

Chapter IV

Financing for development:

Impact of reducing trade costs on foreign direct investment¹⁰⁰

Introduction

Foreign direct investment (FDI) has long been known as an important source of financing for development in host (recipient) countries. UNCTAD (2012b) found that FDI positively contributes to host economies, including through higher employment and wages, tax revenue increases, export generation and capital formation. Identifying factors that make a host country more attractive to FDI therefore remains an important policy issue.

Trade facilitation has often been promoted as a way to attract more FDI, particularly FDI related to international production networks, which typically require that low transaction costs be maintained between the members of the network (e.g., ADB/ESCAP, 2013; UNECE, 2012¹⁰¹; UNECE, 2003). However, little empirical evidence exists of the actual link between trade facilitation and FDI. This chapter therefore quantifies the impact of trade facilitation, defined here in its broadest sense, i.e., lower trade costs, on FDI.

This study uses bilateral FDI data from 2006 onward, both from developed and from developing countries, to estimate FDI gravity models and examine the effect of various trade facilitation-related indicators on FDI, including ESCAP-World Bank bilateral trade costs,¹⁰² maritime connectivity, ease of doing business and the use of the Internet. Changes in effects when considering only FDI flows between developing countries (South-South) are also presented.¹⁰³

Section A reviews selected literature on FDI and linkages to trade facilitation, with particular emphasis on findings from FDI gravity models. Section B provides a brief overview of FDI flows in developing and developed economies, while the methodology and data used to assess the impact of trade facilitation and FDI are presented in section C. The results from the gravity model estimation and a counterfactual simulation of trade facilitation improvements in developing countries are presented in section D followed by the conclusion and policy recommendations in section E.

¹⁰⁰ This chapter is a shortened, updated and edited version of Duval and Utoktham (2014). The full working paper is available at <http://www.unescap.org/sites/default/files/Staff%20Working%20Paper%2004-14.pdf>

¹⁰¹ <http://tfig.unece.org/contents/tf-introduction.htm>.

¹⁰² See Arvis and others (2013) for an introduction.

¹⁰³ Horizontal FDI typically refers to the situation where firms duplicate the production activities they have at source in host countries, while vertical FDI refers to firms who locate different stages of production in different countries. Horizontal FDI is sometimes referred to as market-oriented or import-substituting investment, while vertical FDI is referred to export-platform investment (e.g., Markusen and Venables, 2005).

A. Literature review: Trade and FDI

The literature on FDI and trade is vast, ranging from studies of the relationship between FDI and trade as complements or substitutes (e.g., Swenson, 2004), to studies examining the factors affecting the decision by firms to engage in FDI rather than exporting (e.g., Helpman and others, 2004; Markusen and Venables, 2005)¹⁰⁴. From a policymaker's perspective, however, the identification of factors attracting FDI is particularly relevant.

Blonigen (2005), in a review of the FDI literature, identified five common factors affecting FDI: exchange rates; domestic taxes; quality of institutions; trade protectionism; and the substitution or complementarity effects between trade and FDI. Recent literature generally finds that FDI and trade are complements, particularly since the emergence of regional and global value chains and distributed manufacturing. Evidence of tariff-jumping FDI as described by Carr and others (2001) is limited and trade protectionism is generally found to have a negative effect on FDI (see, for example, Tekin-Koru, 2009 and WTO, 1996).

Gravity models of FDI flows are commonly used to identify determinants of FDI. Most FDI models feature both macroeconomic indicators as well as indicators more closely related to trade facilitation. Table 1 provides an overview of recent studies featuring gravity models of FDI.

Existing studies are often based on very limited and dated FDI data, with many recent studies (2008-2012) still using FDI data from 2005 or earlier. This is of concern, given the changing nature of FDI associated with growing regional and global production networks. Second, trade costs and trade facilitation indicators are typically not included in the FDI models. Bilateral distance and indicators of trade openness found in most models indeed do not adequately capture or provide sufficient insight of the links between trade-related procedures, infrastructure and services, and FDI.¹⁰⁵

While FDI gravity models are relatively common, the theoretical literature providing a microeconomic foundation for the gravity model of FDI is very limited. Gravity models of trade with micro foundation were introduced by Anderson and van Wincoop (2003). Kleinert and Toubal (2010) recently introduced an FDI gravity framework based on proximity-concentration models and factor-proportion theory, using affiliate sales data. However, such data are typically not available between developing countries. Thus, the analysis presented in this chapter relies on a standard gravity model of bilateral FDI flows, with control variables based on those proposed in Blonigen (2005), and Braconier and others (2005). The model is then extended to include relevant trade costs and trade facilitation factors (see section C for details).

¹⁰⁴ For example, Helpman and others (2004) showed that the most productive firms engage in foreign market investment, while the less productive ones export. Markusen and Venables (2005) also found that countries with moderate trade costs engaged in market-oriented assembly while those with lower trade costs engaged in export-platform production.

¹⁰⁵ The examples provided in Carr and others, 2001, clearly suggest the need to include distance, trade costs and investment costs as separate determinants of FDI.

Table 1. Selected studies using a gravity model of FDI

Study	Country/period covered	Source of FDI	Control variables (excluding distance and GDP)	Main findings
Del Bo (2009)	1982-2005; cross countries with the United States	OECD and Bureau of Economic Analysis	Exchange rate volatility Political risk Financial development Trade openness Energy use Labour education Quality of labour Common language	Exchange rate variability and political instability have negative effect on FDI flows
Frankel, and others (2004)	1992-2000; G-5 flows to emerging economies	Eurostat	GDP growth Trade openness Inflation Dummy of fixed exchange rate Economic risk	FDI flows are positively related to economic growth, trade openness and negatively related to country risk ; Effects of exchange rate on FDI are mixed; Inflation is not significant
Furceri and Borelli (2008)	1995-2004; European economies	UNCTAD	GDP per capita Openness Barriers to trade Inflation Investment price Dummy of Asian crisis Dummy of Russian Federation crisis Exchange rate volatility	Relationship between FDI and exchange rate volatility depends on degree of openness and is negative in more open economies; Inflation and price of investment (proxied by investment deflator) have no significant impact on FDI
Gao (2004)	1994-1997; 24 OECD economies to host countries	OECD and UNCTAD	GDP per capita Average GDP growth prior to 1994 Common language Contiguity Colonial link Free trade agreement	GDP growth prior to 1994, GDP per capita, and common language are significant and positively related to FDI; FDI flows within Asia are less sensitive to host countries' income and are more affected by distance
Hattari and Rajan (2009)	1990-2005; developing Asia	UNCTAD	Difference in real GDP per capita Real export Change in real exchange rate Market capitalization of listed companies Political risk Corporate tax rate Trade agreement Financial openness Legal origin of United Kingdom Free trade agreement Common language	Lag of exports, stock market capitalization, financial openness, political risk, legal origin of the United Kingdom and free trade agreement dummy have a positive effect on FDI. Change in the real exchange rate, distance and corporate tax have a negative effect on FDI
Jeon, Tang and Zhu (2004)	1980-1997; 27 OECD countries and 20 non-OECD countries	International Direct Investment Statistics Yearbook,	Product of tele/cell density Trade openness FDI openness Interaction of tele/cell density and distance	IT development in source and host countries encourages FDI significantly. Impacts from G7 on OECD members are more prominent compared to non-OECD

		OECD		countries. In addition, the impact of the 1990s was more significant than that of the 1980s.
Kleinart and Toubal (2010)	1986, 1990, 1994, 1998; cross countries	Affiliate sales from Braconier and others (2005) excluding Swedish FDI	Relative factor endowment Sum of GDP Contiguity Trade protection index Investment Index (based on the World Economic Forum survey)	Differences are found between horizontal and vertical FDI with relative factor endowment and bilateral wealth (sum of GDP) are significant in explaining FDI flows; Trade protection and the investment index are not statistically significant
Petri (2012)	1998-2003; Developing Asia	UNCTAD	Population GDP per capita Common language Waterway Airport Science and technology achievement index Science and technology policy index Regional blocs	Asian FDI flows are correlated with high intellectual property right regime, and negatively correlated with low technology achievement.

B. World FDI flows at a glance

Data in table 3 show FDI from developed countries account for approximately 50 percent or more of World FDI during 2009-2011.¹⁰⁶ While FDI still flows from developed countries to other developed countries, the situation is changing as a growing share of FDI goes to developing economies. As of 2011, FDI to developing and transition economies represented 51% of total FDI (table 3). The main FDI recipients in developing, as illustrated in tables 3 and 4, only provide a very general overview of FDI trend, and bilateral FDI data are essential to better understand FDI patterns. As the availability of such bilateral data is limited, the study combines two sources – OECD and UNCTAD. The OECD database includes flows of OECD members as reporting countries to and from the rest of the world, i.e., North-North and North-South flows. FDI flows among developing economies, i.e., South-South flows, are obtained from the UNCTAD database.¹⁰⁷

Based on this bilateral FDI dataset, table 4 shows FDI flows both from developed and from developing countries or regions to host countries and their evolution from 1996 to 2010. Developed hosts received FDI mainly from other developed economies. However, sources of FDI for developing Asia-Pacific as well as Latin America and the Caribbean regions were often other developing countries. Europe also received FDI mostly from developing world regions during the period considered, with a significant increase in investment in all regions. Within Asia-Pacific, South and South-West Asia is the region where FDI from developing countries appears to have grown the least. In contrast, East and North-East Asia as well as South-East Asia have attracted increasingly large flows.

¹⁰⁶ See UNCTAD, 2012b.

¹⁰⁷ UNCTAD provides data only among developing Asian countries upon request.

Table 2. FDI Outflows by Region: 1996-2011

	Outflows: USD Million				Outflows: % of world total			
	1996	2001	2006	2011	1996	2001	2006	2011
Developing Asia and the Pacific	49644.32	45478.64	145842.6	317503.4	12.48%	6.08%	10.31%	18.74%
East and North-East Asia	33316.14	20273.24	78003.47	167235.8	8.38%	2.71%	5.51%	9.87%
South-East Asia	14829.01	20749.84	28603.78	59889.77	3.73%	2.78%	2.02%	3.53%
South and South-West Asia	531.283	1926.702	15736.1	17697.65	0.13%	0.26%	1.11%	1.04%
North and Central Asia	926.7244	2517.283	23459.04	72569.91	0.23%	0.34%	1.66%	4.28%
Pacific Islands Economies	41.16453	11.57416	40.21324	110.3147	0.01%	0.00%	0.00%	0.01%
Other Developing Regions								
Africa	1813.343	-2644.31	8225.171	3512.398	0.46%	-0.35%	0.58%	0.21%
Latin America and the Caribbean	8395.072	36565.34	79670.23	99653.1	2.11%	4.89%	5.63%	5.88%
Developed Economies								
Asia and the Pacific	27329.97	50925.01	75856.01	137207.4	6.87%	6.81%	5.36%	8.10%
Australia	5142.191	13675.11	25409.46	19998.7	1.29%	1.83%	1.80%	1.18%
Japan	23426.4	38333.24	50264.4	114352.9	5.89%	5.13%	3.55%	6.75%
New Zealand	-1238.62	-1083.34	182.1493	2855.789	-0.31%	-0.14%	0.01%	0.17%
EU-5	128817.1	234415.5	463689.3	336066.8	32.38%	31.35%	32.77%	19.83%
France	30421	86767.01	110673	90146.03	7.65%	11.61%	7.82%	5.32%
Germany	50804.71	39683.64	118701	54368.4	12.77%	5.31%	8.39%	3.21%
Italy	6465.318	16003.34	43796.52	47210.35	1.63%	2.14%	3.09%	2.79%
Spain	7078.558	33106.36	104248	37255.62	1.78%	4.43%	7.37%	2.20%
United Kingdom	34047.47	58855.12	86270.69	107086.4	8.56%	7.87%	6.10%	6.32%
North America	97522.22	160901.8	270433.7	446224.9	24.52%	21.52%	19.11%	26.34%
Canada	13096.22	36028.82	46213.72	49568.94	3.29%	4.82%	3.27%	2.93%
United States	84426	124873	224220	396656	21.22%	16.70%	15.84%	23.41%
World	397769.7	747656.8	1415094	1694396	100.00%	100.00%	100.00%	100.00%
Developing economies	65406.24	83087.38	239336	383753.7	16.44%	11.11%	16.91%	22.65%
Transition economies	947.1836	2741.616	23724.31	73134.75	0.24%	0.37%	1.68%	4.32%
Developed economies	331416.3	661827.8	1152034	1237508	83.32%	88.52%	81.41%	73.04%

Source: Author's calculation, based on UNCTAD online database at <http://unctadstat.unctad.org>.

Note: ESCAP regional members: (a) East and North-East Asia – China; Democratic People's Republic of Korea; Hong Kong, China; Macao, China; Mongolia; and the Republic of Korea; (b) South-East Asia – Brunei Darussalam; Cambodia; Indonesia; Lao PDR; Malaysia; Myanmar; the Philippines; Singapore; Thailand; Timor-Leste; and Viet Nam; (c) South and South-West Asia – Afghanistan; Bangladesh; Bhutan; India; Islamic Republic of Iran; Maldives; Nepal; Pakistan; Sri Lanka; and Turkey; (d) North and Central Asia – Armenia; Azerbaijan; Georgia; Kazakhstan; Kyrgyzstan; Russian Federation; Tajikistan; Turkmenistan; and Uzbekistan; (e) Pacific Island economies – American Samoa; Palau; Papua New Guinea; Samoa; Solomon Islands; Tonga; Tuvalu; and Vanuatu

Table 3. FDI inflows by region, 1996-2011

	Inflows: USD Million				Inflows: share to the world			
	1996	2001	2006	2011	1996	2001	2006	2011
Developing Asia and the Pacific	96010.48	114385.6	276289	467960.8	24.56%	13.82%	18.88%	30.70%
East and North-East Asia	54221.52	74958.47	124405.4	220936.1	13.87%	9.06%	8.50%	14.49%
South-East Asia	32915.17	22094.77	64037.64	116559.2	8.42%	2.67%	4.38%	7.65%
South and South-West Asia	4101.97	10865.4	48103.56	54817.75	1.05%	1.31%	3.29%	3.60%
North and Central Asia	4642.053	6256.837	38444.21	74046.34	1.19%	0.76%	2.63%	4.86%
Pacific Islands Economies	129.766	210.1535	1298.154	1601.335	0.03%	0.03%	0.09%	0.11%
<i>Other Developing Regions</i>								
Africa	6038.584	19960.82	36782.88	42651.85	1.54%	2.41%	2.51%	2.80%
Latin America and the Caribbean	46265.34	80725.33	98175.35	216988.3	11.84%	9.75%	6.71%	14.23%
<i>Developed Economies</i>								
Asia and the Pacific	8807.52	17160.88	29069.01	42927.53	2.25%	2.07%	1.99%	2.82%
Australia	4660.917	11031.12	31049.65	41316.69	1.19%	1.33%	2.12%	2.71%
Japan	227.9852	6242.954	-6506.5	-1758.33	0.06%	0.75%	-0.44%	-0.12%
New Zealand	3918.617	-113.192	4525.871	3369.175	1.00%	-0.01%	0.31%	0.22%
EU-5	66151.79	172792.8	357043.3	193832.1	16.92%	20.88%	24.40%	12.72%
France	21961.46	50476.82	71848.02	40945.01	5.62%	6.10%	4.91%	2.69%
Germany	6572.646	26414.07	55626.11	40402.08	1.68%	3.19%	3.80%	2.65%
Italy	3535.094	14870.56	42580.92	29059.37	0.90%	1.80%	2.91%	1.91%
Spain	9647.285	28408.13	30802.38	29476.32	2.47%	3.43%	2.10%	1.93%
United Kingdom	24435.3	52623.24	156185.9	53949.35	6.25%	6.36%	10.67%	3.54%
North America	94093.76	187141.1	297429.9	267868.5	24.07%	22.61%	20.33%	17.57%
Canada	9633.764	27663.42	60293.91	40931.51	2.46%	3.34%	4.12%	2.69%
United States	84460	159477.6	237136	226937	21.61%	19.27%	16.20%	14.89%
World	390899.5	827617.3	1463351	1524422	100.00%	100.00%	100.00%	100.00%
Developing economies	148993.4	216865.1	427163.4	684399.3	38.12%	26.20%	29.19%	44.90%
Transition economies	5871.134	9511.127	54318.43	92162.89	1.50%	1.15%	3.71%	6.05%
Developed economies	236035	601241.1	981869.3	747860	60.38%	72.65%	67.10%	49.06%

Source: Author's calculation, based on UNCTAD online database at <http://unctadstat.unctad.org>.

Note: Composition of ESCAP regional members is the same as shown in table 2.

Table 4. Bilateral flows among countries and regions

Host \ Source-	Year	Africa	AUS-NZL	Caribbean	Central America	East and North-East Asia	European Union	Japan	North America	Pacific Island economies	South America	South and South-West Asia	South-East Asia
AUS-NZL	1996	68.1	N/A	N/A	N/A	65.0	3 398.7	189.0	3659.0	N/A	N/A	N/A	510.8
	2001	7.8	N/A	N/A	N/A	N/A	N/A	553.0	2 016.0	N/A	32.0	0.5	509.0
	2006	N/A	1 890.0	27.9	N/A	822.0	4 013.8	2 340.0	6 460.0	700.8	169.0	N/A	431.1
	2010	318.0	965.0	73.0	177.0	3 661.0	N/A	5 730.0	18280.0	33.0	874.7	450.0	5 235.8
East and North-East Asia	1996	N/A	N/A	N/A	N/A	23 117.1	N/A	N/A	N/A	0.9	N/A	100.8	837.0
	2001	N/A	N/A	N/A	N/A	24 426.4	N/A	N/A	N/A	0.3	N/A	48.4	N/A
	2006	N/A	N/A	N/A	N/A	40 641.9	N/A	N/A	N/A	N/A	N/A	208.8	1 567.3
	2010	N/A	N/A	N/A	N/A	101 166.0	N/A	N/A	N/A	N/A	N/A	665.9	3 258.3
European Union	1996	419.3	1 823.2	835.2	305.9	1 421.2	48 846.9	418.0	28 401.8	1.3	1 979.7	372.4	1 679.4
	2001	1 319.5	586.2	4 520.4	389.2	418.3	204 842.6	6 368.9	56 924.4	2.7	1 465.0	162.8	698.2
	2006	4 023.9	4 248.0	32 216.7	1 686.9	3 746.3	469 979.2	14 270.6	75 210.2	613.4	5 288.1	1 771.7	6 678.8
	2010	2 888.3	N/A	8 365.2	1 777.6	22 086.4	267 754.3	N/A	108	N/A	10 572.4	1 713.1	3 772.4
										007.1			
Japan	1996	230.0	4.6	N/A	118.0	240.0	2 099.4	N/A	2 250.5	N/A	75.4	1.8	999.0
	2001	N/A	N/A	N/A	45.3	55.2	8 492.0	N/A	5 696.0	N/A	1 410.0	118.0	729.8
	2006	443.8	35.2	260.5	10.3	N/A	N/A	N/A	N/A	126.3	1 595.3	N/A	1 102.9
	2010	36.5	N/A	566.8	N/A	1 217.8	463.4	N/A	3 223.6	1.3	N/A	4.2	1 749.6
North America	1996	91.0	5 324.0	N/A	N/A	2 30.0	55 390.0	13 958.0	15 380.0	N/A	24 33.0	393.0	1 488.0
	2001	534.0	6 562.0	N/A	N/A	1991.0	88 549.0	N/A	34 470.0	N/A	13 61.0	336.0	890.0
	2006	819.0	2 039.0	N/A	3 867.0	3 628.0	19 8818.0	18 710.0	33900.0	N/A	N/A	482.0	3 210.0
	2010	2 039.0	8859.0	427.0	1295.0	2 979.0	130 030.0	22 530.0	27 300.0	1.0	3148.0	834.0	947.0
Pacific Island economies	1996	N/A	N/A	N/A	N/A	0.1	N/A	N/A	N/A	N/A	N/A	1.1	N/A
	2001	N/A	N/A	N/A	N/A	5 04.0	N/A	N/A	N/A	4.4	N/A	N/A	N/A
	2006	N/A	N/A	N/A	N/A	1 657.0	N/A	N/A	N/A	N/A	N/A	0.2	31.6
	2010	N/A	N/A	N/A	N/A	2 324.0	N/A	N/A	N/A	N/A	N/A	0.1	37.9

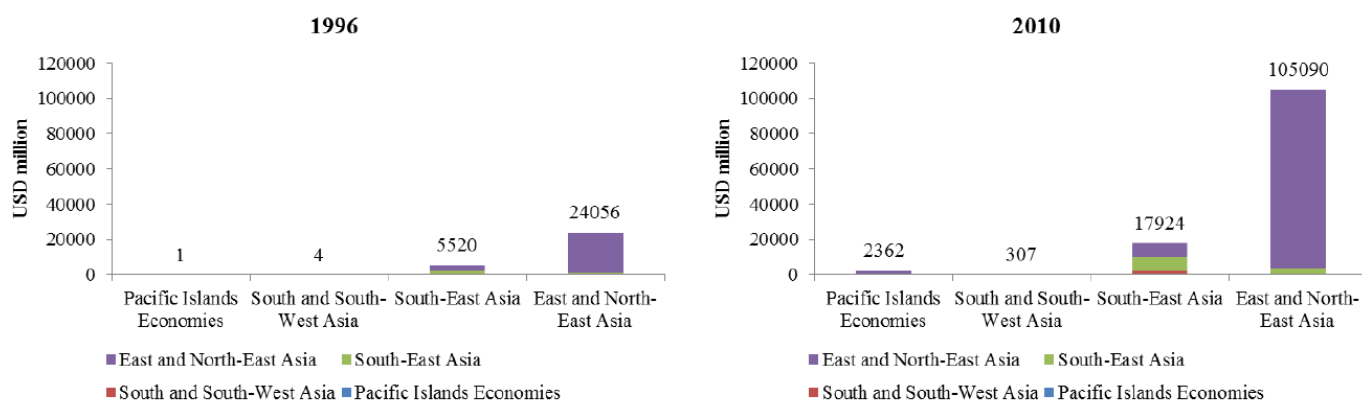
South and South-West Asia	1996	N/A	N/A	N/A	N/A	1.1	4 74.0	24.0	143.0	N/A	N/A	3.3	N/A
	2001	N/A	N/A	N/A	N/A	9.3	2845.0	139.0	280.0	1.2	N/A	2.8	21.3
	2006	9.0	108.0	27.0	N/A	19.0	14 548.0	N/A	1 036.0	N/A	N/A	46.6	N/A
	2010	N/A	9.0	N/A	N/A	82.9	5518.0	356.0	419.0	N/A	6.0	211.5	12.3
South-East Asia	1996	N/A	N/A	N/A	N/A	3 258.7	N/A	N/A	N/A	51.6	N/A	0.6	2 209.1
	2001	N/A	N/A	N/A	N/A	5 328.8	N/A	N/A	N/A	N/A	N/A	56.1	1 715.5
	2006	N/A	N/A	N/A	N/A	4 445.0	N/A	N/A	N/A	N/A	N/A	700.7	5 241.8
	2010	N/A	N/A	N/A	N/A	7 935.3	N/A	N/A	N/A	N/A	N/A	2 041.2	7 947.5

Source: Author's compilation, based on OECD iLibrary (online database, based on inflows data) and UNCTAD based on FDI inflows (upon request); Unit is in US\$ million; data reported only on positive flows.

Note: Composition of ESCAP regional members is the same as in table 16.

Figure 1 provides an overview of FDI flows among Asia-Pacific developing economies. East and North-East Asia is the source and recipient of most of the FDI flows from the region. FDI flows to and from Pacific Islands and South and South West Asia, while they have grown since 1996, remain very small. Interestingly, South-East Asia FDI appears to be directed not only towards itself but also to East and North-East Asia and, increasingly, South and South West Asia.

Figure 1. FDI flows among developing Asia and the Pacific countries



Source: Author's compilation, based on bilateral FDI inflows from UNCTAD.

Note: The figure shows how each Asia-Pacific subregion (x-axis) receives FDI flows from its own as well as other subregions.

C. Impact of trade facilitation on FDI: Data and methodology

To formally estimate the significance of trade facilitation factors on FDI, a series of regression models was used. See annex for technical details of the empirical model estimated, and annex tables 1 and 2 for estimates by the models. More simply put, the impact is estimated of variables listed in table 5 on FDI in the baseline model (Model M0).

Two different models were developed to account for trade costs and facilitation effects in FDI gravity models. The first model (Model M1) incorporates the non-tariff and tariff cost components of the ESCAP-World Bank international trade cost measure.¹⁰⁸ Bilateral trade costs excluding tariff (NTC) between source and host country are included in the models as well as the average NTCs between host country and the rest of the world, where the world is proxied by the three largest world importers.¹⁰⁹ Similarly, bilateral average tariffs between

¹⁰⁸ Details on the decomposition of the ESCAP-World Bank international trade cost measure into a tariff and a non-tariff component is available in Duval and Utoktham (2011). The tariff cost component is the geometric average of the average import tariff rates imposed by country i and j on each other.

¹⁰⁹ As discussed in Arvis and others (2013), using a small defined set of countries for which bilateral data are widely available is preferable to using a world simple average subject to composition effects. The largest world importers are China, Germany and the United States which together account for approximately 30 per cent of world imports.

source and host countries are included in model M1 as well as the average tariff of host countries with the rest of the world. Finally, indicators of ease of doing business (i.e., Distance to frontier from the World Bank Doing Business Database) in host countries are included in the model – capturing behind-the-border trade and investment facilitation, including domestic taxes and institutional factors highlighted by Blonigen (2005).

In model M2, all NTC variables are replaced by factors related to underlying international trade cost components, i.e., maritime transport connectivity of the host country with the source country as well as with the rest of the world, Internet users per 100 people – as a proxy of ICT access and use – and exchange rate volatility.¹¹⁰

RFE inclusion in the model follows Kleinert and Toubal (2010). RFE is defined as the ratio of skilled labour in country *i* to total skilled labour in both source and host countries over the unskilled labour country *i* to total unskilled labour in source and host countries.¹¹¹ The ratio is used to measure whether a host country has relatively more (or less) endowment in skilled rather than unskilled labour. Differences in labour endowments across countries are expected to significantly affect FDI flows, as firms develop international production networks (vertical FDI), breaking down the production process in different stages and moving production of intermediate goods requiring unskilled labour to countries where this type of labour is cheaper and more abundant.¹¹²

However, the viability of international production networks not only depends on whether cheaper factors of production can be accessed overseas, but also on how efficiently – i.e., cost effectively – intermediate goods can be moved in and out of the countries where they are being processed before being assembled into final goods. International trade transaction costs can therefore be expected to be crucial determinants of vertical FDI in this context. Therefore the above empirical mode is extended by incorporating various trade cost components, including tariff- and trade facilitation-related indicators.

¹¹⁰ Tomlin (2000) uses both exchange rate growth and standard deviation in the model. Tenreyro (2007) uses volatility. Volatility is defined as: $v_{ijt} = SD[\ln(e_{ijt,m}) - \ln(e_{ijt,m-1})]$, $m=1, 2, \dots, 12$, where SD stands for standard deviation, *e* denotes exchange rate between countries *i* and *j* at year *t*.

¹¹¹ Let *S* be skilled labour, *L* be unskilled labour. RFE_{ij} is defined as $RFE_{ij} = (S_i / (S_i + S_j)) / (L_i / (L_i + L_j))$.

¹¹² See Braconier and others, 2005, for more details.

Table 5. Variable descriptions, data sources and expected signs

Variable	Unit	Expected signs	Source	Description
fdi_ij	US dollar		OECD iLibrary/UNCTAD	Foreign direct investment flows from host country i to source country j
gdp_i	US dollar	+	WB-WDI	Gross domestic product of host country i
gdp_j	US dollar	+	WB-WDI	Gross domestic product of source country j
dist	Kilometre	-	CEPII	Distance between host country i and source country j
contig	-	+	CEPII	Dummy variable indicating 1 if 2 countries share common border, zero otherwise
comlang_off	-	+	CEPII	Dummy variable indicating 1 if 2 countries share common official language, zero otherwise
rfe_i	-	+	Author's calculation from ILO database	Relative factor endowment (see definition in main text)
ntc_ij	Per cent	-	Author's calculation based on ESCAP-WB Trade Costs Database	Tariff-equivalent trade cost, excluding tariff. Based on Anderson and van Wincoop (2004), it is calculated by: $((1+\text{trade costs})/(1+\text{geometric_avg_tariff})) - 1) * 100$
ntc_iw	Per cent	-	Author's calculation based on ESCAP-WB Trade Costs Database	Tariff-equivalent trade cost, excluding tariff of source country with three main importers (China, Germany and the United States)
tariff_ij	0.0001+percent	-	Author's calculation based on TRAINS	Geometric average tariff of host country i charging on importation from source country j and tariff of host country j charging on importation from source country i
tariff_iw	0.0001+percent	-	TRAINS (accessed through WITS)	Simple average tariff of host country i charging on importation from the rest of the world
d2f_i	Score (0-100)	+	WB Doing Business	Ease of doing business index: distance to frontier of host country i
volatility_ij	-	+	Author's calculation based on IMF-IFS data	Exchange rate volatility (see definition in main text)
lsbci_ij	Index	+	UNCTAD's LSBICI-Version 1	Liner shipping bilateral connectivity index between host country i and source country j
intusers_i	Users/100 people	+	WB-WDI	Internet users per 100 people of host country i

D. Data and model estimation

Data sources for all variables are provided in table 5.¹¹³ As explained above, bilateral FDI flows among OECD countries (North¹¹⁴-North) as well as between OECD countries to developing countries (North-South) are obtained from the OECD iLibrary database, while bilateral data on FDI among developing Asian countries (South-South) is obtained from UNCTAD.¹¹⁵ The combined data includes 63 source countries and 152 host countries, resulting in an unbalanced FDI dataset of 20,000 bilateral FDI flows from 2006 to 2011.¹¹⁶ The study treats missing values as missing and zero, and negative foreign investment data as zero. Indeed, while there is a possibility that a missing value is either unreported FDI (non-zero values) or zero value,¹¹⁷ assuming that unreported FDI is zero might lead to biases in the estimation of the model. Negative bilateral investment data in turn indicate that no foreign investments from a given source country into a host country have taken place, making it sensible to treat the negative values as zero.

Labour data for constructing RFE, which is specific to the vertical FDI model, is obtained from International Labour Organization Statistics (<http://laboursta.ilo.org>). Labour data is defined under International Standard Classification of Occupations (ISCO) in this study. Skilled labour is defined as occupation group 0/1 (professional, technical and related workers) and group 2 (administrative and managerial workers) in ISCO-1968. When a country uses ISCO-88, occupational group 1 (legislators, senior officials and managers), group 2 (professionals) and group 3 (technicians and associate professionals) are used. This skilled/unskilled labour definition follows that of Braconier and others (2005).

GDP in current US dollar and Internet users per 100 people are obtained from the World Bank's World Development Indicators. Geographical distance between most populated cities (in kilometres), contiguity and bilateral common language dummy variables are obtained from CEPII (www.cepii.fr). Data on exchange rate growth and volatility is obtained from International Financial Statistics, International Monetary Fund (IFS-IMF). Since the exchange rate from the source is in local currency per US dollar, the study transforms it to be bilateral exchange rate by dividing local currency per US dollar of source country by local currency of host country.

Tariff data is from the UNCTAD TRAINS database, downloaded through WITS: World Integrated Trade Solutions (<http://wits.worldbank.org>). Trade cost, excluding tariff indicator is based on the ESCAP-World Bank

¹¹³ See full paper annex for the list of countries included, descriptive statistics of variables and the correlation matrix. The full working paper is available at www.unescap.org/resources/impact-trade-facilitation-foreign-direct-investment.

¹¹⁴ The Republic of Korea is also a member of the United Nations and ESCAP, where it is listed among developing countries. Therefore, in this analysis, the Republic of Korea is included in the "South" group of countries rather than the "North" group – which brings together all other OECD Members.

¹¹⁵ The data are available upon request.

¹¹⁶ An important feature of this dataset is that it does not include bilateral FDI flows from developing countries to developed countries (South-North). Data for 2007 are dropped due to missing data in the liner shipping bilateral connectivity index for that particular year.

¹¹⁷ Zero and negative values of investment are approximately 50 per cent of the non-missing data in FDI data from 1995-2010.

Trade cost database from Arvis and others (2013).¹¹⁸ Ease of doing business index (distance to frontier) is downloaded from Doing Business (www.doingbusiness.org). Cross-border proxy, the liner shipping bilateral connectivity index (LSBCI), is from the UNCTAD database's LSBCI version 1, which is available upon request.

E. Impact of trade facilitation on FDI: Gravity model results and counterfactual simulation

1. Overall findings

This section starts by discussing the gravity model results when the full dataset of FDI flows from developing and developed countries is used. See annex table 1 for technical details of the results. The results when model estimation is restricted to South-South FDI flows are presented next, followed by a simulation of the particular NTC in model (M1).¹¹⁹ The positive effect of a common language between partners on FDI inflows remains when the models are extended, highlighting the importance of “cultural distance” in attracting FDI.

Estimation results from Model (M1) suggest that, excluding tariffs, bilateral trade costs (NTC) between source and host countries have a significant effect on FDI. Tariffs are also found to have a negative effect on FDI, with results suggesting that a host country's general openness to trade may be more important to foreign direct investors than receipt of bilateral preferential market access. More generally, it supports the finding of Tekin-Koru (2009) and others that there is no evidence of quid pro quo FDI (tariff-jumping FDI), i.e., trade and investment are generally complementary.

In both models (M1) and (M2), the host country's domestic business environment has a strong positive effect on FDI. However, access and affordability of modern information and communication technologies (ICT) – proxied by the number of Internet users per 100 people – is not found to be significant across the models. The exchange rate effect on FDI is also not found to be statistically significant (exchange rate volatility). The latter result may be explained by the fact that tools are increasingly available for international investors to hedge against exchange rate risks.¹²⁰

RFE is found to have a positive and generally significant effect on FDI inflows, except in model M2, where the RFE is positive but not statistically significant. These results provide some support for the growing importance of vertical FDI, where source countries with highly-skilled labour invest in host countries with relatively more unskilled labour as part of the development of international production networks.¹²¹

¹¹⁸ The data are available on the World Bank website (<http://data.worldbank.org/data-catalog/trade-costs-dataset>) and the ESCAP website (www.unescap.org/tid/artnet/trade-costs.asp).

¹¹⁹ Correlation coefficients between trade costs (excluding tariff) and distance are less than 0.6.

¹²⁰ See Del Bo, 2009.

¹²¹ RFE is significant in M0 and M1.

Bilateral cross-border trade connectivity, as proxied by UNCTAD bilateral LSCI, exhibits a very significant and positive relationship with FDI. This suggests the strong preference of foreign investors for locations that have good transport and logistics linkages to their (source) country.

Based on model (M1), a 1% decrease is found in bilateral trade costs, excluding tariff (NTC), lead to an approximately a 0.8% increase in FDI inflows. In model (M2), a 1% increase in bilateral LSCI results in a 0.6% increase in FDI flows. In contrast, a 1% improvement in the domestic business environment indicator of the host country increases FDI inflows by more than 4.3% in model (M2). These results confirm the importance of trade costs and connectivity in general in attracting FDI, but also highlight the essentiality of a conducive business regulatory environment in the host country.

The results presented above are based on available data from all developed and developing countries considered in this study. It is interesting to note the impact of trade facilitation improvements on FDI.

As shown in annex table A1, the standard gravity variables in the baseline model (M0) exhibit expected signs. GDP (economy size) and sharing of a common language positively affects FDI, while distance has a negative effect on FDI. All variables in the baseline model are statistically significant, except for sharing of a common border (contiguity). The effect of distance on FDI loses its statistical significance when the model is extended. This may be explained by the fact that geographic distance between partners in (M0) was a proxy for other factors now included directly in the extended models, in examining how results change when only developing country investment flows are included in the estimation.

2. South-South FDI and trade facilitation

As shown in annex table 2, when only South-South FDI flows are considered (i.e., between developing Asian countries), significant differences emerge. Contiguity (common border between source and host country) and geographic distance are found to be much more important factors in the case of South-South FDI flows. The importance of liner shipping connectivity becomes more limited while the quality of business environment remains important. Internet usage and exchange rate volatility remain insignificant.

The level of import tariff between source and host country is not significant. At the same time, the strong negative relationship between host countries import tariff on the rest of the world and FDI inflows remain. Excluding tariffs, the importance of low bilateral trade costs between host and developing country remain.¹²²

¹²² At the same time, however, the weakly significant positive relationship between FDI inflows and average trade costs of the host country with the main world importers (China, Germany and the United States) in the context of South-South FDI, suggest that developing country investors may sometime prefer to invest in countries whose markets are difficult to access for other investor and traders.

Together with the other findings, these results suggest that developing country investors – presumably from upper middle-income countries – are trying to gain or maintain a competitive advantage by investing in neighbouring countries with lower production (labour) costs and different endowments. While these investors attach importance to bilateral trade costs and the domestic business environment in the host country, convenience of proximity and cultural ties matter the most.

3. Impact of trade facilitation improvements on FDI: A counterfactual simulation

To better understand how FDI flows would change as a result of reductions in trade costs or other trade facilitation related improvements, a counterfactual simulation was conducted in which the trade costs and other trade facilitation factors of below-average developing countries were brought to the developing country average. Average changes to trade costs and related trade facilitation indicators in developing countries implied in the simulation are reported table 6, together with the impact on FDI flows.

As shown in table 6, the simulation does not imply very large changes in either tariffs or other trade costs across developing countries. The 28% reduction in average tariffs across the Asia-Pacific region only results in a 6% increase in FDI inflows. In contrast, the simulated 14% average reduction in non-tariff trade costs across the region increases FDI flows to Asia-Pacific by 20%.

Not unexpectedly, improving the quality of the business environment in the host country appears to be the most effective way of increasing FDI inflows, with the simulated 10% average improvement in business environment in the Asia-Pacific region resulting in a 61% increase in FDI flows.

Table 6. Counterfactual simulation of trade facilitation improvements in FDI host countries

Area of improvement (in host countries)	All-country		Asia-Pacific	
	Implied average change in developing countries (%)	Average impact on bilateral FDI flows (%)	Implied average change in Asia- Pacific developing countries (%)	Average impact on bilateral FDI flows (%)
Bilateral trade costs between host and source countries, excluding tariffs.	-12	16	-14	20
Bilateral tariff of host country on source country.	-14	1	-20	1
Average tariff of host country on trade partners.	-20	4	-28	6
Doing business score.	7	42	10	61
Bilateral liner shipping connectivity index.	122	39	61	27

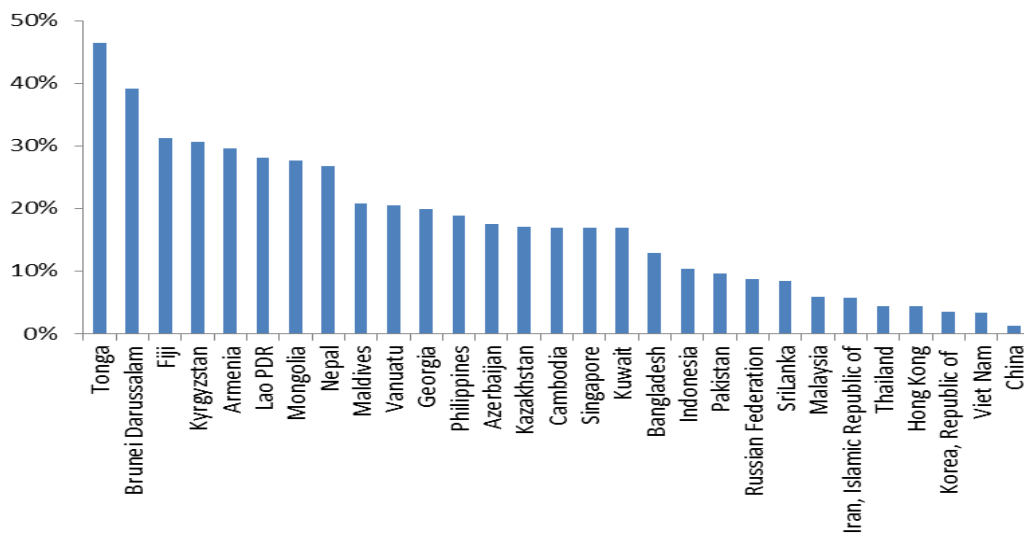
Notes: The impacts from simulated improvements are based on models M1 for trade costs, and model M2 for tariffs, Internet users and bilateral LSCI (see annex table A2). Asia-Pacific refers to all the developing countries member of ESCAP for which data were available (see annex table A1).

In contrast, increasing FDI by enhancing seaport connectivity appears to be less promising and certainly challenging. Gaps between developing countries in these two areas appear to be very wide, as evidenced by the large average changes in LSCI index implied by the simulation (122% up) (table 6). Closing the liner shipping connectivity gap is not feasible in the short term and without massive investment in hard infrastructure. Therefore, improving the quality of the business environment as well as focusing on making administrative trade procedures simpler and more transparent would appear to provide higher return on investment in terms of attracting FDI.

It is important to look beyond regional or global averages, however, as countries are affected differently, depending on how far they are from the global developing country average. Figures 2 and 3 show the impact on FDI in different host countries as a result of improving to the global developing country average. Figure 2 suggests that focusing on reducing bilateral trade costs with its source country may be a pertinent strategy for most developing host countries aiming to increase FDI inflows.

Figure 3 suggests that different countries have to set different priorities when reducing trade costs. For example, Cambodia may best focus on enhancing quality of business environment, while Vanuatu may focus on enhancing port connectivity.

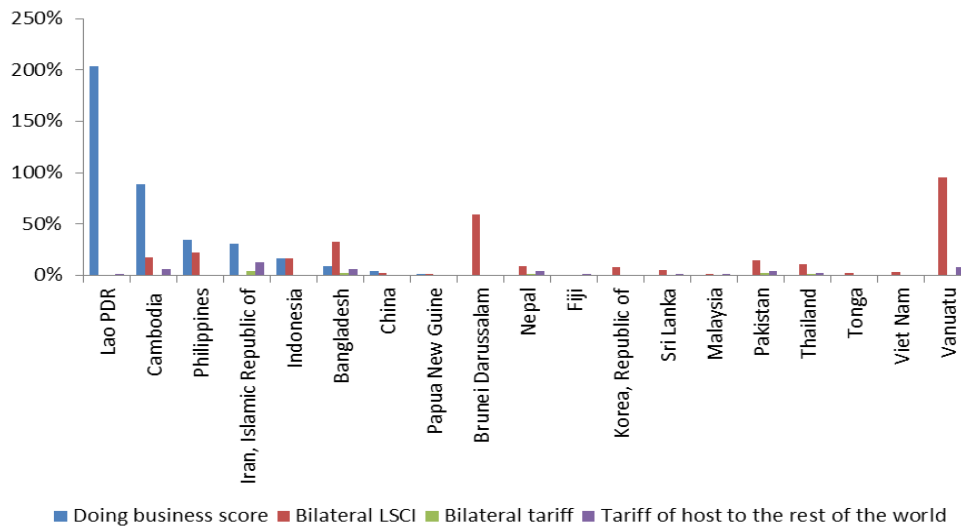
Figure 2. Impact of trade cost improvements on FDI in selected Asia-Pacific countries



Source: Author's compilation.

Note: This shows the percentage increase in FDI flows to a host country when that host country reduces its trade costs to the global developing country average. The impacts are calculated based on model M2.

Figure 3. Impact of tariff reduction and increase use trade facilitation and tariff in developing economies on their FDI flows, by host countries – ESCAP members



Source: Author’s compilation.

Note: this shows the percentage increase in FDI flows to a host country when that host country reduces its trade costs to the global developing country average. The impacts are calculated based on model M3.

F. Conclusion

An augmented FDI gravity model framework was applied in order to determine the effect of comprehensive international trade costs and related factors and components on FDI flows. The results showed that international trade costs of both a non-tariff and tariff nature are important determinants of FDI inflows. International trade costs and the various trade cost components and factors examined in this study were found to be negatively related to FDI inflows, confirming that FDI and trade may best be seen as complements rather than substitutes when designing investment policy frameworks.

Although, as often pointed out in advocacy material related to trade facilitation, the importance of reducing international trade costs was found to be important; the quality of the business environment in the host country was confirmed to be an essential driver of FDI inflows. This also generally held true for South-South FDI, although it appeared that proximity and cultural similarities were key factors for FDI between developing countries. Overall, the results provide further support for implementation of coordinated trade and investment

policies, such as measures aimed at reducing the costs associated with importing and exporting intermediate goods and services linked to FDI in priority sectors identified in the national development strategy.¹²³

While the strong link between FDI and trade costs was found to be generally robust across the various models, data samples and estimation methods used in the course of the above analysis, further research will be useful in confirming the results and estimates of the impact of various trade costs component and factors on FDI. In particular, augmenting the bilateral FDI data used in this study, and testing the significance of alternate indicators of connectivity and trade facilitation (e.g., the logistics performance index) may be pursued. Nonetheless, these findings provide evidence of a strong link between trade facilitation and FDI.

¹²³ See also Anukoonwattaka, 2011.

Annex

Econometric Analysis

Model Specification

The models are estimated using pseudo-poisson maximum likelihood (PPML). This method, introduced by Silva and Tenreyro (2006), solves several problems related to estimation of gravity models. In particular, it takes zero investment flows into account and is unbiased when heteroskedasticity exists. Because of the limited availability of data for several explanatory variables and the need to focus on recent FDI flow patterns, all models are estimated using data from 2006 to 2011. Year and income group fixed effect based on GNI per capita (using the World Bank Atlas method) are included in all the models.¹²⁴

This chapter estimates the following gravity models of FDI:

Baseline Gravity Model (A):

$$(M0): fdiijt = b0 + b1\ln(gdpit) + b2\ln(gdpjt) + b3\ln(distij) + b4 (contigij) + b5 (comlangij) + b16(RFEij) + eijt$$

Augmented Gravity Models (B and C):

$$(M1): fdiijt = b0 + b1\ln(gdpit) + b2\ln(gdpjt) + b3 \ln(distij) + b4 (contigij) + b5 (comlangij) + b6 (RFEij) + b7 \ln(\text{geometric_avg_tariffijt}) + b8 \ln(\text{tariffjwjt}) + b9 \ln(d2fjt) + b10 \ln(\text{ntcijt}) + b11 \ln(\text{ntcjwjt}) + eijt$$

$$(M2): fdiijt = b0 + b1\ln(gdpit) + b2\ln(gdpjt) + b3 \ln(distij) + b4 (contigij) + b5 (comlangij) + b6 (RFEij) + b7 \ln(\text{geometric_avg_tariffijt}) + b8 \ln(\text{tariffjwjt}) + b9 \ln(d2fjt) + b11\ln(\text{lsbcijwt}) + b12\ln(\text{lsbcijwt}) + b13\ln(\text{intusersjt}) + b10 (\text{volatilityijt}) + eijt$$

for host country i, source country j at year t where

fdi	denotes FDI flows.
gdp	denotes Gross Domestic Product
dist	denotes distance between 2 countries
contig	denotes existence of contiguity (common border) between two countries
comlang	denotes existence of common official language between two countries
RFE	denotes relative factor endowment

Income group and year fixed effects as well as source country fixed effects are included in models M1 and M2.

¹²⁴ The groups are: low income, US\$ 1,025 or less; lower middle income, US\$ 1,026-US\$ 4,035; upper middle income, US\$ 4,036-US\$ 12,475; and high income, 12,476 or more. Since the data are unbalanced panel data for source and host countries, income group is used instead of particular country's fixed effect in order to at least capture a more balanced variation within income group.

Estimation Results

Annex Table 1. Regression – all countries

Variables	(M0)	(M1)	(M2)
	Classic Gravity	Host's side NTC	Host's TF sub-indicators
ln_gdp_i	0.486*** [5.628]	0.473*** [5.061]	0.441*** [6.997]
ln_gdp_j	0.614*** [12.30]	1.396*** [2.688]	1.316*** [3.082]
ln_dist	-0.437*** [-4.819]	0.0896 [0.832]	0.0816 [1.095]
contig	-0.115 [-0.305]	0.00868 [0.0324]	0.428** [2.292]
comlang_off	1.218*** [7.412]	0.743*** [3.811]	0.913*** [5.953]
ln_tariff_ij		0.000242 [0.00864]	-0.0508** [-2.567]
ln_tariff_iw		-0.223*** [-4.198]	-0.154*** [-3.644]
ln_d2f_i		1.417* [1.676]	4.303*** [5.440]
ln_lsbcij			0.603*** [5.261]
ln_intusers_i			-0.362 [-1.594]
volatilityij			1.403 [0.339]
rfe_i	0.199*** [6.401]	0.214*** [3.165]	0.0527 [0.821]
ln_ntc_ij		-0.819*** [-2.938]	
ln_ntc_iw		0.136 [0.383]	
Constant	-7.979*** [-3.545]	-38.83*** [-2.621]	-51.82*** [-4.681]
Observations	13,771	9,368	12,159
Source's income group FE	Yes	Yes	Yes
Host's Income group FE	Yes	Yes	Yes
Year	Yes	Yes	Yes
Source FE	No	Yes	Yes
Host FE	No	No	No
Clustered SE	Country pair	Country pair	Country pair
Pseudo R-squared	0.191	0.415	0.572
*** p<0.01, ** p<0.05 t-stat. in square brackets.			

Annex Table 2. Regression – South (host) – South (source)

Variables	(M0)	(M1)	(M2)
	Classic Gravity	Host's side NTC	Host's TF sub-indicators
ln_gdp_i	0.858*** [3.767]	1.267*** [7.083]	0.957*** [6.356]
ln_gdp_j	0.873*** [6.301]	1.186** [2.303]	2.299** [2.179]
ln_dist	-0.345 [-1.199]	-0.653*** [-4.839]	-1.033*** [-4.771]
contig	2.287*** [5.658]	1.367*** [5.188]	0.858** [1.983]
comlang_off	1.311*** [2.649]	1.439*** [3.556]	1.374*** [3.279]
ln_tariff_ij		0.0399 [0.739]	0.0439 [0.673]
ln_tariff_iw		-0.116*** [-2.998]	-0.165*** [-3.186]
ln_d2f_i		4.742*** [2.850]	2.665 [1.381]
ln_lsbcij			0.183 [0.600]
ln_intusers_i			-0.0189 [-0.0677]
volatilityij			-14.70 [-1.171]
rfe_i	0.212*** [2.647]	0.107 [1.911]	0.140*** [2.669]
ln_ntc_ij		-0.843** [-2.105]	
ln_ntc_iw		1.342 [1.682]	
Constant	-27.10*** [-3.249]	-65.25*** [-3.776]	-71.58** [-2.208]
Observations	1 264	565	1 002
Source's income group FE	Yes	Yes	Yes
Host's Income group FE	Yes	Yes	Yes
Year	Yes	Yes	Yes
Source FE	No	Yes	Yes
Host FE	No	No	No
Clustered SE	Country pair	Country pair	Country pair
Pseudo R-squared	0.849	0.994	0.930
*** p<0.01, ** p<0.05 t-stat. in square brackets.			