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North-South FDI and Bilateral Investment Treaties

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United Nations University

North-South FDI and Bilateral Investment Treaties (BITs)

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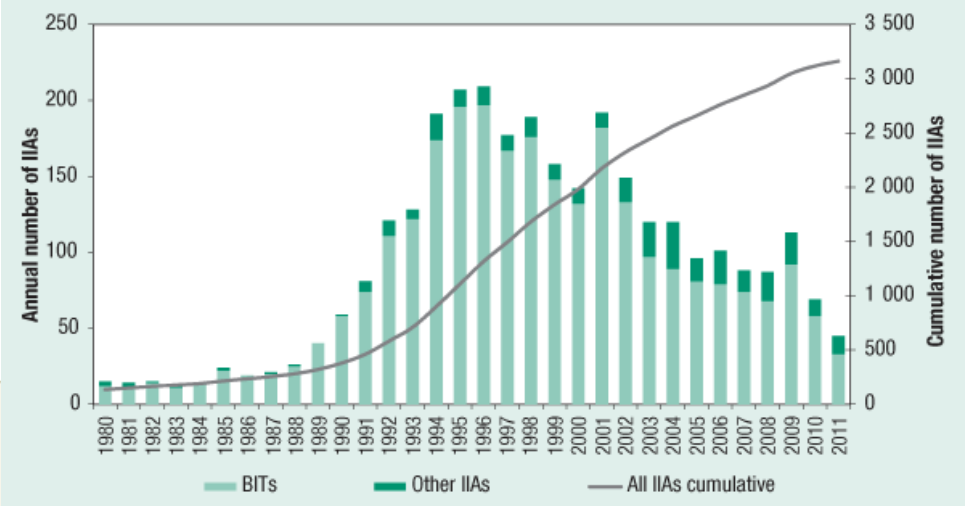
Introduction

- A Bilateral Investment Treaty is an agreement establishing the terms and conditions for private investment by nationals and companies of one state in another state
- Their aim is to encourage FDI flows between BIT partners
  - Usually signed in a North-South context
  - Sometimes involving South-South or North-North country-pairs
  - Investment chapters also included in bilateral and multilateral (deep) trade agreements
    - E.g. Chapter 9 of the TPP
- BITs are an increasingly used form of international economic agreement
  - There are 2,928 BITs in existence today (with 2,276 in force)
  - 356 other investment agreements (e.g. double taxation treaties) (with 280 in force)



Introduction

- What do BITs entail?
  - National treatment
  - Most Favoured Nation (MFN) treatment
  - Minimum standard of treatment
  - Free transfer and repatriation of capital and profits
  - Limits on expropriation and compensation
  - (and most controversially) Dispute settlement mechanisms
- Expected benefits:
  - Provides a credible commitment to investors, which can lead to competitive advantage
  - For developing countries: increased capital inflows, technology, competition, knowledge spillovers,...
    - These rely on increased FDI flows in response to BIT formation
  - For developed country firms: Increased certainty of investment
- Costs to developing country relate to reduced sovereignty (e.g. dispute mechanisms)

Introduction

- Relatively little empirical evidence on the impact of BITs
  - Existing studies consider both bilateral and aggregate FDI flows (stocks)
    - Studies of bilateral FDI tend to use a variant of the gravity equation
    - Include a dummy variable for country-pairs with a BIT
      - E.g. Hallward-Driemeier (2003)
    - Studies using aggregate data ask whether BITs, by providing a signal, impact on inward FDI more generally
      - E.g. Tobin and Rose-Ackerman (2005)
  - Wide range of estimated effects in the literature (Bellack, 2013)
    - Majority are positive and significant
    - Numerous estimated semi-elasticities >100% and <-50%
  - Mixed evidence of contingent effect of BITs
    - Hallward-Driemeier (2003) finds evidence of complementary relationship with institutional quality
    - Neumayer and Spess (2005) report results consistent with a substitutive relationship with insitutional quality

Introduction

- Shortcomings of the existing literature:
  - Wide variety of estimates
  - Endogeneity (i.e. self-selection)
  - Multilateral resistance
  - Zero (and negative) FDI flows
- What do we do?
  - Consider impact of BIT formation on North-South FDI flows
    - 22 OECD countries to 110 ‘southern’ countries for 1985-2011
  - Estimate the causal impact of BIT formation on bilateral FDI flows (and stocks)
    - Using Difference-In-Difference (DID) and Propensity Score Matching
  - Control for multilateral resistance
  - Deal with zero and negative FDI flows
    - Inverse hyperbolic sine transformation
  - Consider developments along the intensive and extensive margins

Self-Selection into BITs?

- The majority of existing studies treat BIT formation as exogenous, with country-pairs implicitly assumed to be randomly assigned into BITs
  - A couple of exceptions include Aisbett (2009) who include country-pair FE and Busse et al (2010) who use an IV method
- Bergstrand and Egger (2013) have shown that the economic fundamentals often found to determine FDI flows are also determinants of BIT membership
  - They base their empirical work on the theoretical model of Bergstrand and Egger (2007), which extends the knowledge capital model to include a third internationally mobile factor, i.e. physical capital
  - They find that indicators of geography, factor endowments and measures of economic size can predict up to 90% of country-pairs that form a BIT (and PTA)

Self-Selection into BITs?

	Non-BIT Pairs		New BIT pairs		t-test	KS test
Variable	Mean	Std. Dev.	Mean	Std. Dev.		
$\ln(GDP_i + GDP_j)$	26.844	1.318	27.200	1.1469	-7.13***	0.225***
$GDPsim$	-4.099	1.854	-3.445	1.6783	-9.32***	0.163***
$POLCON$	0.202	0.197	0.286	0.1922	-10.89***	0.204***
PTA	0.051	0.214	0.104	0.2849	-6.60***	0.079***
$KURatio$	2.965	1.586	2.678	1.2973	4.17***	0.143***
$KUDiff$	-0.909	1.012	-0.902	1.0079	-0.16	0.036
$Ssim$	-2.803	1.383	-2.359	1.0922	-7.69***	0.155***
$BITs\_Other_j$	2.976	3.559	4.206	3.8038	-9.13***	0.183***
$BITs\_Other_i$	16.410	16.317	27.391	19.0103	-17.73***	0.285***
$\ln DIST$	8.798	0.623	8.487	0.8515	13.10***	0.161***

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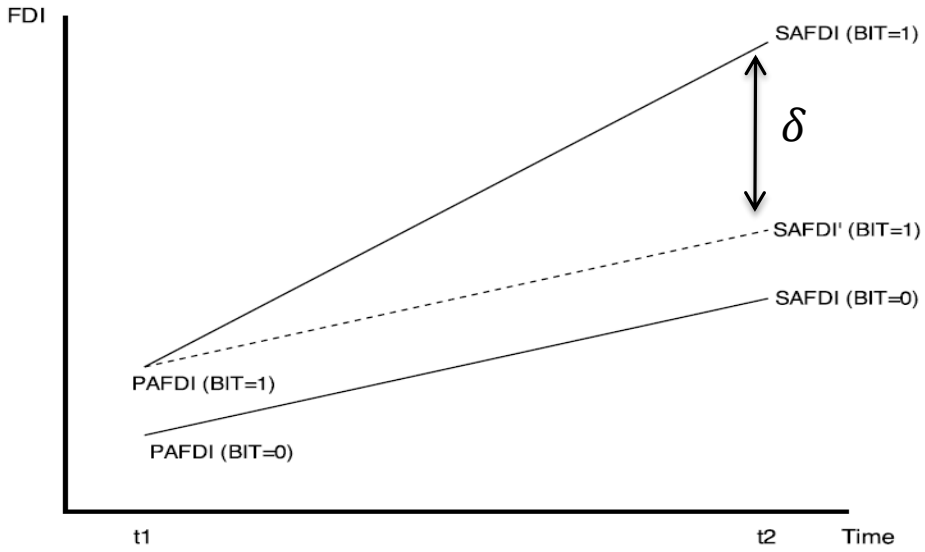
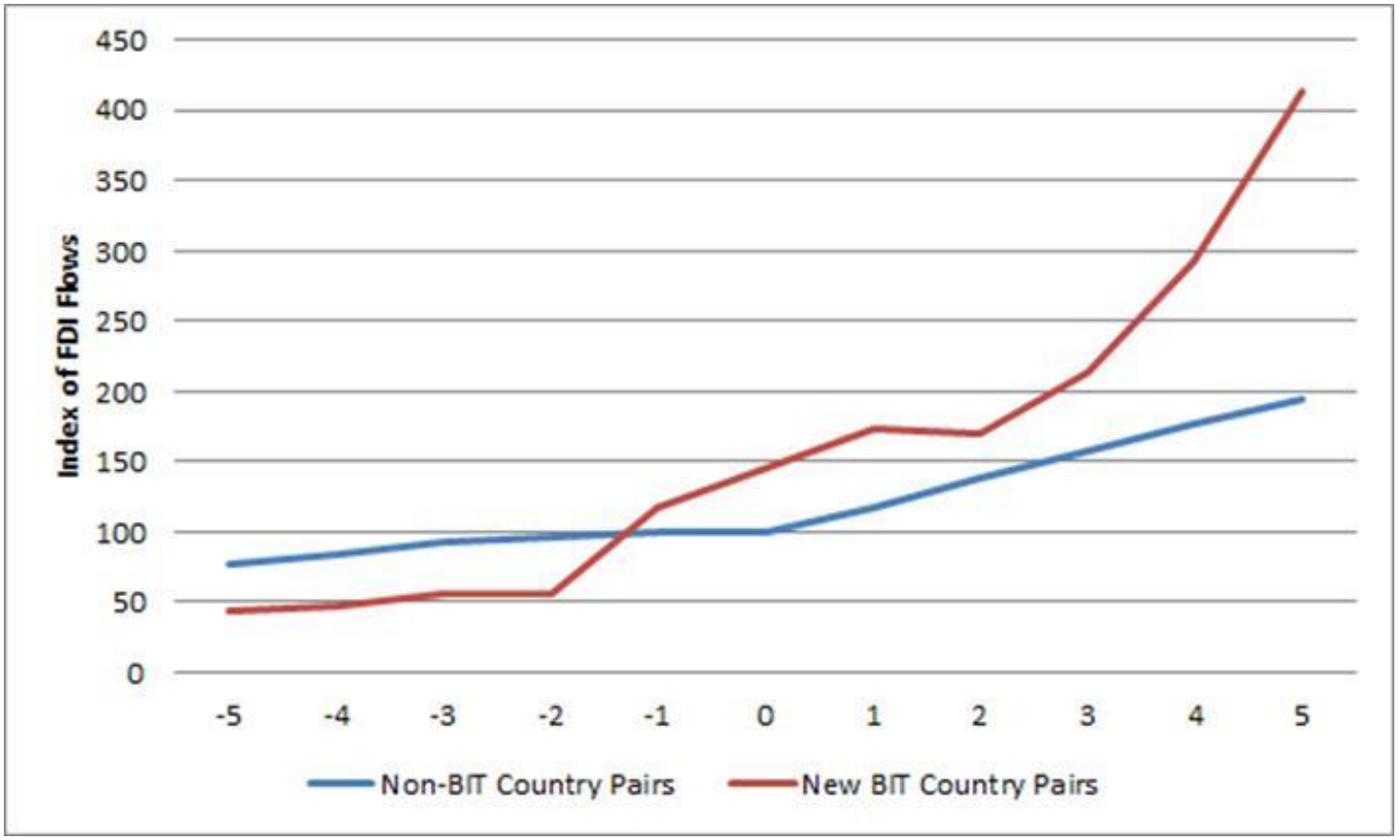
Difference-in-Difference

- We adopt a Difference-In-Difference (DID) approach, the estimator of which is:
  $\hat{\delta} = \big(SAFDI(BIT = 1) - PAFDI(BIT = 1)\big) - \big(SAFDI(BIT = 0) - PAFDI(BIT = 0)\big)$
- Allows for treatment and control groups to differ for unobserved reasons in the absence of random assignment
- Assumption is that in the absence of treatment outcomes for the control and treated group may move in parallel



Comparison of FDI Flows around BIT Formation Date

- DID relies on the assumption that treatment and control groups have a common trend in the pre-treatment period

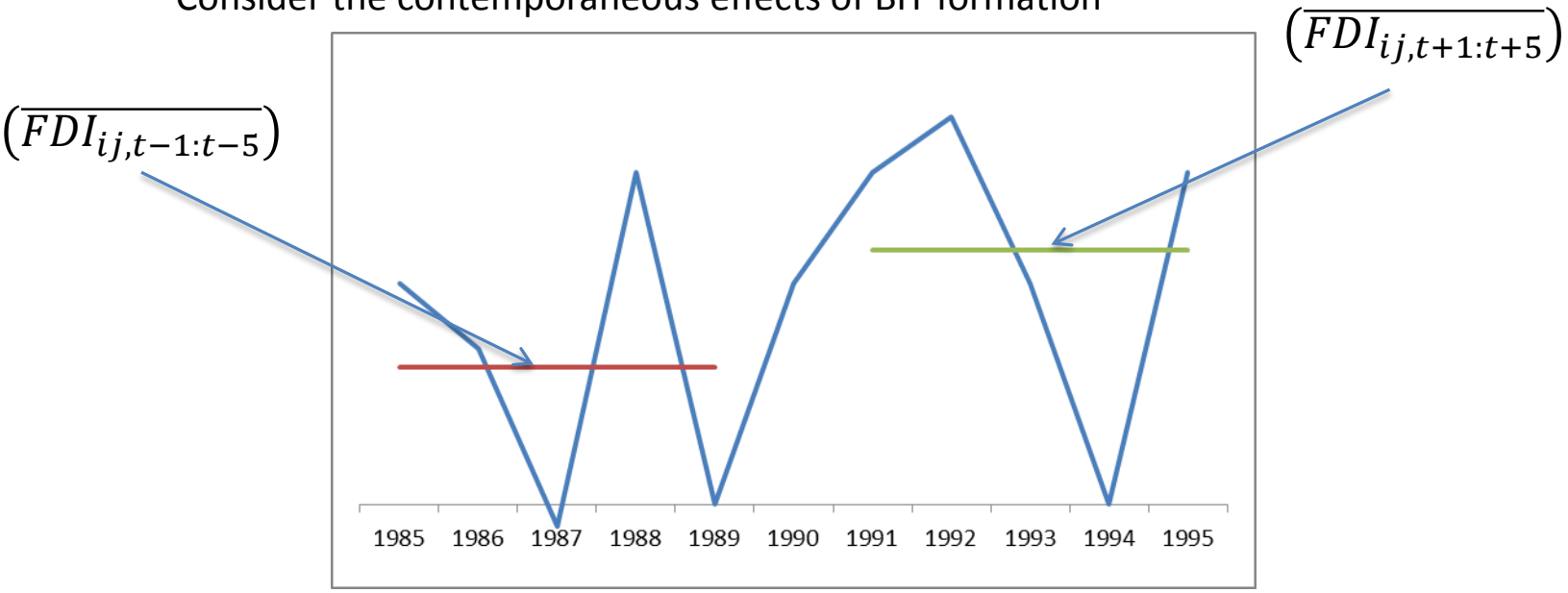


Methodology

- The regression representation of the DID approach we adopt is:

$$\Delta \ln FDI_{ij(t)} = \mu + \alpha BIT_{ij(t)} + \boldsymbol{\beta}\Delta\mathbf{X}_{ij(t)} + \varepsilon_{ij(t)} \qquad (1)$$

- We concentrate on five-year windows either side of BIT entry year
  - Accounts for the 'lumpiness' of FDI flows (and some negatives/zeros)
  - Consider the contemporaneous effects of BIT formation

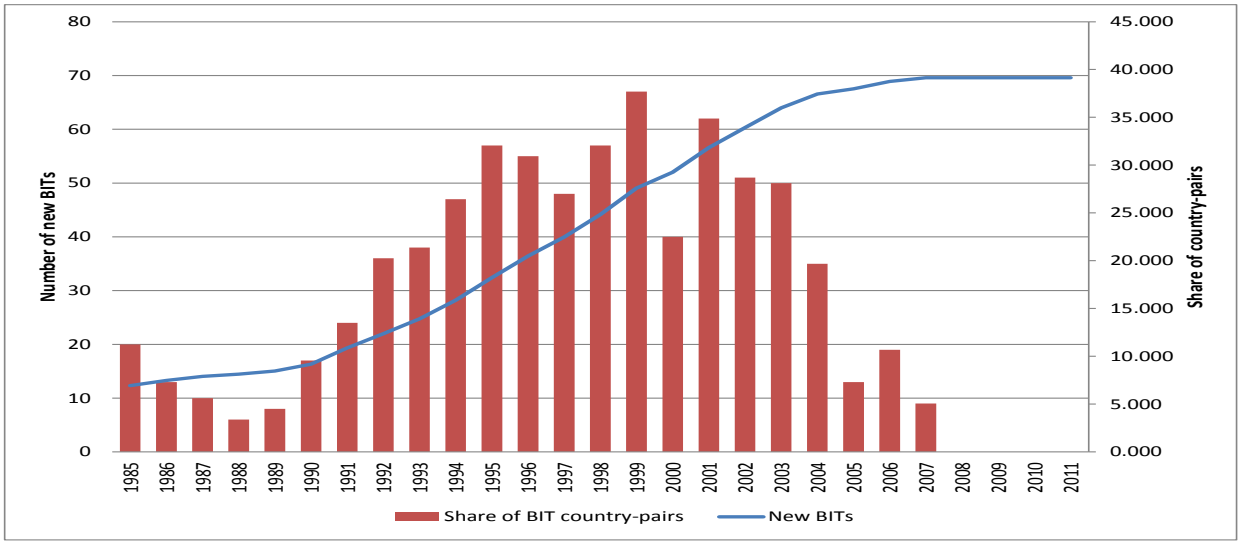


- The change in FDI flows is then calculated for each country-pair as:

$$\Delta \ln FDI_{ijt} = \ln\left(\overline{FDI_{ij,t+1:t+5}}\right) - \ln\left(\overline{FDI_{ij,t-1:t-5}}\right)$$

Methodology

- We obviously have more than one treatment year in our dataset



- We combine data for the different years (1990-2006) to form a single cross-section of new BIT signing events
  - Albeit including year FE to allow for unobserved differences in the change in FDI across time
- Note that while the number of new BITs formed each year is relatively small (1.2% of sample join a BIT each year), country-pairs subject to a BIT are not a unique group
  - Around 40% of country-pairs were subject to a BIT at the end of the period, increasing from 7% in 1985

Methodology

- The change in FDI is constructed for each country-pair for each year within the period 1990-2006
- Similar differences are constructed for each of the control variables
  - The control variables include the set of variables suggested by Bergstrand and Egger (2012) along with controls for multilateral resistance (and time FE) – see below
    - These include measures of market size, factor endowment differences, institutional variables, (and gravity type variables)
    - Note that the differencing implies that time invariant variables (e.g. Distance, common language, etc) drop out of the model of Bergstrand and Egger (2013)
- A dummy variable is constructed equal to 1 if the country-pair formed a BIT in year t
- All observations where a BIT was already in place or where a BIT was formed in $t+1$ to $t+5$ are dropped
- Equation (1) is estimated including time FE and MR terms

Methodology

- Explanatory Variables
  - $\ln(GDP_{it} + GDP_{jt})$ - bilateral economic size
  - $GDPsim_{ijt} \equiv \ln[sh_{it}(1 - sh_{it})]$ - measure of economic similarity
  - $POLCON_{jt}$ - measure of political constraints (institutional quality)
  - $KURatio_{ij} \equiv \left|\ln\left(\frac{k_i}{u_i}\right) - \ln\left(\frac{k_j}{u_j}\right)\right|$ - measures of factor endowment differences
  - $KUDiff_{ij} \equiv \left|\left(k_i^2 + u_i^2\right)^{1/2}\mu - \left(k_j^2 + u_j^2\right)^{1/2}\mu\right|$
  - $Ssim_{ij} = \ln s_i + \ln(1 - s_i)$ - similarity of skilled labour endowments
  - PTA_{ijt} - preferential trade agreement
  - $BITs\_Other_i$ and $BITs\_Other_j$ - (GDP weighted) number of BITs with other partners
  - Non-time varying variables: distance, remoteness, common border and language, colonial relationship

Multilateral Resistance

- Anderson and van Wincoop (2003) have shown that trade between two countries is decreasing in their bilateral trade costs relative to the corresponding average with all their partners, rather than to absolute trade barriers
  - This Multilateral Resistance (MR) also appears in gravity type models for other flows (e.g. FDI, migration)
- One way of capturing these multilateral resistance terms is through the inclusion of (time-varying) reporter and partner fixed effects
- Baier and Bergstrand (2009) suggest controlling for MR by including GDP-weighted exogenous variables as additional controls in the gravity model
  - We follow this approach, including GDP-weighted distance, common language, common border and PTA variables as MR controls

Zero (and Negative) FDI Flows

- An issue with estimating gravity type models are that many flows (e.g. Trade, FDI, migration) are zero
  - Since the model is estimated as log-linear zero flows cannot be included
- Recent developments include:
  - Heckman type adjustments (Helpman et al, 2008)
  - Psuedo Poisson Maximum Likelihood (Santos and Tenreyro, 2006)
- Taking five-year averages helps alleviate this problem

Zero (and Negative) FDI Flows

- To deal with zeros and negatives:
  - Add 1 (i.e. $1 mn) to all FDI flows to allow for the calculation of the log of FDI flows
    - This deals with zero (average) flows
  - Adapt the standard log transformation:

$$\ln FDI_{ijt} = \ln\left(1 + FDI_{ijt}\right) \text{ if } FDI_{ijt} > 0$$

$$\ln FDI_{ijt} = \ln\left(1 + FDI_{ijt}\right) = \ln(1) = 0 \text{ if } FDI_{ijt} = 0$$

$$\ln FDI_{ijt} = -\ln\left(-\left(1 + FDI_{ijt}\right)\right) \text{ if } FDI_{ijt} < 0$$

  - Use an alternative to the log (i.e. the inverse hyperbolic sine transformation) that is defined for zero and negative values

$$\ln\left(y_i + \left(y_i^2 + 1\right)^{1/2}\right)$$

    - Except for very small values of y the inverse sine is equal to $\ln(2y_i)$ or $\ln(2) + \ln(y_i)$
      - It can therefore be interpreted in the same as a standard logarithmic dependent variable

Extensive and Intensive Margins

- Do BITs work by increasing flows from existing partners (i.e. The intensive margin) or by encouraging the development of new FDI relationships (i.e. The extensive margin)?
  - If BITs substitute for institutional quality we may not expect BITs to have large effects along the intensive margin
- To distinguish between the two effects we estimate the model given by (1) separately for:
  - Country-pairs for which there were positive FDI flows in the five years prior to BIT formation (i.e. the intensive margin)
    - i.e. The treatment group include observations for which $PAFDI > 0$ and $BIT = 1$
  - Observations for which FDI flows were zero (or negative) prior to BIT formation (i.e. the extensive margin)
    - i.e. The treatment group includes observations for which $PAFDI = 0$ [or $PAFDI \leq 0$] and $BIT = 1$
  - In both cases the control group are all observations for which $BIT = 0$

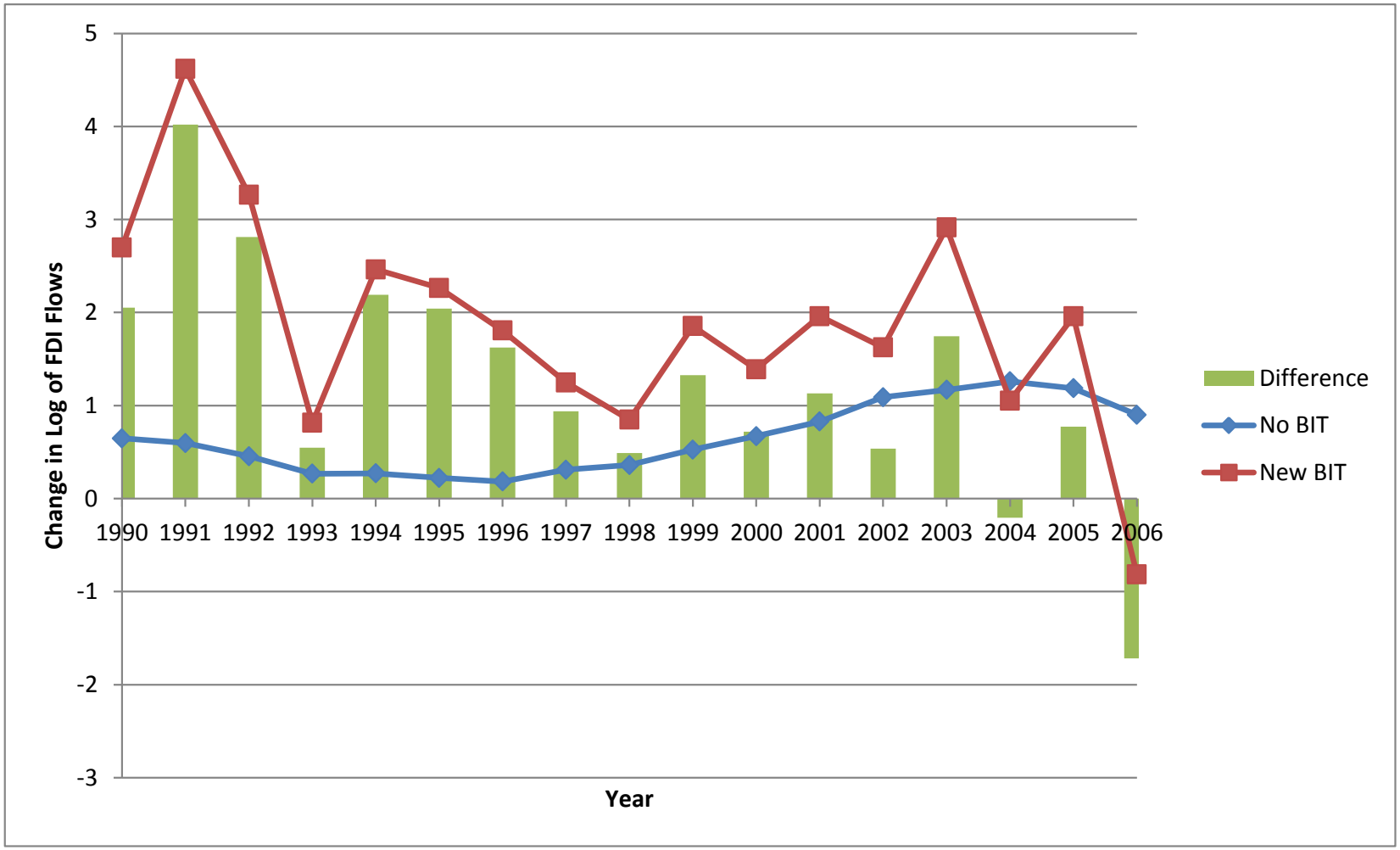
Propensity Score Matching

- As a test of robustness, we further estimate equation (1) using a matched sample of new-BIT and non-BIT country-pairs
  - i.e. Use DiD to compare outcomes for treated and non-treated country-pairs that are similar in terms of (initial) observable characteristics
- Matching is performed using the Propensity Score (using one and five nearest neighbours)
- The propensity score is constructed using a Probit model based upon the model of Bergstrand and Egger (2013)
  - The set of explanatory variables are those previously mentioned, including the (non-time varying) gravity type variables
  - Initial values (i.e. average values over the period t-1 to t-5) of the explanatory variables are used
  - Controls for Multilateral Resistance are also included following Baier and Bergstrand (2009), i.e. GDP-weighted distances and other exogenous variables

Comparison of treated and matched control group

	Probit Results	Average Values		t-statistic	p-value
		Treated	Control		
$\ln(GDP_i + GDP_j)$	0.2432*** (0.0402)	27.316	27.326	-0.12	0.908
$GDPsim$	0.1252*** (0.0957)	-3.004	-3.027	0.21	0.830
$KURatio$	-0.0125 (0.0699)	2.857	2.862	-0.04	0.971
$KUDiff$	0.0304 (0.0345)	-2.173	-2.204	0.37	0.711
$Ssim$	0.1706 (0.1071)	-1.623	-1.656	1.37	0.171
$\ln Dist$	-0.3167*** (0.1000)	8.811	8.758	1.02	0.306
$Contig$	-0.8668*** (0.3197)	0.0029	0.0145	-1.64	0.101
$Comlang$	0.2715* (0.1473)	0.0867	0.0723	0.70	0.483
$Colony$	0.4874** (0.1931)	0.0723	0.0607	0.61	0.542
PTA	-0.3026* (0.1607)	0.173	0.136	1.37	0.172
$POLCON$	0.5824*** (0.1917)	0.369	0.359	0.75	0.454
$BITs\_Other_i$	2.1280*** (0.2089)	0.549	0.551	-0.10	0.919
$BITs\_Other_j$	0.5903*** (0.1702)	0.333	0.345	-0.59	0.558
$REMOTE$	-0.4118* (0.2189)	8.853	8.843	0.83	0.407

DID Estimates by Year



Difference-in-Difference Results I

	(1)	(2)	(3)	(4)
BIT	0.545***	0.563***	0.558***	0.556***
$\ln \Delta(GDP_i + GDP_j)$			0.394	0.452
$\Delta GDPsim$			0.185	0.199
$\Delta KURatio$			0.275**	0.282**
$\Delta KUDiff$			-0.0145	-0.0111
$\Delta Ssim$			0.130	0.123
ΔPTA			0.136	0.0997
$\Delta POLCON$			0.233	0.262
$\Delta BITs\_Other_i$			0.909***	0.867**
$\Delta BITs\_Other_j$			-0.281	-0.312
Time [MR]	No [No]	Yes [No]	Yes [No]	Yes [Yes]

- Estimated percentage increase in FDI due to BIT calculated as $100(exp^{\delta} - 1)$
  - BITs associated with an increase in FDI flows of between 72.5% and 75.6%

Difference-in-Difference Results II

	Intensive Margin				Extensive Margin			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BIT	-0.202	-0.175	-0.256	-0.269	0.881***	0.893***	1.061***	1.065***
$\ln \Delta(GDP_i + GDP_j)$			0.429	0.477			0.267	0.333
$\Delta GDPsim$			0.226	0.241			0.121	0.135
$\Delta KURatio$			0.288**	0.293**			0.259**	0.265**
$\Delta KUDiff$			-0.0182	-0.0148			-0.0220	-0.0174
$\Delta Ssim$			0.134	0.127			0.137	0.127
ΔPTA			0.105	0.0504			0.203	0.154
$\Delta POLCON$			0.200	0.232			0.239	0.277
$\Delta BITs\_Other_i$			0.907***	0.849**			0.844**	0.776**
$\Delta BITs\_Other_j$			-0.192	-0.228			-0.324*	-0.367*
Time [MR]	No [No]	Yes [No]	Yes [No]	Yes [Yes]	No [No]	Yes [No]	Yes [No]	Yes [Yes]

- BITs increase FDI along the extensive margin by between 141.3 and 190.1%

Inverse Hyperbolic Sine Transformation I

	(1)	(2)	(3)	(4)
BIT	0.635***	0.668***	0.702***	0.698***
$\ln \Delta(GDP_i + GDP_j)$			0.176	0.212
$\Delta GDPsim$			0.163	0.174
$\Delta KURatio$			0.319**	0.325**
$\Delta KUDiff$			-0.0168	-0.0148
$\Delta Ssim$			0.142	0.136
ΔPTA			0.128	0.0987
$\Delta POLCON$			0.235	0.256
$\Delta BITs\_Other_i$			0.692*	0.664*
$\Delta BITs\_Other_j$			-0.325	-0.338
Time [MR]	No [No]	Yes [No]	Yes [No]	Yes [Yes]

- Estimated percentage increase in FDI due to BIT calculated as $100(exp^{\delta} - 1)$
  - BITs associated with an increase in FDI flows of between 88.7% and 101.8%

Inverse Hyperbolic Sine Transformation II

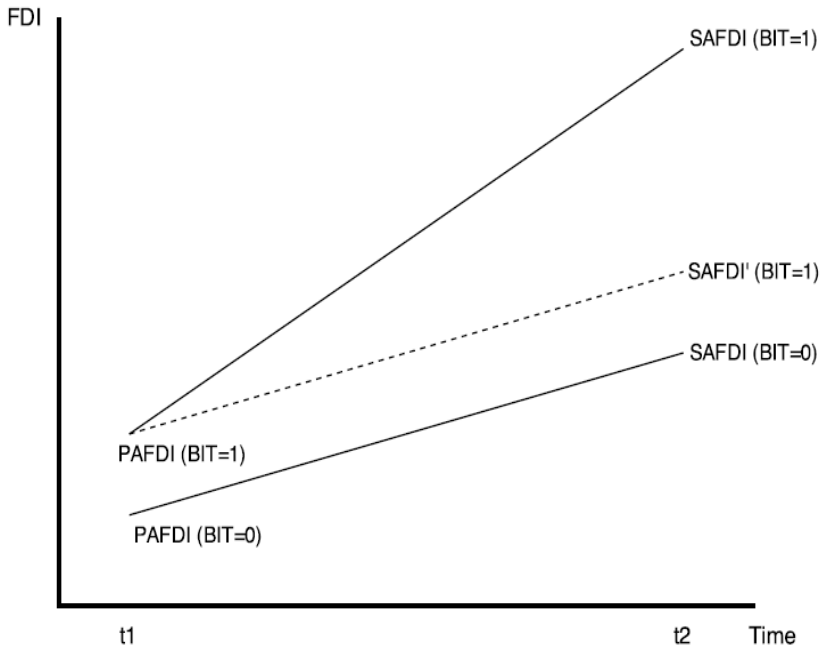
	Intensive Margin				Extensive Margin			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BIT	-0.341	-0.294	-0.345	-0.361	1.074***	1.098***	1.347***	1.350***
$\ln \Delta(GDP_i + GDP_j)$			0.203	0.224			0.0232	0.0669
$\Delta GDPsim$			0.203	0.214			0.0838	0.0951
$\Delta KURatio$			0.330**	0.333**			0.300**	0.305**
$\Delta KUDiff$			-0.0204	-0.0185			-0.0253	-0.0219
$\Delta Ssim$			0.150	0.144			0.154	0.144
ΔPTA			0.0961	0.0452			0.205	0.160
$\Delta POLCON$			0.200	0.225			0.242	0.274
$\Delta BITs\_Other_i$			0.683*	0.635*			0.616*	0.557
$\Delta BITs\_Other_j$			-0.228	-0.246			-0.369*	-0.395*
Time [MR]	No [No]	Yes [No]	Yes [No]	Yes [Yes]	No [No]	Yes [No]	Yes [No]	Yes [Yes]

- Estimated percentage increase in FDI due to BIT calculated as $100(exp^{o} - 1)$
  - BITs associated with an increase in FDI flows of between 192.7% and 285.7%

Matching Results

	$\Delta \ln FDI^{ALL}$	$\Delta \ln FDI^{IM}$	$\Delta \ln FDI^{EM}$
Logged Transformation			
$\Delta \ln FDI^{F}$	0.408	-0.711*	1.054***
	(0.271)	(0.370)	(0.284)
Inverse Hyperbolic Sine Transformation			
$\Delta \ln FDI^{F}$	0.463	-0.937**	1.277***
	(0.309)	(0.420)	(0.325)

Magnitude of the Effects



- The estimated coefficient δ provides an estimate of the percentage difference between $SAFDI'(BIT = 1)$ and $SAFDI(BIT = 1)$
- In order to provide some estimate of the quantitative, i.e. $, change in FDI flows in response to BIT formation we need an estimate of $SAFDI'(BIT = 1)$
- To do this, note that $PAFDI(BIT = 1)$ will differ from $PAFDI(BIT = 0)$ by :

$$F = PAFDI(BIT = 1) - PAFDI(BIT = 0)$$

- In period $t2$ therefore, we can use F to obtain an estimate of $SAFDI'(BIT = 1)$ as:

$$SAFDI'(BIT = 1) = SAFDI(BIT = 0) + F$$

- We can then use this information to calculate the quantitative impact of BIT formation on FDI as:

$$SAFDI(BIT = 1) - SAFDI'(BIT = 1) = [e^{\hat{\delta}} - 1](F + SAFDI(BIT = 0))$$

Magnitude of the Effects

	Range of Coefficients	Lower Estimate	Upper Estimate
FDI Flows			
All	0.545 – 0.563	$\left(230.5 \times (e^{0.545} - 1)\right) = \$167.0\text{mn}$	$\left(230.5 \times (e^{0.563} - 1)\right) = \$174.3\text{mn}$
Intensive Margin	-0.175 – -0.269	$\left(389.8 \times (e^{-0.175} - 1)\right) = \$ - 62.6\text{mn}$	$\left(389.8 \times (e^{-0.269} - 1)\right) = \$ - 91.9\text{mn}$
Extensive Margin	0.881 – 1.065	$\left(131.7 \times (e^{0.881} - 1)\right) = \$186.1\text{mn}$	$\left(131.7 \times (e^{1.065} - 1)\right) = \$250.3\text{mn}$

Conclusion

- BIT formation impacts positively upon bilateral FDI flows
  - Main results are quite stable and suggest that FDI flows increase by around 75% in response to BIT formation
- Significant impacts of forming a BIT tend to be found along the extensive margin only
  - Effects along the intensive margin are negative and tend to be insignificant
- Estimating the dollar change in FDI flows as a result of a new BIT using the main results suggest:
  - Estimated effects of BIT formation range from $167 million to $174 million
  - Estimated effects of BIT formation on the extensive margin range from $186 million to $250 million
- [Inclusion/Exclusion of zero FDI flows may help explain some of the large differences in estimates found elsewhere in the literature]

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