

Regulating Foreign Investment: A Study of the Properties of Bilateral Investment Regimes

Pablo M. Pinto[†] Santiago M. Pinto[‡] Nicolás E. Stier-Moses[†]

[†]Columbia University [‡]West Virginia University

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Motivation

- ▶ HOME COUNTRY BIAS:
 - ▶ investing abroad involves higher costs and risks than investing at home
- ▶ Proliferation of BILATERAL INVESTMENT TREATIES (BITs)
 - ▶ At the end of 2008 the cumulative number of BITs signed was 2,676
 - ▶ Most BITs involve dyads that include a developed and a developing country
 - ▶ Number of BITs among developing countries has increased in recent years
 - ▶ Emerging markets account for one fourth of the world's FDI stock under BITs in 2007 (Sachs and Sauvant 2009)
 - ▶ Unlike trade, no multilateral regime
- ▶ Empirical literature suggests that the effects of BITs on changes in foreign direct investment activity are small (at best); see Sauvant and Sachs (2009)
- ▶ If BITs have limited effect, why sign them?

What are the consequences of BIT signing?

We develop a NETWORK FORMATION GAME aimed at explaining the causes and consequences of signing and ratifying BITs

- ▶ Host governments internalize:
 - ▶ the effect of BITs on the investing activity to their national firms abroad
 - ▶ the expected externalities/spillovers from inward investment at home
- ▶ BITs provide signatory countries an ENFORCEMENT TECHNOLOGY that has the potential to:
 - ▶ Increase the return to investors from the other signatory party
 - ▶ Reduce (but never eliminate) the risk (variance) of the return to those investors
- ▶ Effect would be reflected in HIGHER RETURNS and REDUCE RISK to investors
- ▶ In equilibrium may lead to limited or no change in the PORTFOLIO ALLOCATION of direct investment

Our contribution

- ▶ Develop an empirical strategy to measure effect of BITs on returns and risk:
 - ▶ Fit a structural model to estimate mean and variance from observed allocation of FDI across countries (portfolio analogy)
- ▶ Modelling BIT signing allows us to explain the absence of a clear association between BITs and FDI
 - ▶ Test proposition that in equilibrium BITs will have no impact on FDI flows
 - ▶ Adding lags and other frictional elements into BIT signing:
 - ▶ Effects of BITs of FDI flows/stocks is non-linear in time
 - ▶ Short-term elasticity of allocation when signing fades over time

Controversy over effect of BITs on FDI I

- ▶ Some scholars have found that BITs have:
 - ▶ Positive effects on flows between developed and developing countries (Salacuse and Sullivan 2009; Buthe and Milner 2009; Neumayer and Spess 2009; Jandhyala, Henisz and Mansfield 2008). Effect becomes greater after ratification (Egger and Pfaffermayer 2004, 2009)
 - ▶ Non-linear relationship on flows to developing countries: increasing at a decreasing rate (Tobin and Rose-Ackerman 2006; Rose-Ackerman 2009)
 - ▶ Positive effect when accounting for selection and endogeneity (Swenson 2009, Aisbett 2009)
 - ▶ No effect on flows (UNCTAD 1998; Hallward-Driemeyer 2003, 2009; Yackee 2009; Tobin and Rose-Ackerman 2005)
- ▶ There is also controversy on whether the effect of BITs:
 - ▶ complements good quality institutions (Rose-Ackerman 2009; Hallward-Driemeyer 2003)
 - ▶ substitutes for poor quality institutions (Neumayer and Spess 2005)

Controversy over effect of BITs on FDI II

- ▶ Contradictory findings could be a function of:
 - ▶ sample: geographic, sector and temporal coverage
 - ▶ operationalization and transformation of variables: flows, stocks; dyadic or aggregate
 - ▶ modeling choices
- ▶ Or it is possible that the studies are looking at the behavioral implications on the relationship between BITs and the allocation of FDI that would follow from their theories
 - ▶ Need to account what it is that BITs really do

Modeling BITs

We model the interaction of governments as a network formation process where NODES (countries) choose which ARCS to add (treaties to sign).

- ▶ Modeling Assumptions:

- ▶ Investing abroad involves higher costs and higher risks than investing at home.
- ▶ Investors' decisions on how to allocate their investments are the outcome of a mean-variance optimization problem.
- ▶ Governments internalize the utility of investors, workers and the expected spillover effects from inward investment
- ▶ Governments are in competition for a fixed supply of domestic and foreign investment (can be relaxed)
- ▶ BITs are an *enforcement technology* that reduces (but does not eliminate) the costs and risk of investing in a host country
 - ▶ In anarchy arbitration is not a perfect enforcement mechanism: it creates reputation effects

Portfolio Optimization Model I

- ▶ Investors return vary with characteristics of host countries (endowments/development) and with the presence of a BIT

$$R_i = \begin{cases} X_i & \text{with probability } 1 - p_i \\ -1 & \text{with probability } p_i \end{cases}$$

wX_i is the random return

p_i is the political risk or risk of expropriation

$$p_i = f\{BIT\}$$

$$E(R_i) = E(X_i) - p_i(E(X_i) + 1)$$

$$V(R_i) = (1 - p_i)(V(X_i) + p_i(E(X_i) + 1)^2)$$

- ▶ Expected returns μ_d and μ_g , and variances σ_d^2 and σ_g^2 differ if the country is developed (d) or developing (g)
- ▶ Signing BITs adds shocks by Δ_d^μ , Δ_g^μ , $\Delta_d^{\sigma^2}$, and $\Delta_g^{\sigma^2}$.

Portfolio Optimization Model II

- ▶ Hence investors i in country j with development level $a \in \{d, g\}$ face stochastic returns whose first two moments are:

$$\mu_a + BIT_{ij}\Delta_a^\mu \quad \text{and} \quad \sigma_a^2 + BIT_{ij}\Delta_a^{\sigma^2},$$

- ▶ Investors decide what proportion w_{ij} of their investment to allocate to country j to solve the following optimization problem:

$$\text{maximize } \vec{\mu}_i^T w_i - \frac{1}{2} q w_i^T \Sigma w_i \quad (1)$$

$$\text{subject to } \mathbb{I}^T w_i = 1, \quad (2)$$

$$0 \leq w_i \leq \mathbb{I}. \quad (3)$$

where $q \geq 0$ is a risk-aversion parameter, Σ is the square covariance matrix and \mathbb{I} is the vector of all ones

Parameter Estimation using the Portfolio Model

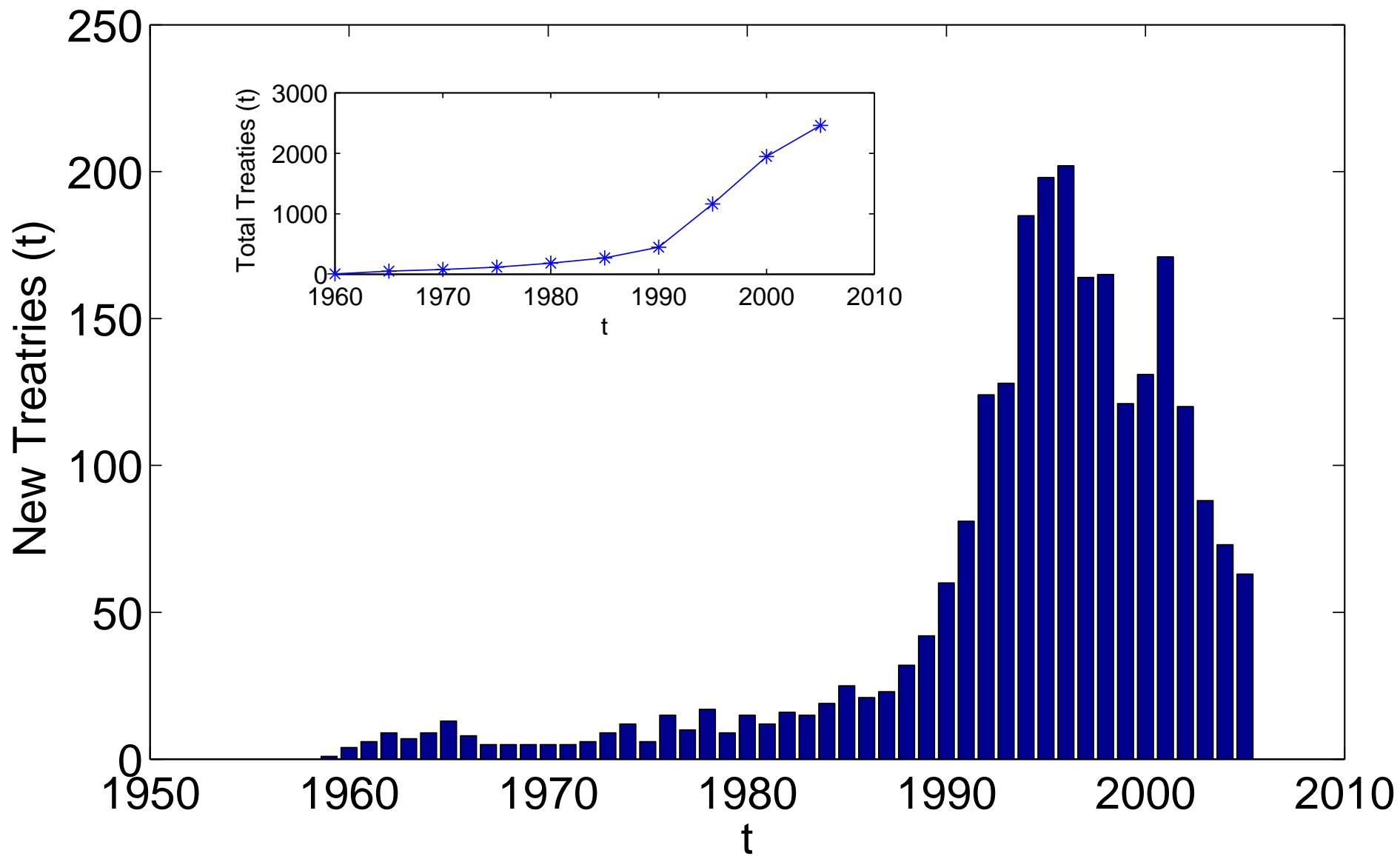
- ▶ Use the observed allocation of FDI to develop a structural estimation of the portfolio allocation model to estimate the expectation and variance of returns
 - ▶ Compare the fractions of the observed allocation with the fractions derived from Problem (1)-(3)
 - ▶ The optimal solution is:

$$w(BITs^t, \mu_d, \mu_g, \sigma_d^2, \sigma_g^2, \Delta_d^\mu, \Delta_g^\mu, \Delta_d^{\sigma^2}, \Delta_g^{\sigma^2}, q),$$

- ▶ Fit parameters by minimizing the sum of the squares of the Euclidean distance between the observed and predicted vectors:

$$\sum_{i,t} \|w_i^t - w(BITs^t, \mu_d, \mu_g, \sigma_d^2, \sigma_g^2, \Delta_d^\mu, \Delta_g^\mu, \Delta_d^{\sigma^2}, \Delta_g^{\sigma^2}, q)\|_2^2.$$

- ▶ Used the estimated parameters to simulate the *network formation game* that can be compared with the actual BIT network (see Bonomo, Sabán and Stier-Moses 2010)



New treaties per year. The insets show cumulative numbers.
Source: Bonomo et al. 2010.

Variable	Dependent Variable						
	Ln (US outward FDI)						
Ln(FDI) _{t-1}	0.746*** (0.021)	0.542*** (0.025)	0.627*** (0.023)	0.541*** (0.026)	0.628*** (0.023)	0.541*** (0.025)	0.628*** (0.023)
<i>Interval under ratified BIT</i>							
All years	1.06*** (0.213)	0.454* (0.241)					
1st interval			0.22 (0.256)	0.242 (0.314)	0.299 (0.257)	0.307 (0.308)	0.397** (0.188)
2nd interval			0.685** (0.282)	0.838*** (0.318)	0.479* (0.274)	0.619* (0.316)	0.046 (0.316)
3rd interval			0.017 (0.360)	0.377 (0.307)	0.371* (0.220)	0.584** (0.272)	
4th interval			0.377 (0.738)	1.008* (0.530)	-0.266 (0.790)	0.058 (0.671)	
5th interval					0.245 (1.039)	0.806 (0.828)	
Ln(GDP/cap)	0.646** (0.264)	0.464*** (0.101)	0.646** (0.265)	0.465*** (0.101)	0.648** (0.265)	0.464*** (0.101)	
Ln(openness)	0.621*** (0.189)	0.438*** (0.093)	0.617*** (0.190)	0.437*** (0.093)	0.618*** (0.190)	0.439*** (0.093)	
Ln(xrate)	-0.018 (0.028)	-0.014 (0.012)	-0.019 (0.028)	-0.013 (0.012)	-0.019 (0.028)	-0.013 (0.012)	
Ln(population)	-0.206 (0.469)	0.45*** (0.044)	-0.198 (0.472)	0.45*** (0.044)	-0.192 (0.472)	0.451*** (0.044)	
Contiguous		0.839* (0.504)		0.829* (0.502)		0.826* (0.501)	
Common language		0.241* (0.129)		0.24* (0.128)		0.238* (0.128)	
Ln(distance)		0.193 (0.217)		0.189 (0.217)		0.19 (0.216)	
<i>Income group (excl: High)</i>							
Low			-0.834*** (0.276)		-0.84*** (0.276)		-0.843*** (0.276)
Lower-middle			-0.793*** (0.219)		-0.794*** (0.219)		-0.799*** (0.219)
Upper-middle			-0.604*** (0.194)		-0.608*** (0.194)		-0.61*** (0.194)
<i>Decades (excl: 1970s)</i>							
1980s		2.236*** (0.167)	1.82*** (0.151)	2.238*** (0.168)	1.818*** (0.151)	2.236*** (0.168)	1.817*** (0.151)
1990s		2.903*** (0.290)	2.121*** (0.200)	2.909*** (0.291)	2.116*** (0.200)	2.906*** (0.291)	2.112*** (0.199)
2000s		2.966*** (0.332)	2.076*** (0.223)	2.956*** (0.332)	2.075*** (0.223)	2.959*** (0.332)	2.08*** (0.223)
Intercept	0.037 (0.049)	-8.231* (4.644)	-11.953*** (1.897)	-8.287* (4.658)	-11.931*** (1.896)	-8.349* (4.657)	-11.928*** (1.895)
N	3658	3499	3499	3499	3499	3499	3499
Groups	188	178	178	178	178	178	178
R ²	0.702	0.649	0.752	0.652	0.752	0.653	0.752
Intercepts	FE	FE	Random	FE	Random	FE	Random
Region dummies	No	No	Yes	No	Yes	No	Yes
Under BIT interval	All	All	5-year	5-year	4-year	4-year	10-year

Significance levels : * 10% ** 5% *** 1%; clustered std. errors in parenthesis.

Variable	Dependent Variable						
	Ln (US outward FDI)						
Ln(FDI) _{t-1}	0.746*** (0.021)	0.542*** (0.025)	0.627*** (0.023)	0.541*** (0.026)	0.628*** (0.023)	0.541*** (0.025)	0.628*** (0.023)
<i>Interval under ratified BIT</i>							
All years	1.06*** (0.213)	0.454* (0.241)					
1st interval			0.22 (0.256)	0.242 (0.314)	0.299 (0.257)	0.307 (0.308)	0.397** (0.188)
2nd interval			0.685** (0.282)	0.838*** (0.318)	0.479* (0.274)	0.619* (0.316)	0.046 (0.316)
3rd interval			0.017 (0.360)	0.377 (0.307)	0.371* (0.220)	0.584** (0.272)	
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Intercepts	FE	FE	Random	FE	Random	FE	Random
Region dummies	No	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Decade dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Income Dummies	No	No	Yes	No	Yes	No	Yes
Under BIT interval	All	All	5-year	5-year	4-year	4-year	10-year

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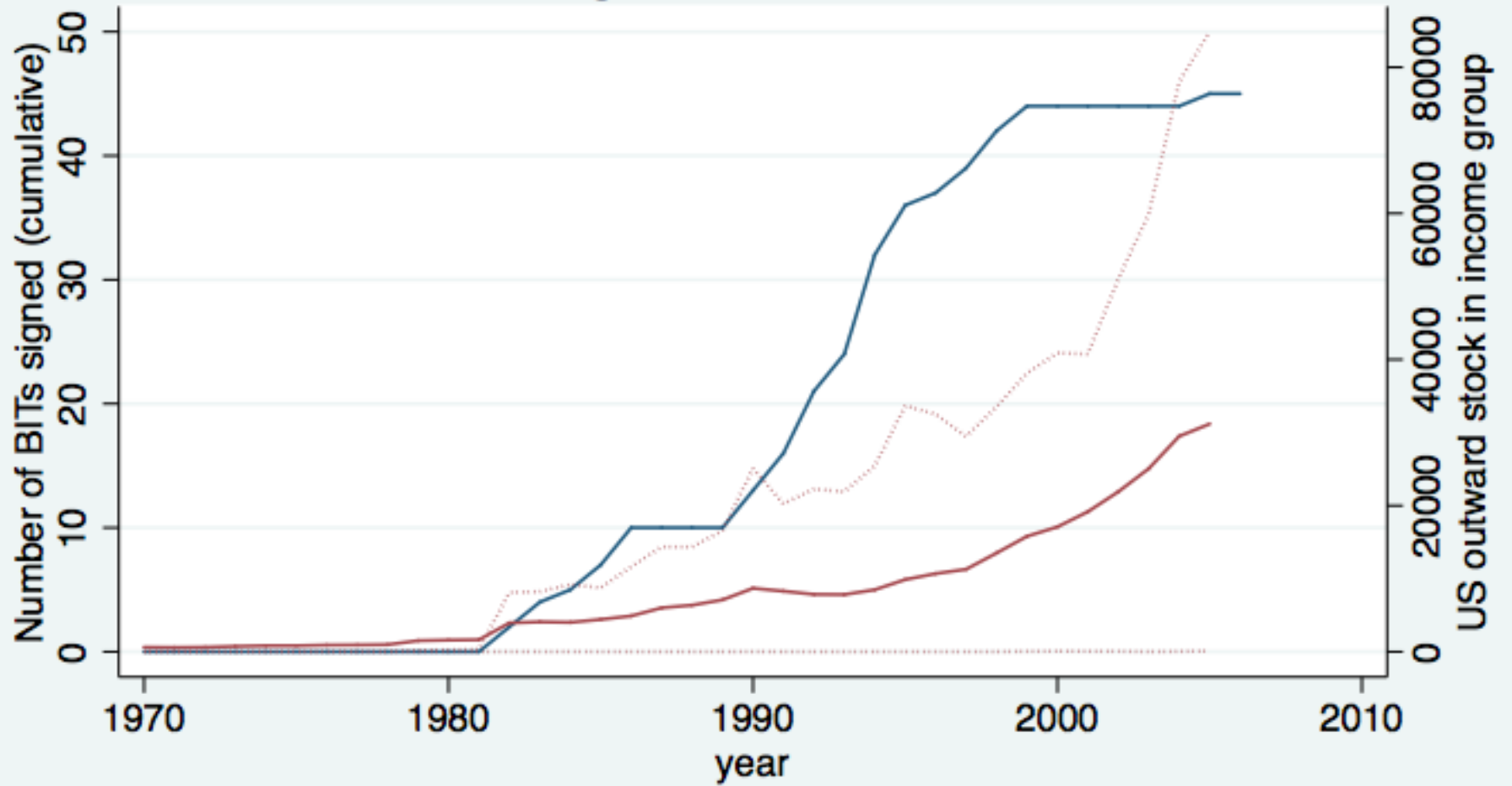
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A Study of the Properties of Bilateral Investment Regimes

Abstract

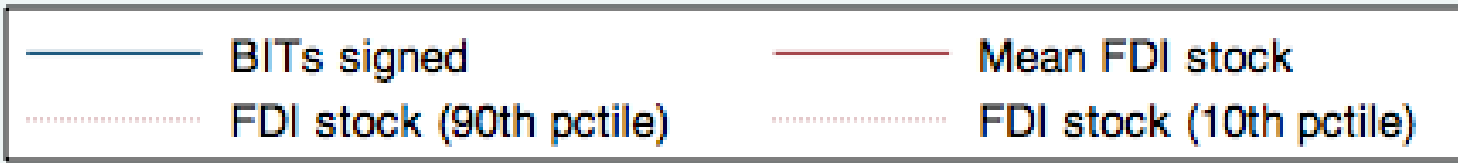
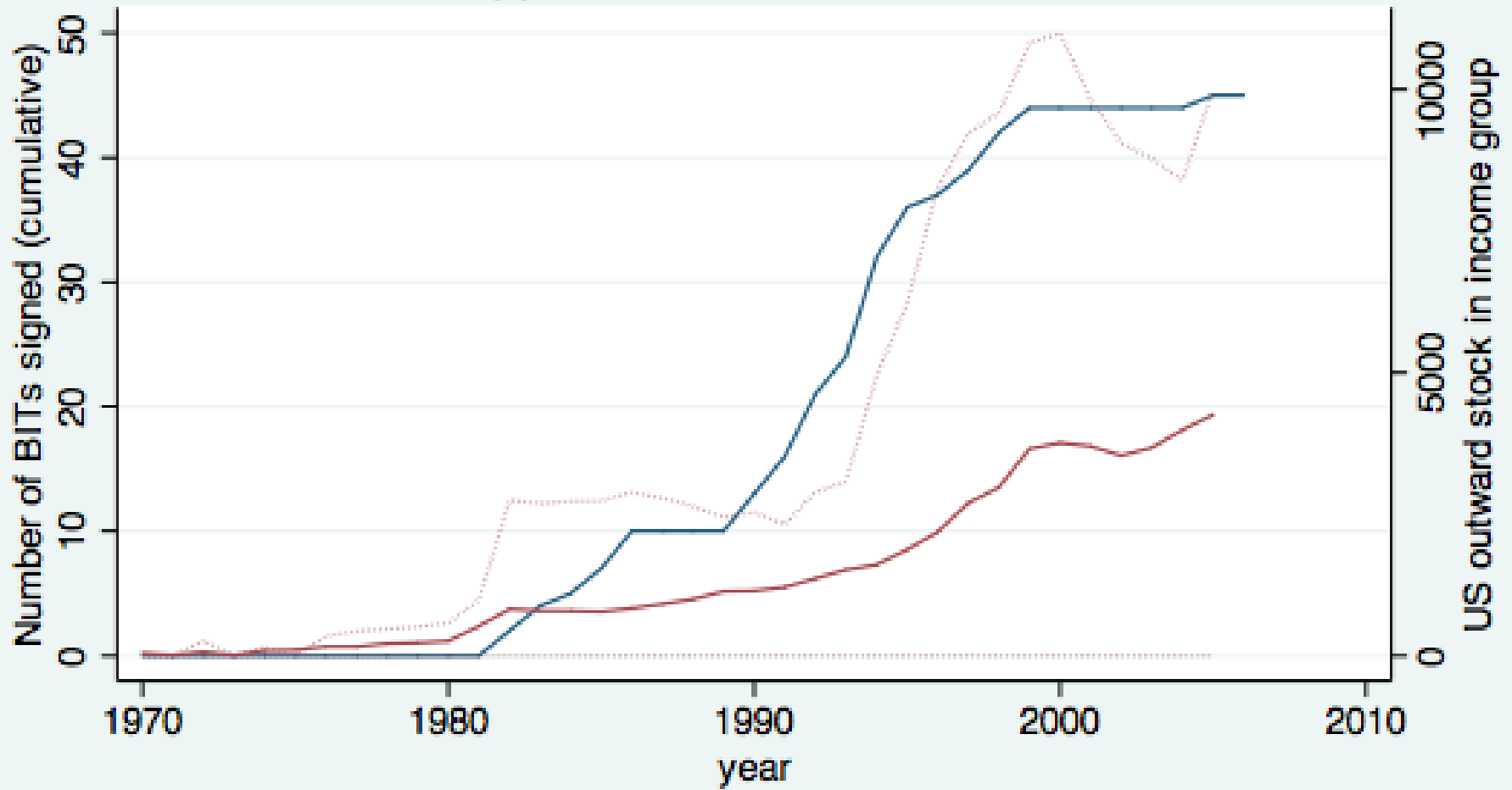
In this paper, we argue that the signing of BITs can be explained by its differential impact on welfare and the distributive consequences of regulating and enforcing investment standards at the international level. In our model, governments compete for a fixed supply of domestic and foreign investment. We assume that investing abroad involves higher costs and risks than at home. Investors' decisions are the outcome of a mean-variance optimization problem that explicitly accounts for this home country bias. The interaction between governments is modeled as a network formation process where nodes (countries) choose which arcs to add (treaties to sign). We explicitly model the main provisions of BITs as an enforcement technology that reduces costs and risk, and has the potential to increase the return to investors. In deciding which treaties to sign, governments also internalize the potential effects of inward investment on the return to domestic factors of production. One of the central corollaries derived from our model is that main effect of BITs is on the mean and the variance of the return to investors from the counterpart in the agreement. In equilibrium -when all the potentially beneficial agreements have been signed and the network reaches a level of saturation- the signing and ratification of BITs would be consistent with a limited reallocation of investment capital across countries, or even no reallocation at all if BIT signing is defensive. We would expect some transitional changes in the allocation of capital in favor of countries that are BIT signatories in the transition to that stage, a prediction that seems to be borne out in statistical analyses of US outward FDI stock. We do expect BITs to have an effect on risk and return to investors, which are hard to observe. Hence we develop an empirical strategy to estimate the effect of BITs on risk and return from a structural model of FDI allocation. The model and preliminary empirical findings presented in the paper help explain the contradictory results in the empirical literature on the effects of BITs on FDI flows.

United States: BITs signed and FDI outward stock in High income countries

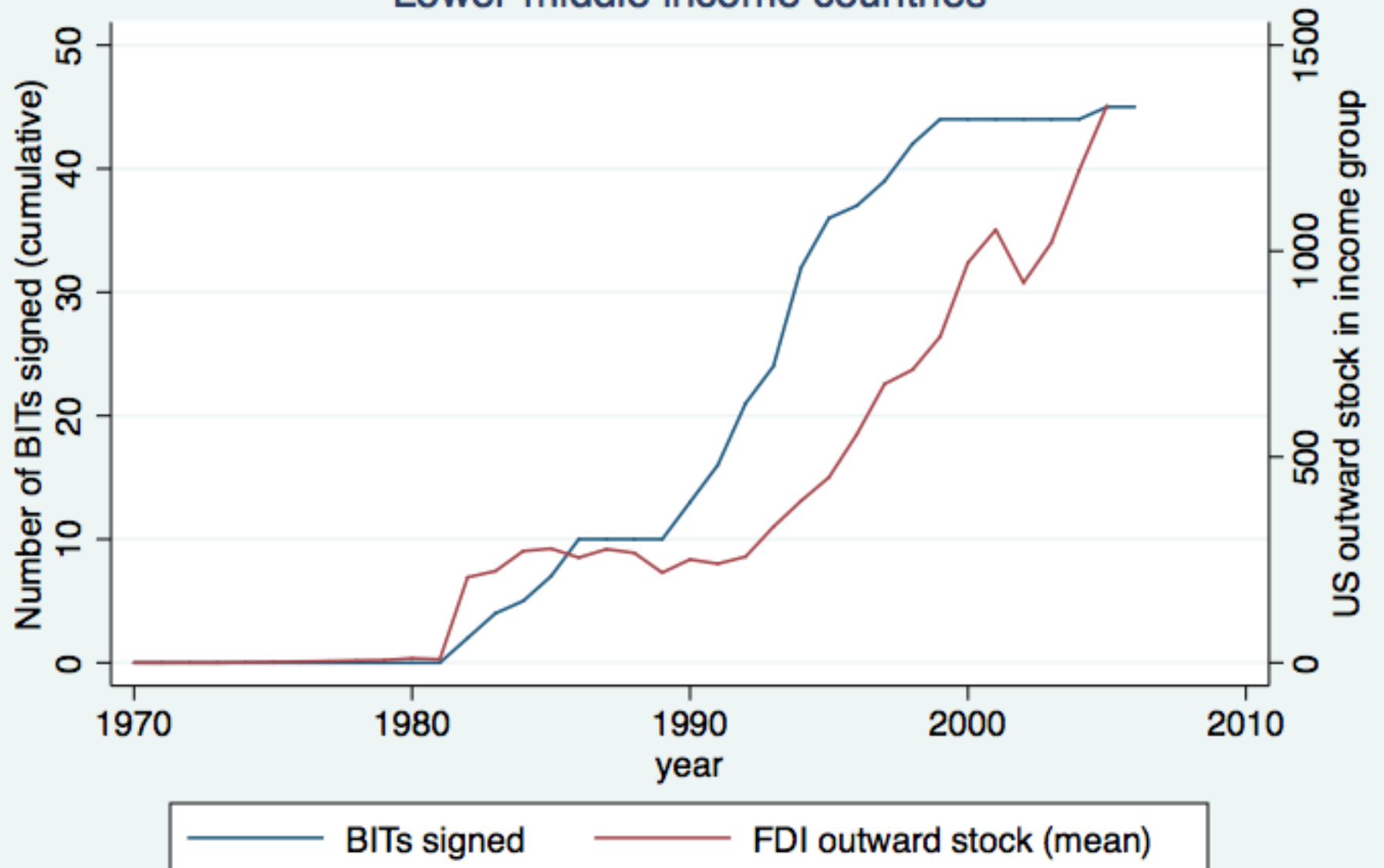


— BITs signed
— Mean FDI stock
..... FDI stock (90th pctile)
..... FDI stock (10th pctile)

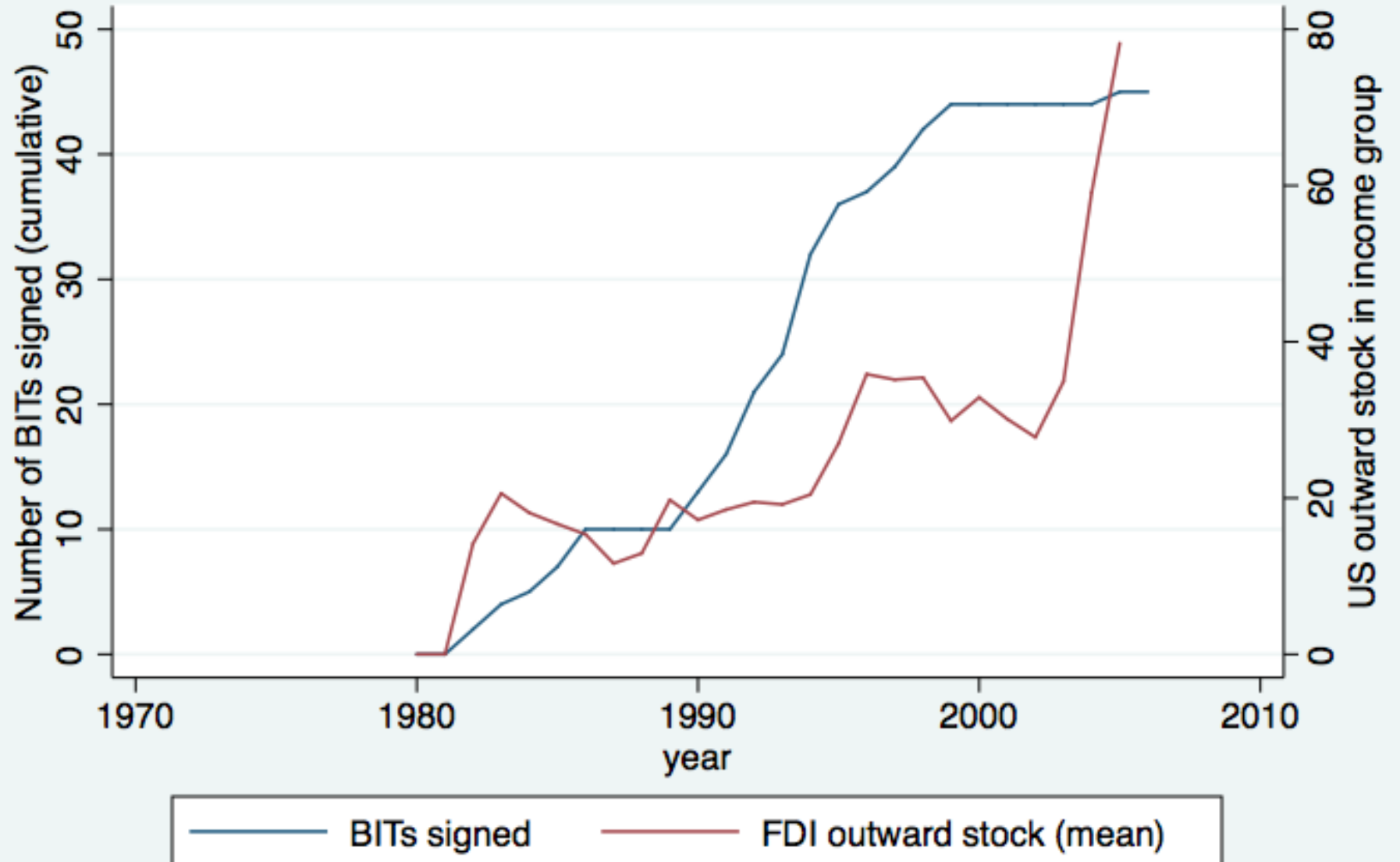
United States: BITs signed and FDI outward stock in Upper-middle income countries



United States: BITs signed and outward FDI stock Lower-middle income countries



United States: BITs signed and FDI outward stock in Low income countries



BITs signed by the United States

Country	Sign Date	Entry Date	Country	Sign Date	Entry Date
Panama	Oct-82	May-91	Ecuador	Aug-93	May-97
Senegal	Dec-83	Oct-90	Belarus	Jan-94	..
Haiti	Dec-83	..	Jamaica	Feb-94	Mar-97
Congo Dem	Aug-84	Jul-89	Ukraine	Mar-94	Nov-96
Morocco	Jul-85	May-91	Georgia	Mar-94	Aug-97
Turkey	Dec-85	May-90	Estonia	Apr-94	Feb-97
Cameroon	Feb-86	Apr-89	Trinidad & Tobago	Sep-94	Dec-96
Bangladesh	Mar-86	Jul-89	Mongolia	Oct-94	Jan-97
Egypt	Mar-86	Jun-92	Uzbekistan	Dec-94	..
Grenada	May-86	Mar-89	Latvia	Jan-95	Dec-96
Congo	Feb-90	Aug-94	Albania	Jan-95	Jan-98
Poland	Mar-90	Aug-94	Honduras	Jul-95	Jul-01
Tunisia	May-90	Feb-93	Nicaragua	Jul-95	..
Sri Lanka	Sep-91	May-93	Croatia	Jul-96	Jun-01
Czech Republic	Oct-91	Dec-92	Jordan	Jul-97	Jun-03
Slovakia	Oct-91	Dec-92	Azerbaijan	Aug-97	Aug-01
Argentina	Nov-91	Oct-94	Lithuania	Jan-98	Nov-01
Kazakhstan	May-92	Jan-94	Bolivia	Apr-98	Jun-01
Romania	May-92	Jan-94	Mozambique	Dec-98	Mar-05
Russian Federation	Jun-92	..	El Salvador	Mar-99	..
Bulgaria	Sep-92	Jun-94	Bahrain	Sep-99	May-01
Armenia	Sep-92	Mar-96	Uruguay	Nov-05	Nov-06
Kyrgyzstan	Jan-93	Jan-94	Rwanda	Feb-08	..
Moldova	Apr-93	Nov-94			

Preferential Trade Agreements entered by the US

Partner country	Sign date	Entry date	Type of PTA	Investment protection
Israel	Apr-1985	Jan-1995	Bilateral	No
Canada	Dec-1993	Jan-1994	NAFTA	Yes
Mexico	Dec-1993	Jan-1994	NAFTA	Yes
Jordan	Oct-2000	Dec-2001	Bilateral	No
Singapore	May-2003	Jan-2004	Bilateral	Yes
Chile	Jun-2003	Jan-2004	Bilateral	Yes
Australia	May-2004	Jan-2005	Bilateral	Yes
El Salvador	May-2004	Mar-2006	CAFTA-DR	Yes
Honduras	May-2004	Apr-2006	CAFTA-DR	Yes
Nicaragua	May-2004	Apr-2006	CAFTA-DR	Yes
Guatemala	May-2004	Jul-2006	CAFTA-DR	Yes
Dominican Republic	May-2004	Mar-2007	CAFTA-DR	Yes
Costa Rica	May-2004	Jan-2009	CAFTA-DR	Yes
Morocco	Jun-2004	Jan-2006	Bilateral	Yes
Bahrain	Sep-2004	Aug-2006	Bilateral	Yes [†]
Oman	Jan-2006	Jan-2009	Bilateral	Yes
Peru	Apr-2006	Feb-2009	Bilateral	Yes
Colombia	Nov-2006	..	Bilateral	Yes
Panama	Jun-2007	..	Bilateral	Yes
South Korea	Jun-2007	..	Bilateral	Yes

[†] Protection for financial investment only