Does international commercial arbitration promote FDI?
Online Appendix*

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Robustness

The aim of this online Appendix is to present additional empirical evidence on the effect of arbitration on FDI. We start by relaxing the constraints imposed by a structural estimation of country pair dynamic panel. We proceed by dropping CPFE and substituting CYFE by CFE. The basic assumption behind this specification is that third country effects are constant. This would mean that total factor productivity is constant in all countries during the decade under study. We control for unobserved heterogeneity at the country pair level with standard gravity variables (distance, border, colony, common language, same-country, religion and landlocked). In particular, we estimate the following augmented gravity equation:

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$$FDI_{ijt} = \exp\begin{pmatrix} \beta_1 \ln(Y_{it} * Y_{jt}) + \beta_2 \ln(D_{ij}) + \beta_3 border_{ij} + \beta_4 colony_{ij} + \\ \beta_5 lang_{ij} + \beta_6 smctry_{ij} + \beta_7 rel_{ij} + \beta_8 locked_{ij} + \beta_{10} BIT_{ijt} + \\ \beta_{11} FTA_{ijt} + \beta_{12} NYC_{it} + \beta_{13} NYC_{jt} \\ \beta_{14} rights_{it} + \beta_{15} rights_{jt} + \beta_{16} rights_{it} * NYC_{it} + \beta_{17} rights_{jt} * NYC_{jt} \\ \beta_{18} \ln(D_{ij}) * NYC_{it} + \beta_{19} \ln(D_{ij}) * NYC_{jt} + \lambda_i + \lambda_i + \lambda_t \end{pmatrix} + e_{ijt} \quad (1)$$

Summary statistics of the additional control variables and dictionary for the variable names are shown in Table 1.

[Table 1 about here.]

Distance, common language, colony and border come from the CEPII (2011) database and control for freight, information, cultural, historic and administrative transaction costs between country pairs. Religious affinities increases the probability of economic transactions between nations with similar values and beliefs (Helble, 2007). The variable religion is calculated with data from CIA World Factbook (2011) according to following formula for country each country pair: $\%Christian_i * \%Christian_j + \%Muslim_i * \%Muslim_j + \%Hindu_i * \%Hindu_j + \%Jewish_i * \%Jewish_j$.

Although equation (1) is biased due to the reason explained in the empirical section, it offers several additional insights. Since CYFE are not included we are able to distinguish between home and host effects. Furthermore, CPFE might capture partly the effect of arbitration in reducing distance costs.

Table 2 reports the results for both margins. As expected, most coefficients are statistically significant with the expected signs. In particular, countries with larger economies invest more, and more distant countries invest less. Sharing a common language, religion or colonial link increases investment across borders. Additionally, we have run OLS regressions to measure the effect of omitting zeros. For example, the same country, border, landlocked and trade agreements have no significant impact on FDI on the CFE-OLS regressions. The PPML with a set of CFE and year dummies (CFE-PPML) overcomes country and firm-selection bias stemming from the omission of zeros. This empirical setup corrects the signs of FTA (now positive) and BIT (not significant). Focusing on the variables of interest, the OLS finds no significant effect of the NY Convention on source countries. Conversely, PPML-CFE estimates of NYC_{it} report positive and significant effects. Henceforth we discuss our preferred PPML estimator.

[Table 2 about here.]

With regard to our main variable of interest, the NY Convention has a positive and significant sign for both the investor and investee. This is consistent with the benefit that the NY Convention provides of allowing both parties in the contract to enforce arbitration rulings in the other firms' domestic courts (Berkowitz, Moenius and Pistor, 2006, p. 371). Moreover, our robustness analysis confirms our previous results that suggested the effect is greater on the intensive than on the extensive margin.

Columns (4) and (8) report the results of the interaction with legal rights and distance for investment volumes and projects respectively. The results obtained are in line with our baseline specification, where we showed that arbitration reduced the effect of better legal in the host.

However, the estimation of the interaction between NY Convention and distance is now significant and positive (our base estimations yielded not significant results). Allowing for a certain degree of unobserved heterogeneity at the country pair level, this result suggest that arbitration offsets distance costs completely when both countries in the pair join the NY Convention. That is, arbitration might be a way for MNEs to reduce the transaction costs associated with distant hosts and might shed some light on the role of distance in FDI. There are only a handful empirical studies that estimate a positive effect of distance on FDI (for exceptions see Daniels and Ruhr (2014) and Egger and Pfaffermayr, 2004). According to the proximity-concentration trade-off (Brainard, 1997; Carr, Markusen and Maskus, 2001), distance should have a positive effect on FDI Markusen (2002). Proximity to customers abroad saves trade costs while concentration of production (at home) reduces plant costs. Our results are consistent with the notion that when firms are able to use a familiar legal system - international commercial arbitration - the transaction costs that arise from distance are reduced. This suggests that when the institutional risks are low enough companies prefer to serve distant foreign markets with FDI rather than exports.

Quantile regressions

In table 3 we follow the same approach as above and relax the number of fixed effects in the regression. We are then able to differentiate between home and host effects. The results reported in Table 3 confirm our baseline quantile results where we discovered that the impact of arbitration is higher in FDI's upper quantiles. We can appreciate how this upper trend is present for both host and home countries.

[Table 3 about here.]

Endogeneity

We perform additional tests with other variables as instruments. Our approach is to use spatial and time instruments. We use instruments from the literature on BITs and FTAs, which highlights spatial, e.g. neighboring diffusion (Neumayer and Plümper, 2010) and timing dependencies (Baier, Bergstrand and Mariutto, 2014;

Baier and Bergstrand, 2009). Namely, (i) the number of neighbors who have joined the NY Convention, and (ii) the sum of the number of years that neighbors have been members of the NY Convention. These instruments should be independent of FDI and solely affect the likelihood that a country will join the NY Convention. We start with a conventional two-stage least square 2SLS estimator, sine it provides a standard way to test the validity of the instruments. Moreover, to eliminate the firm-selection bias stemming from zeros, we use the IV-PPML, which is the two stage instrumental variable version of PPML (Windmeijer and Silva, 1997)[1].

Column 1 in Table 4 reports the 2SLS results fro investment volumes. According to Wooldridge's (1995) robust score test of over-identifying restrictions, we cannot reject the null hypothesis that our instruments are valid at the 1% level. Both 2SLS IV-PPML estimates show a positive and significant coefficient sign for the NY Convention. The magnitude effect of this IV variable, however, appears to be overestimated.

The exercise is repeated for the extensive margin in the two columns of Table 4. The results are not as consistent as the aggregate flows. According to Wooldridge's (1995) robust score, we can discard the instruments used for the number of projects for the 2SLS estimation[2].

[Table 4 about here.]

Notes

[1]We focus on the host's Convention variable.

[2] Additionally, IV-PPML did not converge for the extensive margin.

References

Baier, Scott L. and Jeffrey H. Bergstrand. 2009. "Estimating the effects of free trade agreements on international trade flows using matching econometrics" *Journal of International Economics*. 77:63–76.

Baier, Scott L., Jeffrey H. Bergstrand, and Ronald Mariutto. 2014. "Economic Determinants of Free Trade Agreements Revisited: Distinguishing Sources of Interdependence" *Review of International Economics*. 22:31–58.

Berkowitz, Daniel, Johannes Moenius, and Katharina Pistor. 2006. "Trade, law, and product complexity" *The Review of Economics and Statistics*. 88:363–373.

Brainard, S. Lael. 1997. "An Empirical Assessment of the Proximity-Concentration Trade-off Between Multinational Sales and Trade" *The American Economic Review*. 87:520–544.

Carr, David L., James R. Markusen, and Keith E. Maskus. 2001. "Estimating the Knowledge-Capital Model of the Multinational Enterprise" *The American Economic Review*. 91:693–708.

CEPII. 2011. Centre d'études prospectives et d'informations internationales http://www.cepii.fr.

CIA World Factbook. 2011. Central Intelligence Agency www.cia.gov/library/publications/the-world-factbook/.

Daniels, Joseph P and Marc Ruhr. 2014. "Transportation Costs and US Manufacturing FDI" *Review of International Economics*. 22:299–309.

Egger, Peter and Michael Pfaffermayr. 2004. "Distance, trade and FDI: a Hausman–Taylor SUR approach" *Journal of Applied Econometrics*. 19:227–246.

Helble, Matthias. 2007. "Is God good for trade?" *Kyklos*. 60:385–413.

Markusen, James R. 2002. *Multinational firms and the theory of international trade*. Boston: MIT Press.

Neumayer, Eric and T. Plümper. 2010. "Spatial effects in dyadic data" *International Organization*. 64:145–166.

Windmeijer, Frank AG and J. M. C. Santos Silva. 1997. "Endogeneity in Count Data Models: An Application to Demand for Health Care" *Journal of Applied Econometrics*. 12:281–294.

Wooldridge, Jeffrey M.. 1995. Score diagnostics for linear models estimated by two stage least squares. In G. Maddala, P. Phillips, & T. Srinivasan (Eds.), *Advances in Econometrics and Quantitative Economics*, pp. 66–87. Oxford: Blackwell.

Table 1: Variable Dictionary and Summary Statistics

Variable	Description	Units/Type	mean	sd	min	max
$\ln(D_{ij})$	Distance	Kilometers	8.31	1.00	4.08	9.88
$border_{ij}$	Border	Dummy	0.06	0.24	0	1
$lang_{ij}$	Common language	Dummy	0.16	0.36	0	1
col_{ij}	Colony	Dummy	0.05	0.21	0	1
$smctry_{ij}$	Same Country	Dummy	0.02	0.13	0	1
rel_{ij}	Religion	Index	0.33	0.31	0	1
$locked_{ij}$	Landlocked	Augmented dummy	0.26	0.47	0	2

Table 2: Robustness Results (FDI)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
	FDI volumes				FDI projects			
$\ln(Y_{it} \cdot Y_{jt})$	0.338**	-0.198	0.344**	-0.085	0.182***	-0.352	0.244***	-0.225
	(0.13)	(0.24)	(0.15)	(0.27)	(0.05)	(0.29)	(0.06)	(0.27)
$\ln(D_{ij})$	-0.429***	-0.336***	-0.434***	-0.358***	-0.256***	-0.369***	-0.258***	-0.372***
	(0.04)	(0.05)	(0.04)	(0.05)	(0.02)	(0.03)	(0.02)	(0.03)
$border_{ij}$	0.0864	0.0386	0.0715	0.0274	0.0558	-0.130*	0.0610	-0.133*
	(0.09)	(0.13)	(0.09)	(0.12)	(0.05)	(0.07)	(0.05)	(0.07)
$lang_{ij}$	0.172**	0.489***	0.176**	0.461***	0.172***	0.511***	0.172***	0.490***
	(0.07)	(0.11)	(0.07)	(0.11)	(0.04)	(0.05)	(0.04)	(0.06)
col_{ij}	0.567***	0.513***	0.554***	0.524***	0.427***	0.625***	0.423***	0.625***
	(0.0912)	(0.110)	(0.09)	(0.11)	(0.05)	(0.08)	(0.06)	(0.08)
$smctry_{ij}$	0.147	0.387	0.155	0.310	0.145	0.571***	0.122	0.572***
	(0.16)	(0.24)	(0.16)	(0.23)	(0.09)	(0.14)	(0.09)	(0.14)
rel_{ij}	0.498***	0.839***	0.533***	0.828***	0.230***	0.415***	0.242***	0.398***
	(0.124)	(0.229)	(0.12)	(0.23)	(0.06)	(0.13)	(0.06)	(0.13)
$locked_{ij}$	0.002	-0.112	0.001	-0.092	0.011	-0.049	0.013	-0.043
	(0.0586)	(0.0906)	(0.06)	(0.09)	(0.03)	(0.05)	(0.03)	(0.05)
FTA_{ijt}	-0.011	0.241**	-0.005	0.235**	0.001	0.247***	0.004	0.254***
	(0.07)	(0.10)	(0.07)	(0.11)	(0.04)	(0.07)	(0.04)	(0.07)
BIT_{ijt}	-0.170***	-0.0949	-0.157***	-0.082	-0.106***	-0.006	-0.103***	-0.001
	(0.05)	(0.07)	(0.05)	(0.07)	(0.02)	(0.04)	(0.02)	(0.04)
NYC_{it}	0.485	0.748*	1.179	1.107	0.114	0.672***	-0.224	1.028**
	(0.31)	(0.39)	(0.79)	(1.40)	(0.12)	(0.23)	(0.34)	(0.51)
NYC_{jt}	0.339*	0.542**	0.688*	2.045***	0.174**	0.462***	0.376**	0.965***
	(0.19)	(0.25)	(0.37)	(0.46)	(0.07)	(0.10)	(0.15)	(0.27)
$rights_{it}$			0.432**	0.257			-0.047	0.128
			(0.16)	(0.33)			(0.07)	(0.10)
$rights_{jt}$			0.105	0.411***			0.042	0.075
			(0.08)	(0.08)			(0.03)	(0.05)
$rights_{it} * NYC_{it}$			-0.322*	-0.188			0.055	-0.110
			(0.17)	(0.33)			(0.08)	(0.10)
$rights_{jt} * NYC_{jt}$			-0.092	-0.418***			-0.057	-0.143**
			(0.08)	(0.08)			(0.03)	(0.06)
$\ln(D_{ij}) * NYC_{it}$			-0.142	-0.206			0.121	0.747***
			(0.16)	(0.32)			(0.07)	(0.12)
$\ln(D_{ij}) * NYC_{jt}$			-0.058	0.205**			0.079*	0.435***
			(0.08)	(0.11)			(0.04)	(0.08)
Dep. Variable	lnFDI	FDI	lnFDI	FDI	lnProjects	Projects	lnProjects	Projects
Observations	14330	39181	13274	35226	14330	39181	13274	35226
R^2	0.28	0.44	0.29	0.44	0.55	0.78	0.55	0.79
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses (clustered by country pair). Country and year fixed effects included

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Robustness Results (Quantile Regression)

	(1)	(2)	(3)
	Q(0.25)	Q(0.5)	Q(0.75)
$\ln(Y_{it} \cdot Y_{jt})$	0.592***	0.744***	0.804***
	(0.01)	(0.01)	(0.01)
$\ln(D_{ij})$	-0.861***	-1.241***	-1.194***
	(0.02)	(0.03)	(0.02)
$border_{ij}$	0.202***	0.117***	0.449***
	(0.02)	(0.03)	(0.03)
$lang_{ij}$	0.449***	0.512***	0.471***
	(0.01)	(0.01)	(0.03)
col_{ij}	0.877***	1.238***	0.876***
	(0.01)	(0.04)	(0.03)
$smctry_{ij}$	0.196***	-0.0001	0.243***
	(0.01)	(0.01)	(0.02)
rel_{ij}	0.583***	0.367***	0.402***
	(0.01)	(0.03)	(0.04)
$locked_{ij}$	0.042***	-0.087***	0.020**
	(0.01)	(0.01)	(0.01)
FTA_{ijt}	0.128***	0.0544	-0.209***
	(0.01)	(0.06)	(0.01)
BIT_{ijt}	-0.101***	-0.058***	0.0944***
	(0.01)	(0.01)	(0.01)
NYC_{it}	0.097***	0.096**	0.275***
	(0.01)	(0.02)	(0.02)
NYC_{jt}	0.106***	0.086***	0.289***
	(0.01)	(0.01)	(0.01)
Dep. Variable	FDI	FDI	FDI
Observations	39201	39201	39201
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Boostrap standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Results (Endogeneity)

	(1) 2SLS	(2) IV-PPML	(3) 2SLS
$\ln(Y_{it} \cdot Y_{jt})$	0.303***	0.267***	0.112***
	(0.01)	(0.01)	(0.01)
$\ln(D_{ij})$	-0.193***	-0.160***	-0.063***
	(0.02)	(0.01)	(0.008)
$border_{ij}$	0.483***	0.140***	0.191***
	(0.06)	(0.03)	(0.02)
$lang_{ij}$	0.627***	0.316***	0.253***
	(0.05)	(0.03)	(0.01)
col_{ij}	0.769***	0.280***	0.327***
	(0.06)	(0.03)	(0.02)
$smctry_{ij}$	-0.300***	0.017	-0.115***
	(0.09)	(0.05)	(0.03)
rel_{ij}	-0.299***	-0.091***	-0.111***
	(0.05)	(0.04)	(0.02)
$locked_{ij}$	-0.0662*	-0.056	-0.0241*
	(0.03)	(0.02)	(0.01)
FTA_{ijt}	-0.250***	-0.016	-0.116***
	(0.04)	(0.03)	(0.01)
BIT_{ijt}	0.147***	0.132***	-0.111***
	(0.03)	(0.02)	(0.01)
NYC_{jt}	4.175***	4.597***	1.920***
	(0.62)	(1.53)	(0.22)
Dep. Variable	ln(FDI+1)	FDI	ln(Projects+1)
Observations	39201	39201	39201
Year FE	Yes	Yes	Yes
Wooldridge score	1.529		423.5
	(p = 0.21)		(p =0.0)

Notes: Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Wooldridge's (1995) robust score test for over-identification of instruments

Instruments: Number of neighbors with NYC and Sum of years since neighbors signed NYC