0.0107)	(0.0137)	(0.00866)	(0.0105)
Observations	2,257	928	2,322	2,399	2,453	2,453
R-squared	0.715	0.635	0.802	0.774	0.819	0.802
Source FE	YES	YES	YES	YES	YES	YES
Target FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Main Results: Spatial Lag Model (average and minimum rates)

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties	(5) **Avg.Rate**	(6) **Min.Rate**
source_lag	0.0326	0.0511	0.171***	0.161***	**0.0895*****	**0.125*****
	(0.0361)	(0.0710)	(0.0304)	(0.0300)	(0.0258)	(0.0300)
target_lag	0.0464	0.0682	0.170***	0.167***	**0.0759*****	**0.103*****
	(0.0305)	(0.0739)	(0.0297)	(0.0296)	(0.0236)	(0.0270)
source_avg	-0.107	0.418	0.135	0.171*	0.0832	0.0175
	(0.0933)	(0.295)	(0.0983)	(0.0898)	(0.0681)	(0.0976)
target_avg	-0.0286	0.392	0.128	0.194**	0.115	0.184*
	(0.107)	(0.313)	(0.0984)	(0.0908)	(0.0743)	(0.0982)
LNgdp_source	-0.00849	-0.0538	0.0210*	0.0327**	0.00978	0.0170*
	(0.0159)	(0.0508)	(0.0114)	(0.0141)	(0.00844)	(0.0100)
LNgdp_target	0.0185	-0.0413	0.0222*	0.0338**	0.0214**	0.0290***
	(0.0172)	(0.0529)	(0.0141)	(0.0141)	(0.00901)	(0.0108)
LNgdpcap_source	-0.00626	0.0581	-0.0221**	-0.0390***	-0.0157*	-0.0239**
	(0.0154)	(0.0536)	(0.0107)	(0.0137)	(0.00815)	(0.00974)
LNgdpcap_target	-0.0211	0.0460	-0.0220**	-0.0396***	-0.0236***	-0.0339***
	(0.0165)	(0.0522)	(0.0107)	(0.0137)	(0.00866)	(0.0105)
Observations	2,257	928	2,322	2,399	2,453	2,453
R-squared	0.715	0.635	0.802	0.774	0.819	0.802
Source FE	YES	YES	YES	YES	YES	YES
Target FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Dynamics: Source Contagion
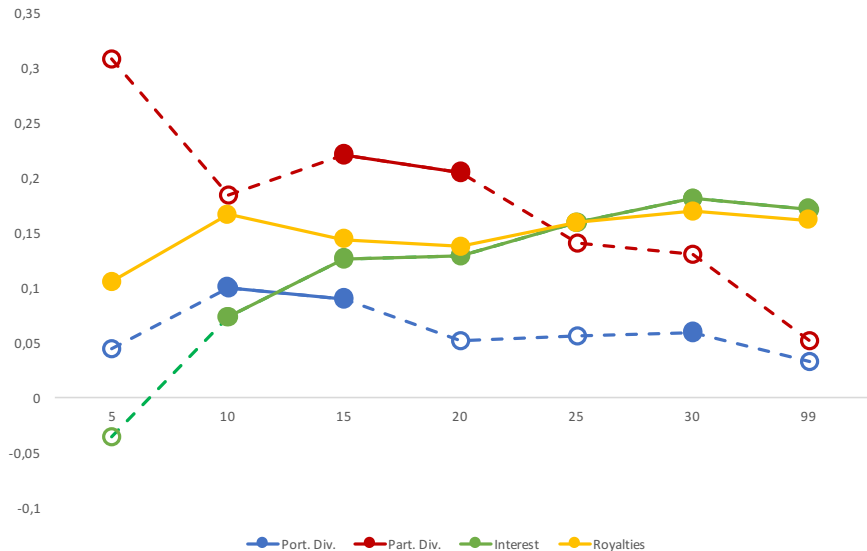
Dynamics: Target Contagion

Legend: Port. Div. Part. Div. Interest Royalties
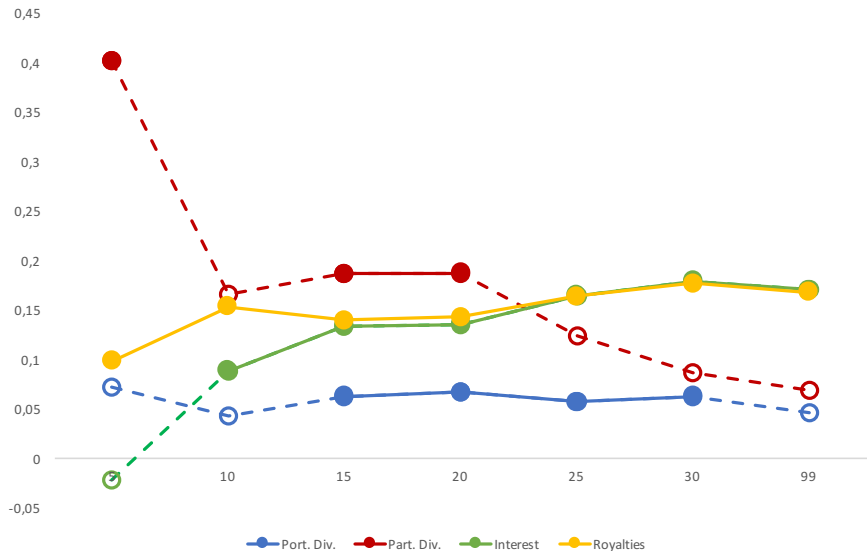
OECD Model Tax Convention

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.145***	**0.183**	**0.317***	**0.0650***
	(0.0503)	(0.0851)	(0.0354)	(0.0239)
target_lag	**0.0656**	**0.245**	**0.328***	**0.0761***
	(0.0324)	(0.101)	(0.0346)	(0.0231)
source_avg	0.0209	0.417	0.0601	0.0987*
	(0.0820)	(0.267)	(0.0747)	(0.0594)
target_avg	0.145*	0.311	0.0599	0.111*
	(0.0872)	(0.271)	(0.0747)	(0.0596)
model_rate_dummy	**0.0964***	**0.0582***	**0.104***	**-0.0659***
	(0.00790)	(0.00853)	(0.00313)	(0.00269)
source_lag#model	**-0.263***	**-0.269***	**-0.426***	**-0.0471**
	(0.0464)	(0.0908)	(0.0365)	(0.0348)
target_lag#model	**-0.0789***	**-0.324***	**-0.435***	**-0.0577***
	(0.0407)	(0.0939)	(0.0364)	(0.0346)
Observations	2,257	928	2,322	2,399
R-squared	0.835	0.678	0.886	0.890
Controls	YES	YES	YES	YES
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES
Memo: OECD MTC rates	15%	5%	10%	0%

Note: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Non-OECD countries - interaction terms

	(5) Port. Div.	(6) Part. Div.	(7) Interest	(8) Royalties
source_lag	**0.214*****	**0.0406**	**0.325*****	**0.456*****
	(0.0643)	(0.138)	(0.0503)	(0.0557)
target_lag	**-0.0652**	**0.114**	**0.324*****	**0.435*****
	(0.0685)	(0.129)	(0.0502)	(0.0560)
source_avg	-0.100	0.445	0.107	0.123
	(0.0950)	(0.301)	(0.0951)	(0.0890)
target_avg	-0.0425	0.410	0.107	0.140
	(0.105)	(0.325)	(0.0950)	(0.0891)
non-oecd_pair	0.0172	0.0202	0.0217***	0.0271***
	(0.0164)	(0.0164)	(0.00707)	(0.00634)
source_lag#non-oecd_source	**-0.0625**	**0.128**	**-0.153*****	**-0.214*****
	(0.0507)	(0.146)	(0.0473)	(0.0496)
source_lag#non-oecd_pair	**-0.198****	**-0.0827**	**-0.126****	**-0.252*****
	(0.0791)	(0.202)	(0.0611)	(0.0678)
target_lag#non-oecd_target	**0.0113**	**-0.00576**	**-0.158*****	**-0.199*****
	(0.0556)	(0.150)	(0.0470)	(0.0499)
target_lag#non-oecd_pair	**0.123**	**-0.0702**	**-0.124****	**-0.226*****
	(0.0823)	(0.180)	(0.0616)	(0.0682)
Observations	2,257	928	2,322	2,399
R-squared	0.723	0.637	0.813	0.792
Controls	YES	YES	YES	YES
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Tax havens as a treaty partner - interaction effects

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.0415**	**0.0708**	**0.164***	**0.145***
	(0.0407)	(0.0764)	(0.0312)	(0.0304)
target_lag	**0.0359**	**0.0789**	**0.162***	**0.151***
	(0.0314)	(0.0768)	(0.0304)	(0.0303)
source_avg	-0.105	0.420	0.137	0.175*
	(0.0931)	(0.302)	(0.0979)	(0.0895)
target_avg	-0.0251	0.389	0.130	0.197**
	(0.106)	(0.318)	(0.0980)	(0.0900)
haven_pair	-0.0362*	0.0183	-0.00723	-0.00618
	(0.0210)	(0.0254)	(0.00945)	(0.00937)
source_lag#haven_source	**-0.0274**	**-0.107**	**0.0188**	**0.136***
	(0.0643)	(0.120)	(0.0518)	(0.0510)
source_lag#haven_pair	**-0.0639**	**-0.300**	**0.160**	**0.0840**
	(0.133)	(0.540)	(0.0976)	(0.0887)
target_lag#haven_target	**0.0240**	**-0.188**	**0.0304**	**0.137***
	(0.0820)	(0.167)	(0.0515)	(0.0493)
target_lag#haven_pair	**0.401**	**-0.0958**	**0.159**	**0.122**
	(0.157)	(0.423)	(0.0988)	(0.0893)
Controls	YES	YES	YES	YES
Observations	2,257	928	2,322	2,399
R-squared	0.717	0.636	0.804	0.776
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Indirect effect of tax havens: tax havens treaties dummy

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.0329**	**0.0563**	**0.172*****	**0.160*****
	(0.0361)	(0.0710)	(0.0306)	(0.0300)
target_lag	**0.0467**	**0.0760**	**0.172*****	**0.167*****
	(0.0304)	(0.0741)	(0.0298)	(0.0296)
source_avg	-0.113	0.420	0.129	0.171*
	(0.0952)	(0.300)	(0.0970)	(0.0898)
target_avg	-0.0440	0.408	0.119	0.193**
	(0.109)	(0.320)	(0.0970)	(0.0907)
source_havens_treaty	**-0.00215**	**0.00572**	**-0.00498**	**0.00150**
	(0.00444)	(0.00601)	(0.00411)	(0.00425)
target_havens_treaty	**-0.00393**	**0.00917**	**-0.00733*****	**0.00219**
	(0.00450)	(0.00702)	(0.00407)	(0.00421)
Observations	2,257	928	2,322	2,399
R-squared	0.715	0.636	0.803	0.774
Controls	YES	YES	YES	YES
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Robustness tests

- Sample selection: WHT rates observable only for treaty country-pairs
  Heckman

- Alternative definitions of spatial weights:
  - Different temporal values of the spatial lags Robust II
  - Contiguity Robust III
  - Sub-regions Robust IV
  - Economic similarity: Market Potential (Head & Mayer, 2004)
    Robust V

- Additional controls:
  - OECD Dummies   Interaction   Interaction non-OECD
  - Tax Havens Interaction   Dummies   Count
  - Treaty relief methods: exemption
  - Renegotiated and multilateral treaties
  - Additional "gravity-style" controls

- Placebo spatial lag Robust VI

- Strong spatial interdependence in treaty withholding tax rates, especially on interest and royalty payments
  - ▶ Once corrected for sample selection, also spatial spillovers on portfolio dividend rates
- Limited influence of tax **havens**
- OECD countries driving tax competition
- OECD model tax convention as an **anchor**
- Bilateral targeted tax competition in withholding tax rates (not only untargeted multilateral tax competition in CIT)

Thank you for listening! Questions?

- Additional material Robustness tests

References

Barthel, F., & Neumayer, E. (2012). Competing for scarce foreign capital: Spatial dependence in the diffusion of double taxation treaties. *International Studies Quarterly*, *56*(4), 645–660.

Basinger, S., & Hallerberg, M. (2004). Remodeling the Competition for Capital: How Domestic Politics Erases the Race to the Bottom. *American Political Science Review*, *98*(2), 261–275.

Chisik, R., & Davies, R. B. (2004). Asymmetric FDI and tax-treaty bargaining: theory and evidence. *Journal of Public Economics*, *88*(6), 1119–1148.

Davies, R. B. (2003). Tax treaties, renegotiations, and foreign direct investment. *Economic Analysis and Policy*, *33*(2), 251–273.

Franzese, R., & Hays, J. (2007). Empirical models of international capita-tax competition. In C. Read & G. Gregoriou (Eds.), *International taxation handbook: Policy, practice, standards and regulation*. Amsterdam: Elsavier.

Hays, J. (2003). Globalization and Capital Taxation in Consensus and Majoritarian Democracies. *World Politics*, *56*(1), 79–114.

Head, K., & Mayer, T. (2004). Market potential and the location of japanese investment in the european union. *The Review of Economics and Statistics*, *86*(4), 959–972.

Ligthart, J. E., Vlachaki, M., & Voget, J. (2011). The determinants of double tax treaty formation.

Petkova, K., Stasio, A., & Zagler, M. (2018). On the relevance of double tax treaties. *WU International Taxation Research Paper Series*.

Rixen, T., & Schwarz, P. (2009). Bargaining over the avoidance of double taxation: Evidence from German tax treaties. *FinanzArchiv: Public Finance Analysis*, *65*(4), 442–471.

Global withholding taxation: portfolio dividends
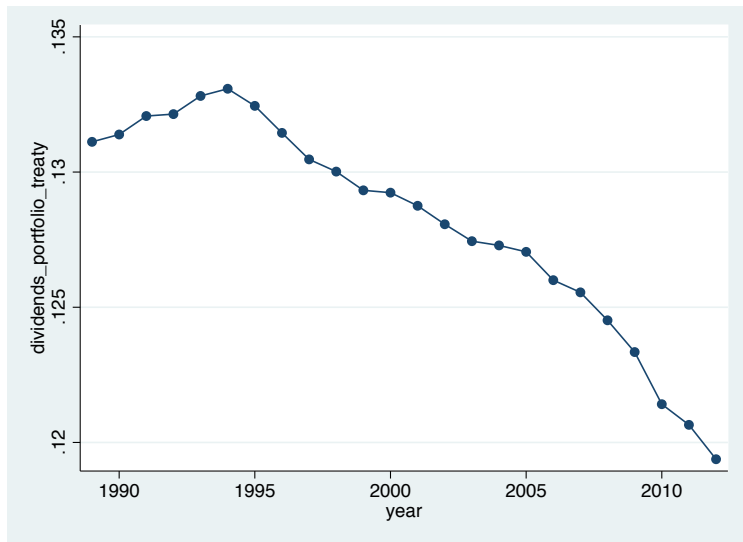
Global withholding taxation: participation dividends
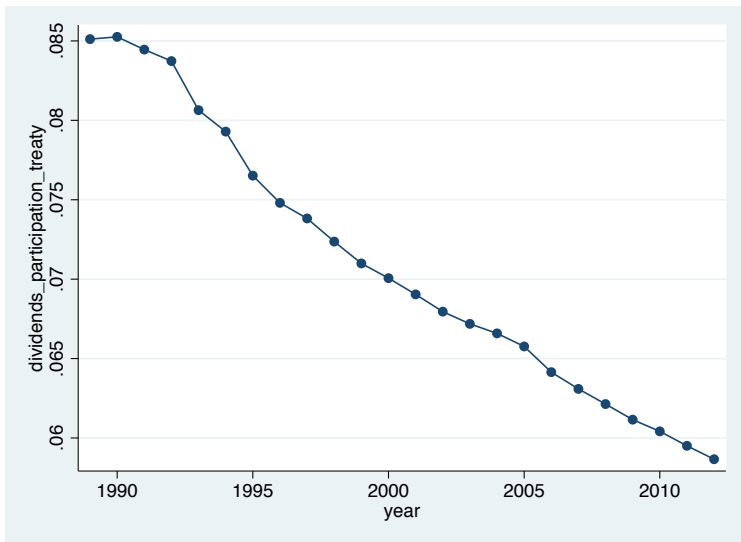
Global withholding taxation: interest
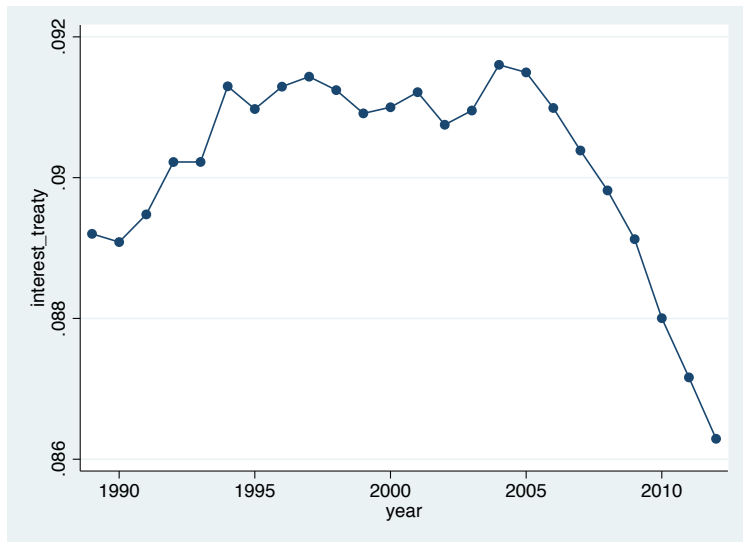
Global withholding taxation: royalties
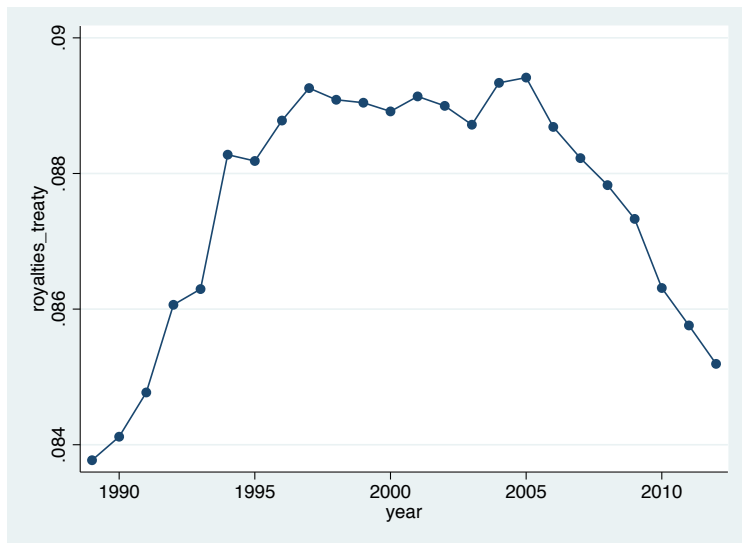
Only source and target spatial lag

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.0326**	**0.0652**	**0.177*****	**0.174*****
	(0.0355)	(0.0703)	(0.0299)	(0.0298)
target_lag	**0.0398**	**0.0869**	**0.177*****	**0.177*****
	(0.0301)	(0.0742)	(0.0293)	(0.0293)
LNgdp_source	-0.00873	-0.0475	0.0212*	0.0296**
	(0.0158)	(0.0489)	(0.0114)	(0.0141)
LNgdp_target	0.0187	-0.0333	0.0223*	0.0305**
	(0.0171)	(0.0500)	(0.0114)	(0.0140)
LNgdpcap_source	-0.00571	0.0531	-0.0211**	-0.0355***
	(0.0153)	(0.0520)	(0.0106)	(0.0136)
LNgdpcap_target	-0.0211	0.0410	-0.0210**	-0.0359***
	(0.0164)	(0.0505)	(0.0106)	(0.0136)
Observations	2,257	930	2,322	2,399
R-squared	0.715	0.639	0.802	0.773
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Dynamics - portfolio dividends

	(1) S=5	(2) S=10	(3) S=15	(4) S=20	(5) S=25	(6) S=30	(7) S=∞
source_lag	**0.0437**	**0.100***	**0.0898****	**0.0522**	**0.0559**	**0.0593***	**0.0326**
	(0.0695)	(0.0567)	(0.0358)	(0.0349)	(0.0356)	(0.0358)	(0.0361)
target_lag	**0.0715**	**0.0421**	**0.0620****	**0.0665****	**0.0565***	**0.0624****	**0.0464**
	(0.0553)	(0.0409)	(0.0294)	(0.0285)	(0.0300)	(0.0307)	(0.0305)
source_avg	-0.365**	-0.152	-0.176*	-0.159*	-0.127	-0.106	-0.107
	(0.171)	(0.131)	(0.0939)	(0.0963)	(0.0967)	(0.0957)	(0.0933)
target_avg	-0.244*	-0.182	-0.0963	-0.103	-0.0818	-0.0417	-0.0286
	(0.147)	(0.137)	(0.112)	(0.109)	(0.107)	(0.109)	(0.107)
LNgdp_o	0.0210	0.0104	0.00617	-0.00498	-0.00740	-0.00826	-0.00849
	(0.0274)	(0.0207)	(0.0155)	(0.0157)	(0.0156)	(0.0157)	(0.0159)
LNgdp_d	0.0232	0.0267	0.0250	0.0235	0.0201	0.0179	0.0185
	(0.0279)	(0.0222)	(0.0173)	(0.0170)	(0.0169)	(0.0170)	(0.0172)
LNgdpcap_o	-0.0220	-0.0214	-0.0178	-0.0102	-0.00780	-0.00669	-0.00626
	(0.0257)	(0.0198)	(0.0150)	(0.0152)	(0.0149)	(0.0152)	(0.0154)
LNgdpcap_d	-0.0207	-0.0308	-0.0262	-0.0258	-0.0222	-0.0205	-0.0211
	(0.0252)	(0.0212)	(0.0165)	(0.0164)	(0.0163)	(0.0163)	(0.0165)
Observations	854	1,515	1,917	2,105	2,175	2,218	2,257
R-squared	0.802	0.727	0.732	0.722	0.716	0.716	0.715
Source FE	YES	YES	YES	YES	YES	YES	YES
Target FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
S.Region#Y.FE	YES	YES	YES	YES	YES	YES	YES
T.Region#Y.FE	YES	YES	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Dynamics - participation dividends

	(1) S=5	(2) S=10	(3) S=15	(4) S=20	(5) S=25	(6) S=30	(7) S=∞
source_lag	**0.308**	**0.184**	**0.221****	**0.205***	**0.141**	**0.130**	**0.0511**
	(0.202)	(0.115)	(0.111)	(0.116)	(0.0967)	(0.0942)	(0.0710)
target_lag	**0.401****	**0.166**	**0.186***	**0.187***	**0.124**	**0.0859**	**0.0682**
	(0.190)	(0.106)	(0.109)	(0.107)	(0.0960)	(0.0950)	(0.0739)
source_avg	0.326	0.683	0.305	0.273	0.330	0.420	0.418
	(0.874)	(0.513)	(0.397)	(0.338)	(0.320)	(0.295)	(0.295)
target_avg	0.554	0.726	0.396	0.261	0.319	0.362	0.392
	(0.835)	(0.556)	(0.412)	(0.334)	(0.330)	(0.308)	(0.313)
LNgdp_o	-0.140	-0.116	-0.0395	-0.0427	-0.0435	-0.0499	-0.0538
	(0.120)	(0.0954)	(0.0578)	(0.0531)	(0.0526)	(0.0522)	(0.0508)
LNgdp_d	-0.136	-0.107	-0.0294	-0.0316	-0.0358	-0.0413	-0.0413
	(0.121)	(0.0993)	(0.0594)	(0.0546)	(0.0563)	(0.0550)	(0.0529)
LNgdpcap_o	0.153	0.105	0.0485	0.0518	0.0506	0.0551	0.0581
	(0.112)	(0.0868)	(0.0589)	(0.0557)	(0.0556)	(0.0551)	(0.0536)
LNgdpcap_d	0.154	0.0991	0.0406	0.0377	0.0394	0.0443	0.0460
	(0.112)	(0.0919)	(0.0607)	(0.0539)	(0.0547)	(0.0538)	(0.0522)
Observations	376	587	736	847	870	898	928
R-squared	0.690	0.627	0.613	0.637	0.646	0.639	0.635
Source FE	YES	YES	YES	YES	YES	YES	YES
Target FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
S.Region#Y.FE	YES	YES	YES	YES	YES	YES	YES
T.Region#Y.FE	YES	YES	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Dynamics - interest

	(1) S=5	(2) S=10	(3) S=15	(4) S=20	(5) S=25	(6) S=30	(7) S=∞
source_lag	**-0.0354**	**0.0733***	**0.126*****	**0.129*****	**0.159*****	**0.181*****	**0.171*****
	(0.0510)	(0.0382)	(0.0331)	(0.0308)	(0.0313)	(0.0303)	(0.0304)
target_lag	**-0.0216**	**0.0882****	**0.133*****	**0.135*****	**0.164*****	**0.179*****	**0.170*****
	(0.0523)	(0.0383)	(0.0324)	(0.0306)	(0.0306)	(0.0296)	(0.0297)
source_avg	0.300*	0.247**	0.164	0.155	0.107	0.113	0.135
	(0.161)	(0.115)	(0.104)	(0.103)	(0.100)	(0.0986)	(0.0983)
target_avg	0.303*	0.253**	0.163	0.156	0.105	0.108	0.128
	(0.160)	(0.115)	(0.104)	(0.103)	(0.100)	(0.0985)	(0.0984)
LNgdp_o	0.00382	0.0325**	0.0143	0.0126	0.0190*	0.0186*	0.0210*
	(0.0182)	(0.0128)	(0.0118)	(0.0115)	(0.0113)	(0.0112)	(0.0114)
LNgdp_d	0.00500	0.0328**	0.0148	0.0138	0.0203*	0.0198*	0.0222*
	(0.0179)	(0.0128)	(0.0118)	(0.0115)	(0.0113)	(0.0112)	(0.0114)
LNgdpcap_o	-0.0133	-0.0292**	-0.0147	-0.0131	-0.0192*	-0.0195*	-0.0221**
	(0.0154)	(0.0123)	(0.0112)	(0.0109)	(0.0106)	(0.0106)	(0.0107)
LNgdpcap_d	-0.0134	-0.0290**	-0.0146	-0.0129	-0.0190*	-0.0194*	-0.0220**
	(0.0153)	(0.0123)	(0.0112)	(0.0109)	(0.0106)	(0.0106)	(0.0107)
Observations	902	1,604	1,994	2,183	2,257	2,301	2,322
R-squared	0.836	0.832	0.804	0.804	0.806	0.806	0.802
Source FE	YES	YES	YES	YES	YES	YES	YES
Target FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
S.Region#Y.FE	YES	YES	YES	YES	YES	YES	YES
T.Region#Y.FE	YES	YES	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Dynamics - royalties

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	S=5	S=10	S=15	S=20	S=25	S=30	S=∞
source_lag	**0.105****	**0.166*****	**0.144*****	**0.137*****	**0.159*****	**0.169*****	**0.161*****
	(0.0477)	(0.0337)	(0.0327)	(0.0305)	(0.0304)	(0.0297)	(0.0300)
target_lag	**0.0981****	**0.153*****	**0.139*****	**0.142*****	**0.163*****	**0.176*****	**0.167*****
	(0.0471)	(0.0343)	(0.0313)	(0.0301)	(0.0299)	(0.0293)	(0.0296)
source_avg	-0.0898	0.0653	0.186**	0.224**	0.140	0.156*	0.171*
	(0.160)	(0.0981)	(0.0916)	(0.0879)	(0.0889)	(0.0910)	(0.0898)
target_avg	-0.0977	0.0847	0.204**	0.249***	0.162*	0.180*	0.194**
	(0.160)	(0.0982)	(0.0917)	(0.0882)	(0.0898)	(0.0920)	(0.0908)
LNgdp_o	0.0329	0.0407***	0.0327**	0.0264**	0.0285**	0.0300**	0.0327**
	(0.0210)	(0.0154)	(0.0136)	(0.0131)	(0.0137)	(0.0140)	(0.0141)
LNgdp_d	0.0328	0.0416***	0.0333**	0.0274**	0.0296**	0.0310**	0.0338**
	(0.0210)	(0.0152)	(0.0136)	(0.0131)	(0.0136)	(0.0140)	(0.0141)
LNgdpcap_o	-0.0471**	-0.0510***	-0.0387***	-0.0346***	-0.0368***	-0.0373***	-0.0390***
	(0.0199)	(0.0152)	(0.0132)	(0.0128)	(0.0133)	(0.0136)	(0.0137)
LNgdpcap_d	-0.0470**	-0.0513***	-0.0386***	-0.0350***	-0.0374***	-0.0378***	-0.0396***
	(0.0200)	(0.0152)	(0.0132)	(0.0128)	(0.0133)	(0.0136)	(0.0137)
Observations	904	1,604	2,030	2,229	2,303	2,365	2,399
R-squared	0.839	0.822	0.781	0.783	0.781	0.777	0.774
Source FE	YES	YES	YES	YES	YES	YES	YES
Target FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
S.Region#Y.FE	YES	YES	YES	YES	YES	YES	YES
T.Region#Y.FE	YES	YES	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

OECD countries - dummies

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.0326**	**0.0471**	**0.169*** **	**0.159*** **
	(0.0360)	(0.0723)	(0.0306)	(0.0300)
target_lag	**0.0441**	**0.0625**	**0.169*** **	**0.166*** **
	(0.0304)	(0.0754)	(0.0298)	(0.0296)
source_avg	-0.116	0.450	0.141	0.164*
	(0.0937)	(0.299)	(0.0996)	(0.0918)
target_avg	-0.0407	0.416	0.135	0.188**
	(0.106)	(0.322)	(0.0997)	(0.0929)
oecd_source	**-0.0138***	**0.000702**	**-0.00319**	**-0.00418**
	(0.00702)	(0.0205)	(0.00660)	(0.00606)
oecd_target	**-0.0111**	**0.00324**	**-0.00291**	**-0.00393**
	(0.00712)	(0.0186)	(0.00660)	(0.00605)
oecd_pair	**-0.00461**	**-0.0121***	**-0.00622**	**-0.00876*** **
	(0.00400)	(0.00705)	(0.00380)	(0.00371)
Controls	YES	YES	YES	YES
Observations	2,257	928	2,322	2,399
R-squared	0.717	0.637	0.803	0.775
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

OECD countries - interaction terms II

	(5) Port. Div.	(6) Part. Div.	(7) Interest	(8) Royalties
source_lag	**-0.0463**	**0.0854**	**0.0459**	**-0.0100**
	(0.0427)	(0.0878)	(0.0362)	(0.0348)
target_lag	**0.0691***	**0.0377**	**0.0419**	**0.0107**
	(0.0394)	(0.103)	(0.0360)	(0.0340)
source_avg	-0.100	0.445	0.107	0.123
	(0.0950)	(0.301)	(0.0951)	(0.0890)
target_avg	-0.0425	0.410	0.107	0.140
	(0.105)	(0.325)	(0.0950)	(0.0891)
oecd_source	-0.0192**	0.00804	-0.0142*	-0.0245***
	(0.00895)	(0.0216)	(0.00749)	(0.00720)
oecd_target	-0.00947	0.00311	-0.0144*	-0.0231***
	(0.00964)	(0.0204)	(0.00750)	(0.00722)
oecd_pair	-0.0172	-0.0202	-0.0217***	-0.0271***
	(0.0164)	(0.0164)	(0.00707)	(0.00634)
source_lag#oecd_source	**0.0625**	**-0.128**	**0.153***	**0.214***
	(0.0507)	(0.146)	(0.0473)	(0.0496)
source_lag#oecd_pair	**0.198***	**0.0827**	**0.126***	**0.252***
	(0.0791)	(0.202)	(0.0611)	(0.0678)
target_lag#oecd_target	**-0.0113**	**0.00576**	**0.158***	**0.199***
	(0.0556)	(0.150)	(0.0470)	(0.0499)
target_lag#oecd_pair	**-0.123**	**0.0702**	**0.124***	**0.226***
	(0.0823)	(0.180)	(0.0616)	(0.0682)
Observations	2,257	928	2,322	2,399
R-squared	0.723	0.637	0.813	0.792
Controls	YES	YES	YES	YES
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Non-OECD countries - interaction terms

	(5) Port. Div.	(6) Part. Div.	(7) Interest	(8) Royalties
source_lag	**0.214***	**0.0406**	**0.325***	**0.456***
	(0.0643)	(0.138)	(0.0503)	(0.0557)
target_lag	**-0.0652**	**0.114**	**0.324***	**0.435***
	(0.0685)	(0.129)	(0.0502)	(0.0560)
source_avg	-0.100	0.445	0.107	0.123
	(0.0950)	(0.301)	(0.0951)	(0.0890)
target_avg	-0.0425	0.410	0.107	0.140
	(0.105)	(0.325)	(0.0950)	(0.0891)
non-oecd_source	0.0192**	-0.00804	0.0142*	0.0245***
	(0.00895)	(0.0216)	(0.00749)	(0.00720)
non-oecd_target	0.00947	-0.00311	0.0144*	0.0231***
	(0.00964)	(0.0204)	(0.00750)	(0.00722)
non-oecd_pair	0.0172	0.0202	0.0217***	0.0271***
	(0.0164)	(0.0164)	(0.00707)	(0.00634)
source_lag#non-oecd_source	**-0.0625**	**0.128**	**-0.153***	**-0.214***
	(0.0507)	(0.146)	(0.0473)	(0.0496)
source_lag#non-oecd_pair	**-0.198**	**-0.0827**	**-0.126**	**-0.252***
	(0.0791)	(0.202)	(0.0611)	(0.0678)
target_lag#non-oecd_target	**0.0113**	**-0.00576**	**-0.158***	**-0.199***
	(0.0556)	(0.150)	(0.0470)	(0.0499)
target_lag#non-oecd_pair	**0.123**	**-0.0702**	**-0.124**	**-0.226***
	(0.0823)	(0.180)	(0.0616)	(0.0682)
Observations	2,257	928	2,322	2,399
R-squared	0.723	0.637	0.813	0.792
Controls	YES	YES	YES	YES
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Indirect effect of tax havens - tax havens treaties count data

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	0.0364	0.0528	0.171***	0.160***
	(0.0360)	(0.0722)	(0.0305)	(0.0300)
target_lag	0.0516*	0.0663	0.170***	0.167***
	(0.0304)	(0.0740)	(0.0297)	(0.0296)
source_avg	-0.185*	0.435	0.103	0.163*
	(0.0976)	(0.300)	(0.0989)	(0.0908)
target_avg	-0.0876	0.401	0.0931	0.185**
	(0.111)	(0.317)	(0.0990)	(0.0917)
source_havens_treaties	-0.00327***	-0.00245	-0.00150*	-0.00112
	(0.000986)	(0.00204)	(0.000799)	(0.000780)
target_havens_treaties	-0.00256***	-0.00242	-0.00169**	-0.00118
	(0.000978)	(0.00221)	(0.000805)	(0.000783)
Controls	YES	YES	YES	YES
Observations	2,257	928	2,322	2,399
R-squared	0.719	0.637	0.803	0.775
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Avergage witholding rate with tax havens prior to DTT

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.0715**	**0.00310**	**0.139***	**0.181***
	(0.0469)	(0.123)	(0.0359)	(0.0352)
target_lag	**0.0772***	**0.102**	**0.136***	**0.190***
	(0.0395)	(0.107)	(0.0344)	(0.0343)
source_avg	-0.155	0.472	0.0609	0.00200
	(0.197)	(0.538)	(0.160)	(0.143)
target_avg	0.0629	0.430	0.0420	-0.0154
	(0.211)	(0.552)	(0.161)	(0.143)
source_havens_avg	**0.0426**	**0.521**	**0.0598**	**-0.0201**
	(0.0748)	(0.411)	(0.0704)	(0.0811)
target_havens_avg	**0.0692**	**0.526**	**0.0500**	**-0.0142**
	(0.0653)	(0.431)	(0.0704)	(0.0806)
Observations	1,658	619	1,761	1,878
R-squared	0.742	0.595	0.828	0.797
Controls	YES	YES	YES	YES
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

- WHT rates observable only for country-pairs with a tax treaty:
  - Sample selection
  - Heckman correction model
  - Exclusion criterion: common language
  - Estimated by two-step method

Heckman: first stage

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**-2.2266**	**-7.6657**	**-3.6465**	**-1.1118**
	(2.9388)	(6.6946)	(3.7507)	(3.4876)
target_lag	**0.0588**	**-5.5415**	**-4.4853**	**-0.6374**
	(2.8804)	(6.3977)	(3.7724)	(3.4667)
source_avg	-51.1386	-116.2218***	-22.1538	-51.1163*
	(33.3260)	(34.2132)	(84.9154)	(30.7396)
target_avg	-54.7268	-114.8414***	-22.4930	-58.9628*
	(36.5162)	(34.8915)	(84.7484)	(32.9056)
LNgdp_source	0.6312	0.1938	0.3528	-2.0503
	(1.8211)	(2.9921)	(9.1499)	(2.4634)
LNgdp_target	0.9404	0.9699	0.3779	-2.2580
	(1.8493)	(3.1300)	(9.0837)	(2.5219)
LNgdpcap_source	-1.3427	0.0848	0.0325	2.1089
	(1.8021)	(2.8009)	(8.6231)	(2.4727)
LNgdpcap_target	-1.5147	0.7345	0.0200	2.0237
	(1.7451)	(2.8482)	(8.5506)	(2.4890)
comlang_off	**0.6023***	**0.9145**	**0.8905****	**0.6125***
	(0.3128)	(0.6801)	(0.3594)	(0.3140)
Observations	4,508	2,337	4,511	4,601
Mills ratio	**0.0264*****	**0.0036**	**-0.0149***	**-0.0078**
	(0.0066)	(0.0060)	(0.0079)	(0.0079)
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Heckman's consistent standard errors in parentheses. *** p<0.01, ** p<0.05,
* p<0.1

Heckman: second stage

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.0513****	**0.0544**	**0.1682*****	**0.1763*****
	(0.0225)	(0.0635)	(0.0219)	(0.0238)
target_lag	**0.0700*****	**0.0648**	**0.1553*****	**0.1746*****
	(0.0236)	(0.0569)	(0.0218)	(0.0239)
source_avg	-0.0299	0.5814***	0.0394	0.1531**
	(0.0970)	(0.2177)	(0.0777)	(0.0761)
target_avg	0.2138**	0.5044**	0.0257	0.1799**
	(0.0987)	(0.2374)	(0.0778)	(0.0763)
LNgdp_source	-0.0039	-0.0708***	0.0231**	0.0405***
	(0.0115)	(0.0262)	(0.0103)	(0.0103)
LNgdp_target	0.0136	-0.0621**	0.0231**	0.0408***
	(0.0114)	(0.0267)	(0.0103)	(0.0103)
LNgdpcap_source	-0.0128	0.0707***	-0.0249**	-0.0461***
	(0.0108)	(0.0244)	(0.0098)	(0.0098)
LNgdpcap_target	-0.0184*	0.0597***	-0.0241**	-0.0465***
	(0.0109)	(0.0247)	(0.0098)	(0.0098)
Observations	2,367	1,079	2,425	2,480
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Heckman's consistent standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Robustness test II: $n = 3$

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.0354**	**0.0848**	**0.186***	**0.150***
	(0.0376)	(0.0855)	(0.0306)	(0.0311)
target_lag	**0.0321**	**0.108**	**0.181***	**0.151***
	(0.0321)	(0.0788)	(0.0296)	(0.0305)
source_avg	-0.0246	0.219	0.00746	0.0283
	(0.0926)	(0.310)	(0.0995)	(0.0869)
target_avg	-0.0275	0.108	-0.00706	0.0357
	(0.105)	(0.286)	(0.0999)	(0.0878)
LNgdp_source	-0.0119	-0.0481	0.0262**	0.0286*
	(0.0169)	(0.0618)	(0.0122)	(0.0154)
LNgdp_target	0.0211	-0.0116	0.0286**	0.0305**
	(0.0181)	(0.0509)	(0.0121)	(0.0154)
LNgdpcap_source	-0.00298	0.0548	-0.0270**	-0.0341**
	(0.0162)	(0.0637)	(0.0114)	(0.0149)
LNgdpcap_target	-0.0228	0.0196	-0.0274**	-0.0353**
	(0.0174)	(0.0496)	(0.0114)	(0.0149)
Observations	2,061	819	2,124	2,197
R-squared	0.729	0.644	0.806	0.779
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Robustness test II: $n = 4$

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.0645***	**0.0675**	**0.177*****	**0.148*****
	(0.0345)	(0.112)	(0.0331)	(0.0349)
target_lag	**0.0475**	**0.115**	**0.173*****	**0.151*****
	(0.0333)	(0.112)	(0.0321)	(0.0334)
source_avg	-0.112	0.184	-0.0836	-0.0475
	(0.0879)	(0.288)	(0.106)	(0.0857)
target_avg	-0.0458	-0.0526	-0.0892	-0.0410
	(0.109)	(0.270)	(0.106)	(0.0866)
LNgdp_source	-0.0161	-0.0644	0.0211	0.0256
	(0.0179)	(0.0777)	(0.0133)	(0.0162)
LNgdp_target	0.0220	-0.0371	0.0234*	0.0277*
	(0.0198)	(0.0734)	(0.0133)	(0.0162)
LNgdpcap_source	0.000993	0.0726	-0.0203	-0.0313**
	(0.0175)	(0.0777)	(0.0125)	(0.0157)
LNgdpcap_target	-0.0233	0.0518	-0.0205	-0.0326**
	(0.0192)	(0.0714)	(0.0125)	(0.0157)
Observations	1,880	706	1,928	2,003
R-squared	0.740	0.641	0.809	0.788
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.0414**	**0.101**	**0.182*****	**0.135*****
	(0.0338)	(0.146)	(0.0352)	(0.0355)
target_lag	**0.0223**	**0.241**	**0.185*****	**0.144*****
	(0.0329)	(0.213)	(0.0338)	(0.0341)
source_avg	-0.0969	0.213	-0.183*	-0.0735
	(0.0843)	(0.326)	(0.111)	(0.0906)
target_avg	0.0287	-0.139	-0.183*	-0.0661
	(0.108)	(0.375)	(0.111)	(0.0911)
LNgdp_source	-0.0150	-0.0541	0.0234*	0.0354**
	(0.0191)	(0.0826)	(0.0138)	(0.0172)
LNgdp_target	0.0193	-0.0249	0.0263*	0.0351**
	(0.0216)	(0.0765)	(0.0137)	(0.0172)
LNgdpcap_source	0.00188	0.0707	-0.0228*	-0.0374**
	(0.0186)	(0.0842)	(0.0126)	(0.0168)
LNgdpcap_target	-0.0204	0.0521	-0.0239*	-0.0364**
	(0.0209)	(0.0757)	(0.0126)	(0.0168)
Observations	1,738	617	1,781	1,853
R-squared	0.739	0.653	0.810	0.789
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Robustness test III: spatial lag contiguity

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.0429**	**0.123**	**0.123*****	**0.173*****
	(0.0421)	(0.151)	(0.0349)	(0.0354)
target_lag	**0.0227**	**0.191**	**0.113*****	**0.171*****
	(0.0299)	(0.159)	(0.0340)	(0.0359)
source_avg	-0.0544	1.061	0.140	0.0598
	(0.174)	(0.720)	(0.139)	(0.129)
target_avg	-0.0606	0.875	0.125	0.0278
	(0.175)	(0.634)	(0.139)	(0.128)
LNgdp_source	-0.0636***	-0.400	0.0100	0.00742
	(0.0231)	(0.291)	(0.0194)	(0.0181)
LNgdp_target	-0.0374	-0.439	0.0115	0.00550
	(0.0248)	(0.319)	(0.0193)	(0.0181)
LNgdpcap_source	0.0615***	0.403	-0.0130	-0.0192
	(0.0229)	(0.295)	(0.0191)	(0.0180)
LNgdpcap_target	0.0413*	0.442	-0.0144	-0.0168
	(0.0242)	(0.319)	(0.0189)	(0.0180)
Observations	1,365	474	1,407	1,439
R-squared	0.708	0.564	0.814	0.812
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Robustness test IV: spatial lag sub-region

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.0344**	**0.0337**	**0.165*****	**0.149*****
	(0.0346)	(0.0672)	(0.0292)	(0.0285)
target_lag	**0.0500***	**0.0834**	**0.163*****	**0.154*****
	(0.0297)	(0.0657)	(0.0284)	(0.0282)
source_avg	-0.0914	0.388	0.140	0.195**
	(0.0919)	(0.292)	(0.0966)	(0.0881)
target_avg	0.00264	0.386	0.133	0.217**
	(0.105)	(0.312)	(0.0968)	(0.0891)
LNgdp_source	-0.0147	-0.0555	0.0208*	0.0289**
	(0.0157)	(0.0504)	(0.0112)	(0.0139)
LNgdp_target	0.0111	-0.0426	0.0219*	0.0300**
	(0.0167)	(0.0532)	(0.0112)	(0.0139)
LNgdpcap_source	0.000221	0.0583	-0.0219**	-0.0362***
	(0.0151)	(0.0534)	(0.0106)	(0.0134)
LNgdpcap_target	-0.0130	0.0461	-0.0218**	-0.0368***
	(0.0160)	(0.0523)	(0.0106)	(0.0134)
Observations	2,413	973	2,480	2,587
R-squared	0.720	0.637	0.811	0.781
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Robustness test V: spatial lag market potential

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
source_lag	**0.033**1	**0.0179**	**0.0254**	**0.0897*****
	(0.0415)	(0.0479)	(0.0320)	(0.0302)
target_lag	**-0.00492**	**0.0218**	**0.00843**	**0.0821*****
	(0.0324)	(0.0426)	(0.0313)	(0.0299)
source_avg	-0.0991	0.113	0.188**	0.112
	(0.0937)	(0.162)	(0.0751)	(0.0720)
target_avg	0.112	0.330**	0.157*	0.135*
	(0.109)	(0.159)	(0.0830)	(0.0743)
LNgdp_source	-0.00545	0.0954**	0.00377	-0.0512**
	(0.0291)	(0.0384)	(0.0236)	(0.0227)
LNgdp_target	0.0636*	0.143***	0.0114	-0.0478**
	(0.0327)	(0.0384)	(0.0237)	(0.0228)
LNgdpcap_source	-0.00344	-0.0892**	-0.00185	0.0527**
	(0.0290)	(0.0375)	(0.0232)	(0.0225)
LNgdpcap_target	-0.0565*	-0.135***	-0.0106	0.0486**
	(0.0328)	(0.0377)	(0.0233)	(0.0226)
Observations	3,101	1,511	3,137	3,207
R-squared	0.683	0.831	0.760	0.758
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Robustness test VI: spatial lag placebo

	(1) Port. Div.	(2) Part. Div.	(3) Interest	(4) Royalties
placebo_source_lag	**0.0162**	**-0.190**	**0.0188**	**-0.0490**
	(0.0479)	(0.344)	(0.0479)	(0.0525)
placebo_target_lag	**0.0165**	**0.143**	**-0.0879***	**0.0389**
	(0.0390)	(0.225)	(0.0452)	(0.0477)
source_avg	-0.0340	2.366	0.267	-0.165
	(0.197)	(2.201)	(0.206)	(0.161)
target_avg	0.301	-0.688	0.140	0.117
	(0.254)	(2.697)	(0.243)	(0.228)
LNgdp_source	-0.00739	0.0184	0.00132	0.00799
	(0.0228)	(0.186)	(0.0206)	(0.0169)
LNgdp_target	-0.0230	0.284	0.0195	0.0182
	(0.0290)	(0.221)	(0.0222)	(0.0236)
LNgdpcap_source	0.00854	-0.0464	0.00600	0.000445
	(0.0229)	(0.194)	(0.0199)	(0.0175)
LNgdpcap_target	0.00408	-0.255	-0.0273	-0.0320
	(0.0274)	(0.175)	(0.0194)	(0.0222)
Observations	1,045	229	1,101	1,114
R-squared	0.802	0.789	0.814	0.811
Source FE	YES	YES	YES	YES
Target FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
SourceRegion#Year FE	YES	YES	YES	YES
TargetRegion#Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1