Sources of FDI Flows to Developing Asia: The Roles of Distance and Time Zones

Rabin Hattari and
Ramkishen S. Rajan

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Rabin Hattari is a research analyst in the World Bank's South Asia Poverty Reduction, Economic Management, Finance, and Private Sector Development Department. Ramkishen S. Rajan is an associate professor in the School of Public Policy at George Mason University in Arlington, Virginia. This paper was completed while he was a visiting fellow at the Asian Development Bank Institute June–July 2008. He acknowledges with gratitude the support offered by ADBI.

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Asian Development Bank Institute
Kasumigaseki Building 8F
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

Abstract

This paper investigates sources and determinants of foreign direct investment (FDI) flows to developing Asia using bilateral FDI flows for the period 1990–2005. The Triad (composed of Japan, EU, and the US) has accounted for about 35–40% of FDI inflows to developing Asia in recent years, with Japan being the single largest investor. Intra-developing Asian flows have also accounted for about 35% of total inflows to the region, and these shares have remained fairly stable for the period 1997–2004. With regard to the determinants of FDI flows, the paper finds that an augmented gravity model fits the data fairly well. We pay particular attention to possible differences in the determinants of FDI flows to developing Asian economies from the rest of the Asia and Pacific region, compared to those from non-regional OECD economies, with an emphasis on the roles of distance and time zone differences. To preview the main conclusion, we find that the elasticity of distance is greater for FDI from the non-Asia Pacific OECD economies than intraregional Asian flows. However, this difference disappears when one accounts for differences in time zones.

JEL Classification: F21, F23, F36

Contents

I. INTRODUCTION

With the rapid growth of countries such as the People's Republic of China (PRC) and India, and the resurgence of Southeast Asia after the 1997–1998 currency crisis, developing Asia has once again become one of the most dynamic economic regions in the world. It would not be an exaggeration to say that international trade and foreign direct investment (FDI) is a key determinant of trade and growth in much of the developing Asian region. While there have been detailed studies on the sources and determinants of international trade flows to developing Asia at the bilateral level, less research has been done on bilateral FDI flows. Eichengreen and Tong (2007); Liu, Chow, and Li (2007); and Sudsawasd and Chaisrisawatsuk (2006) are some of just a handful of papers that examine FDI to Asia using aggregate data. However, all these papers only consider FDI flows from the Organisation for Economic Co-operation and Development (OECD) economies as the source country, since they use data from the OECD. In contrast, the focus of this paper is on FDI flows to developing Asian economies from the main OECD economies as well as from other developing Asian economies using data from UNCTAD.[1]

The paper is organized as follows: Section II discusses broad patterns and trends in FDI flows to developing Asia using bilateral net FDI flows over the period 1990–2005. Sections III and IV respectively outline and estimate an augmented gravity model framework to examine the main determinants of FDI flows to the region using a panel dataset. We pay particular attention to whether there are differences in the determinants of FDI flows from the non Asia-Pacific OECD economies compared to those coming from intraregional flows, with particular emphasis on the role of distance and time zone differences. The final section presents a summary and a few concluding remarks. To preview the main conclusion, we find the elasticity of distance to be greater for FDI from non-Asia Pacific OECD economies than for intra-developing Asian flows. However, this difference disappears when one accounts for differences in time zones in the manner of Stein and Daude (2006).

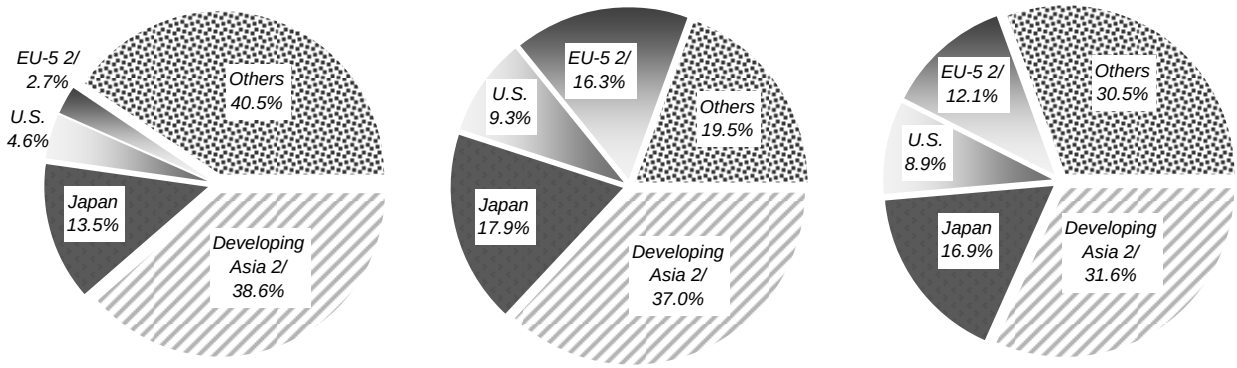
II. SOURCES OF FDI FLOWS TO DEVELOPING ASIA: BILATERAL DATA ANALYSIS

Analyzing bilateral FDI flows data is far from being a straighforward exercise, as inflows and outflows data do not accurately match. While some source countries have relatively complete FDI outflows data, it is apparent that for many countries, source country data is incomplete or non-existent. Numerous practices of describing FDI data create bilateral discrepancies between FDI flows as reported by source and host countries, some of which can sometimes be quite large. Faced with these concerns, we drew inferences on FDI flows by examining FDI inflow data reported in the host economies, as they are relatively more complete and are available for all developing Asian economies under consideration. In other words, we focused on the sources of inflows rather than the destination of outflows.

Figure 1 highlights the period 1990–2004, during which, Japan has been the single largest investor into developing Asia, accounting for 17–18% of total flows, and showing an increase from 13–14% in 1990–1994. The US was the second largest investor in the region, accounting for 9% of total inflows, up from 4–5% in 1990–1994. The EU has averaged around 14% of total inflows over the period 1995–2004, while intra-developing Asian flows has accounted for an average of 35%, with a slightly declining trend over the last 15 years. The main EU sources of FDI flows to Asia have been the United Kingdom, Netherlands, and Germany. Intra-developing Asian flows have been largely from the People's Republic of China (PRC); Hong Kong, China; Singapore; and Taipei,China.

[1] We follow the United Nations Conference on Trade and Development (UNCTAD) policies in categorizing Republic of Korea as part of developing Asia.

Figure 1: Sources of FDI Inflows to Asia, 1990–2004[1]



(1990-1994 averaged) (1995-1999 averaged) (2000-2004 averaged)

1. Developing Asia consists of newly industrialized Asian economies (NIEs), ASEAN-4, People's Republic of China (PRC), India, Low-income Asia, and other parts of Asia.

2. EU (5) consists of France, Germany, Italy, Netherlands, and the United Kingdom.

Source: UNCTAD.

Table 1 summarizes the top 40 bilateral FDI flows to developing Asia for the last two sub-periods. Flows from Hong Kong, China to the PRC, and vice versa, stand out in this regard. Part of this is due to round-tripping, which significantly inflates the amount of outward FDI from the PRC (Xiao 2004). Flows from Japan, the US, and Singapore to the PRC and Hong Kong, China also stand out. Also noteworthy are FDI flows from the US and Japan to the Republic of Korea, Malaysia, Thailand, and in particular, Singapore. Overall, FDI inflows are particularly pronounced between and within East Asian economies and Southeast Asia economies (Table 2). India is the only South Asian country that enters the top 40 bilateral FDI flows to developing Asia.

Table 1: Top 40 Bilateral Flow To Developing Asia[1]
(in millions of US$)

Donor	Host	Average (1997-2000)	Average (2001–2005)	In percent to Asia (1997–2000)	In percent to Asia (2001–2005)
Hong Kong , China	People's Republic of China (PRC)	17,750.8	17,819.1	16.0	16.8
People's Republic of China (PRC)	Hong Kong , China	7,266.9	5,459.4	6.5	5.2
Japan	People's Republic of China (PRC)	3,276.2	5,194.5	3.0	4.9
United States	People's Republic of China (PRC)	3,774.7	4,107.0	3.4	3.9
Taipei,China	People's Republic of China (PRC)	2,774.8	3,361.3	2.5	3.2
Singapore	People's Republic of China (PRC)	2,706.3	2,136.7	2.4	2.0
Netherlands	Hong Kong , China	1,929.0	2,011.5	1.7	1.9
Japan	Thailand	1,347.0	2,324.9	1.2	2.2
Japan	Hong Kong , China	1,417.6	2,044.6	1.3	1.9
United States	Hong Kong , China	1,915.1	1,521.3	1.7	1.4
United States	Singapore	1,840.4	1,506.5	1.7	1.4
Singapore	Hong Kong , China	2,835.3	353.1	2.6	0.3
United States	Republic of Korea	1,293.6	1,571.4	1.2	1.5
Japan	Singapore	1,281.5	1,276.6	1.2	1.2
United Kingdom	People's Republic of China (PRC)	1,305.4	893.4	1.2	0.8
Germany	People's Republic of China (PRC)	995.1	1,146.4	0.9	1.1
Singapore	Malaysia	844.1	1,133.8	0.8	1.1
Netherlands	Republic of Korea	1,350.1	573.4	1.2	0.5
United States	Malaysia	1,429.8	428.8	1.3	0.4
Singapore	Thailand	441.7	1,381.9	0.4	1.3
United States	India	631.3	852.7	0.6	0.8
Germany	Singapore	486.9	957.0	0.4	0.9
Netherlands	People's Republic of China (PRC)	590.2	801.7	0.5	0.8
Japan	Republic of Korea	607.8	717.3	0.5	0.7
France	People's Republic of China (PRC)	701.4	594.8	0.6	0.6
Germany	Malaysia	316.0	852.2	0.3	0.8
Germany	Republic of Korea	681.9	248.3	0.6	0.2
United States	Philippines	658.8	250.5	0.6	0.2
Taipei,China	Hong Kong , China	268.9	446.6	0.2	0.4
Australia	People's Republic of China (PRC)	278.2	400.7	0.3	0.4
United Kingdom	Thailand	273.9	363.5	0.2	0.3
Japan	Philippines	232.9	377.5	0.2	0.4
Malaysia	People's Republic of China (PRC)	290.8	316.7	0.3	0.3
United Kingdom	India	134.3	443.4	0.1	0.4
Hong Kong, China	Malaysia	272.3	296.5	0.2	0.3
Hong Kong, China	Thailand	360.1	160.8	0.3	0.2
France	Singapore	303.8	211.5	0.3	0.2
Japan	India	249.3	244.7	0.2	0.2
Netherlands	India	130.0	350.9	0.1	0.3
France	Republic of Korea	382.2	97.4	0.3	0.1

Note: 1. Based on FDI inflow data in host economy.

Source: UNCTAD FDI database

Table 2: Average Intra-Asian Bilateral Net FDI Flows[1]
(in millions of US$)

	Host region					
	(1997-2000)			(2001-2005)		
Source region	East Asia[2]	South-East Asia[3]	South Asia[4]	East Asia[2]	South-East Asia[3]	South Asia[4]
East Asia[2]	28,453.6	1,604.2	201.9	27,482.5	1,168.1	78.9
South-East Asia[3]	6,328.7	1,748.2	86.6	3,622.3	2,641.7	111.1
South Asia[4]	0.0	43.4	5.2	0.0	27.9	14.6
EU[5]	7,597.6	6,208.1	869.9	8,496.5	7,073.4	1,507.0
Japan	5,619.3	3,074.7	275.3	8,090.6	4,536.5	262.7
United States	7,032.1	4,631.6	715.0	7,265.6	2,194.2	1,018.6
Rest of the world	45,393.3	23,129.2	3,980.8	49,220.7	15,066.0	6,387.6

Notes: 1. Based on FDI inflow data in host economy.
2. East Asia consists of People's Republic of China (PRC); Hong Kong, China; Republic of Korea; and Taipei,China.
3. South-East Asia consists of Brunei Darussalam, Cambodia, Lao PDR, Malaysia, Myanmar, Singapore, Philippines, Thailand, and Viet Nam.
4. South Asia consists of Bangladesh, India, Maldives, Sri Lanka, and Pakistan.
5. France, Germany, Italy, Netherlands, and United Kingdom

Source: UNCTAD FDI/TNC database.

While Japan, North America, and the EU-5 (i.e. France, Germany, Italy, Netherlands and UK) intraregional (Asian) economies, as well as Australia and New Zealand, have together constituted around 70% of total inflows to developing Asia over the last fifteen years, that still leaves a substantial portion of inflows unaccounted for. While regions such as Russia, Latin America, and the Middle East have invested in the region, they have been relatively small players to date.[2] A significant portion of FDI to the region is from offshore financial centers (OFCs) such as the British Virgin islands, Bermuda, Cayman islands, Mauritius, and Western Samoa. Insofar as some part of inflows from the OFCs involve FDI that originated from other Asian economies and are not intended for the originating country (i.e., trans-shipping as opposed to round-tripping), we may be undercounting the size of intra-Asian FDI flows.

III. DETERMINANTS OF FDI FLOWS TO DEVELOPING ASIA

This section undertakes an empirical investigation of some of the possible determinants of FDI flows to developing Asia from the OECD and the rest of the region over the period 1990–2005 using an augmented gravity model framework.

A. The Model

Our aim is to develop a relatively parsimonious model that includes specific bilateral variables as well as selected host country policy variables. In view of this, we followed the basic gravity-type framework, which argues that market size and distance are important determinants in the choice of the location of source countries for direct investments.[3]

[2] Similarly, while we have not included all the EU members, the excluded countries are relatively marginal players in Asia.

[3] The theoretical basis for the gravity model of FDI has recently been proposed by Head and Ries (2008). The competing model is the capital-knowledge model of multinational activity developed by Carr, Markusen, and Maskus (CMM) (2001), which is arguably more appropriate if one uses FDI stock data. In addition, some of the

The basic specification of our estimated model is outlined below:

$$\ln(FDI_{ijt}) = \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 LANG_{ij} + \beta_4 \ln(DIST_{ij}) + \beta_5 X_{ijt} + \alpha_j + \delta_t + \nu_{ijt}, \quad (1)$$

where FDI_{ijt} is the real FDI flow from source country (i) to host country (j) in time (t); GDP_{it} and GDP_{jt} are real GDPs in US dollars for the source country (i) and the host country (j) in time (t); LANG is a binary variable equal to 1 if the source and host countries have a common official language; $DIST_{ij}$ is the geographical distance between the host and source countries; X_{ijt} is a vector of control variables influencing FDI outflows; α_j denotes the unobservable type of source country effects (source country dummies are used); α_t denotes the unobservable time effects (year dummies are used); and ν_{ijt} is a nuisance term. Our baseline gravity model is augmented with measures of trade openness and financial openness of the host country as well as bilateral imports between the two countries.

We assumed the coefficients of the real GDP of the source and destination countries to be both positive, as they proxy for important masses in gravity models. A destination country that has a large market tends to attract more FDI. The coefficient of the source country size could either be negative or positive. While large real GDP indicates greater aggregate income and/or more companies, and therefore higher ability to invest abroad, small real GDP in the source implies limited market size and consequent desire by companies to expand their wings overseas in order to gain market share. The sign for common language ought to be positive, while the sign for distance from the source to the host country should be negative, as greater distance between countries makes a foreign operation more difficult and expensive to supervise and might therefore discourage FDI.[4]

We also added a measure for bilateral trade (i.e. imports). The idea here is that a source country could either import from the host country or choose to establish a production base there in order to sell directly to their home market. Alternatively, insofar as companies in the home market are losing market share to "cheap" imports, they may choose to relocate overseas in order to counter this competition. There may be issues of reverse causality between FDI and imports, so we lagged imports by one period. In addition to bilateral trade, in general, the more open the economy is to trade and capital flows, the more likely it is to attract FDI.[5] We used total trade to GDP ratio as a measure of trade openess and used a normalized Chinn-Ito index (see Chinn and Ito 2007) as a proxy for financial openness.[6] Clearly, there may be a number of other host country determinants of FDI (for instance, see Hattari and Rajan 2008). However, since our aim is to focus on the basic gravity model, and in particular, to compare the difference between OECD and developing Asian sources of FDI, we have kept the regressions fairly economical. We also included time (year) dummies to account for global changes in FDI trends, and also controlled for other source country effects to account for unobservable or omitted factors.

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variables required to operationalize the CMM model are not easily available for smaller developing Asian economies.

[4] However, if the foreign firm is looking to service the destination country's market, a longer distance also makes exporting from source countries more expensive and might therefore make local production more desirable and encourage investment. This argument is not unlike the tariff-jumping one.

[5] We could have included bilateral exports rather than imports. However, the nexus between FDI and trade is ambiguous a priori. Insofar as both are a means of servicing a market, they could be competitive in nature (i.e., market-seeking FDI). On the other hand, their relationship could be complementary if FDI is export-oriented, or if greater exports increase familiarity with a country, hence stimulating FDI inflows as well.

[6] We normalized the Chinn-Ito index from 0 to 100.

B. Data and Methodology

Tables A1 and A2 summarize the data sources that are used. The FDI data are based on the UNCTAD FDI/TNC and EIU's World Investment Service databases in millions of US dollars. We deflated the FDI data by using the 1996 US consumer price index (CPI) for urban consumers. Data for real GDP and real GDP per capita are taken from the World Bank's World Development Indicators database. Imports data from the source countries to the host countries are taken from the International Monetary Fund's (IMF) Direction of Trade and Statistics (DOTS) database (although the data are limited to merchandise trade). We also deflated our export data using the 1996 US CPI for urban consumers. Data on distance and common official language are taken from the CEPII (http://www.cepii.fr/).

Our sample is based on a balanced panel dataset of annual data on 187 source-host country pairs, which consist of 24 source countries and 12 host countries between 1990–2005 (Table 3). The dataset contains a large number of missing variables for bilateral FDI (roughly 40% of the total observations) and a small number of disinvestment figures shown in the data as negative (188 observations). Excluding missing and negative observations, our panel consists of around 1,600 observations. In all of our estimations, we dealt with the issue of censored data using the Tobit model, a commonly used approach to dealing with censored data (for instance see Stein and Daude 2006; and Loungani, Mody, and Razin 2002).[7] We followed di Giovanni (2005) by computing a Tobit model using the two-step procedure: first, a probit model is estimated based on whether a deal is observed to be conditional or not on the same right-hand variables as in equation (1), and the inverse Mills' ratio is constructed from the predicted values of the model. Second, a regression is run to estimate equation (1) including the inverse Mills ratio as a regressor.[8]

Table 3: Host and Source Economies

Source	Source	Host
OECD	Developing Asia	Bangladesh
Australia	Bangladesh	People's Republic of China
Canada	People's Republic of China	Hong Kong, China
France	Hong Kong, China	India
Germany	India	Indonesia
Italy	Indonesia	Republic of Korea
Japan	Republic of Korea	Malaysia
Netherlands	Malaysia	Pakistan
New Zealand	Pakistan	Philippines
United Kingdom	Philippines	Singapore
United States	Singapore	Thailand
	Sri Lanka	Viet Nam
	Taipei,China	
	Thailand	
	Viet Nam	

Source: Authors' own calculations.

[7] An alternative suggested by Santos Silva and Tenreyo (2006) is to use the Poison pseudo maximum likelihood method. This methodology has been recently applied to FDI by Head and Ries (2008).

[8] The standard errors are corrected for heteroskedasticity and we use an estimated parameter of an exogenous variable (the inverse Mills' ratio) in the second stage. See di Giovanni (2005) for details.

IV. EMPIRICAL RESULTS

A. Baseline Results

We started with the baseline regression (regression 1) and went on to add dummy interaction terms in order to differentiate between developing Asia and the OECD. The results are summarized in Table 4.

Table 4: Gravity Models on the Determinants of Bilateral FDI Flows to Developing Asia[1, 2, 3]

Dependent variable: Ln of bilateral real FDI outflows	**Regression (1)**	**Regression (2)**	**Regression (3)**	**Regression (4)**
	Two Stage Tobit (Annual data)	Two Stage Tobit (Three Year Average)	Two Stage Tobit Hong Kong, China Dummy (Annual data)	OLS, 1+ FDI (Annual data)
Ln(real GDP i)	-1.203***	-1.237***	-1.190***	-1.113***
	(0.076)	(0.109)	(0.0074)	(0.062)
Ln(real GDP j)	1.243***	1.263***	1.246***	1.136***
	(0.074)	(0.102)	(0.072)	(0.053)
Common language	0.273	0.163	0.126	0.421***
	(0.188)	(0.213)	(0.176)	(0.104)
Ln distance	-0.376***	-0.476***	-0.319***	-0.469***
	(0.117)	(0.181)	(0.114)	(0.084)
Lag of import from i to j	0.197**	0.174**	0.114	0.143***
	(0.078)	(0.078)	(0.095)	(0.038)
Trade openness in j	0.008***	0.008***	0.008***	0.006***
	(0.001)	(0.002)	(0.001)	(0.001)
Financial openness in j	0.008**	0.004	0.010**	0.008***
	(0.004)	(0.005)	(0.004)	(0.002)
Hong Kong, China Dummy			3.579***	
			(0.245)	
Observations	1,589	706	1,589	1,589
Adjusted R-squared	0.67	0.70	0.69	0.70

Notes: 1) Robust standard errors in parentheses.
2) * significant at 10%; ** significant at 5%; *** significant at 1%.
3) Year and source dummies, inverse Mills' ratio, and constant not shown.
Source: Authors' own calculations.

Our base-line regression (regression 1) suggests that larger countries received greater volumes of FDI and that the results are statistically significant. However, the coefficient of the source country is negative and economically and statistically significant. This result is not completely unexpected, as major source economies such as Japan and the US, and smaller source economies such as the Netherlands; Hong Kong, China; and Singapore are both major sources of FDI to the region. Possessing a common language is positively associated with increased FDI inflows, though it is not statistically significant. This may be because English is the de facto language of economic transactions in most of Asia. Greater distance between the host and source country appears to hinder bilateral FDI and this result is strongly significant, with the distance elasticity at about -0.4. Bilateral imports are positive and statistically significant. There is also evidence that a country that is more open to international trade and capital flows (based on the Chinn-Ito index) receives more FDI.

B. Robustness Checks

We undertook three robustness checks. First, given that annual data could be volatile, we re-estimated regression 1 using three year data averages (regression 2). The results are quite close to the baseline, with the exception that financial openess in the host country loses its statistical signficance. Second, given the importance of the Hong Kong, China-PRC bilateral FDI flows, and the likelihood that a large part of that may be round-tripping, we re-estimated the regression by including a Hong Kong, China-PRC dummy (regression 3). Once again the results are robust with the exception being the lag of imports, which now loses its statistical signficance. Third, we re-estimated the regression by using OLS and converted the dependent variable to (1 + FDI) (regression 4). The results remain robust, with the exception of the common language dummy which becomes statistically significant. Overall, the results are highly robust.

C. Role of Time Zone Differences

Could the distance variable be capturing factors other than physical distance? In a recent paper, Stein and Daude (2006) emphasized the importance of time zone differences using OECD data for 17 OECD source economies and 58 host economies. According to the authors:

> (t)he transaction costs associated with the difference in time zones should be important in activities that are intensive in information and require a great deal of interaction in real-time. Frequent real-time communications should be particularly important between headquarters and their foreign affiliates, as well as between a firm and its prospective foreign partners (p.97).

We therefore re-estimated regression 1 by including the difference in time zone between the host and source countries (regression 5 in Table 5). The source data on time zone differences is from Stein and Daude (2006), and similar to their approach, we extracted the absolute difference of time between the host and source countries. Interestingly, with the inclusion of the time zone difference variable, the distance elasticity declines by about half in absolute terms to -0.2. The time zone difference variable almost wholly captures this decline in elasticity. In particular, the time zone elasticity is estimated at -0.18 and it is strongly statistically significant. All the other estimated coefficients are the same as in regression 1. It clearly appears that physical distance is partly affected by the differences in time zones between countries.

Table 5: Gravity Models on the Determinants of Bilateral FDI Flows to Developing Asia[1, 2, 3]

	Two Stage Tobit (Annual data)	Two Stage Tobit (Annual data)	Two Stage Tobit (Annual data)	Two Stage Tobit (Annual data)
ln(real GDP i)	-1.248***	-1.466***	-1.279***	-1.234***
	(0.077)	(0.140)	(0.099)	(0.104)
ln(real GDP j)	1.278***	1.505***	1.275***	1.255***
	(0.074)	(0.156)	(0.108)	(0.112)
Common language	0.117	0.412*	0.164	0.163
	(0.198)	(0.240)	(0.233)	(0.228)
ln distance	-0.204*	-0.653***	-0.401***	-0.314**
	(0.120)	(0.164)	(0.133)	(0.134)
Lag of import from i to j	0.182**	0.026	0.195**	0.167**
	(0.078)	(0.108)	(0.090)	(0.083)
Trade openness in j	0.008***	0.009***	0.007***	0.007***
	(0.001)	(0.002)	(0.002)	(0.002)
Financial openness in j	0.009**	0.008*	0.007	0.006
	(0.004)	(0.004)	(0.004)	(0.004)
Time zone difference	-0.176***			-0.143
	(0.040)			(0.094)
OECD		-4.384	18.202***	-1.885
		(3.103)	(4.522)	(4.824)
ln(real GDP i) * OECD		0.647***	0.523**	0.161
		(0.221)	(0.206)	(0.194)
ln(real GDP j) * OECD		-0.554***	-0.394**	-0.146
		(0.212)	(0.193)	(0.181)
Common language * OECD		-0.067	0.071	-0.166
		(0.290)	(0.276)	(0.285)
ln distance* OECD		0.509**	-1.407***	0.360
		(-0.247)	(0.499)	(0.544)
Lag of import from i to j* OECD		0.403***	0.405***	0.479***
		(0.128)	(0.141)	(0.137)
Trade openness in j* OECD		-0.002	0.000	0.000
		(0.003)	(0.002)	(0.002)
Financial openness in j* OECD		0.003	0.004	0.006
		(0.005)	(0.006)	(0.006)
Time zone difference* OECD				-0.281**
				(0.141)
Observations	1,589	1,589	1,589	1,589
Adjusted R-squared	0.68	0.68	0.68	0.68

Notes: 1) Robust standard errors in parentheses.
2) * significant at 10%; ** significant at 5%; *** significant at 1%.
3) Year and source dummies, inverse Mills' ratio, and constant not shown.
4) OECD interaction terms exclude Japan, Australia, and New Zealand.

Source: Authors' own calculations.

D. Intraregional versus Extraregional FDI Flows

While we do not have sectoral data on FDI flows, we recognize that there could be differences in the determinants of between FDI from the OECD and that from other

developing Asian countries, particularly in consideration of distance and time zone variables. To determine this we re-estimated regression 1 by including an interaction term for all the dependent variables with the OECD economies (regression 6). Compared to the baseline regressions, the elasticities of host and source GDPs increases somewhat and remain statistically significant. Interestingly, although the elasticity of the source countries' GDP remain negative, the elasticity of the distance variable rises sharply to -0.65 and remains highly statistically significant, while the lag of imports becomes economically and statistically insignificant.

The OECD interaction terms offer some noteworthy findings, including the decline of elasticity of the host and source countries' GDPs (in absolute terms). Another notable finding is the statistical significance and sharp rise of elasticity of imports, which imply that bilateral imports tend to strongly attract bilateral FDI from the OECD economies, but not from developing Asian sources. This may suggest that FDI flows from OECD may be relatively export-oriented, while those from developing Asia are focused on the domestic market. This said, the distance elasticity of FDI from OECD sources sharply declines (-0.653+0.509=-0.142), appearing quite counter-intuitive and requiring further examination. To this end we re-estimated regression 2 but only included the interaction terms for the non Asia-Pacific OECD economies (i.e., excluding Japan, Australia, and New Zealand). The results are outlined in regression 7. Interestingly, the non-interaction terms are quite similar to the baseline in regression 1, with the exception of financial openess which is no longer statistically significant. With regard to the interaction terms, it is notable that the distance elasticity is much higher (in absolute terms). Specifically, intraregional FDI is -0.4, while extraregional flows is a rather high -1.8.

Accordingly, we included the time zone difference variable and re-estimated the regression (regression 8). Notably, the time zone difference variable is no longer statistically significant, as expected a priori, since these are only intraregional flows. The interaction terms, economic masses, trade and financial openess, and common language elasticities, are all statistically insignificant, suggesting no difference between non Asia-Pacific OECD FDI sources and intraregional sources. Interestingly, the distance variable is also statistically insignificant[9] The time zone difference is statistically and economically significant (entering with a negative coefficient), suggesting that there is no obvious difference in distance elasticity between intraregional and extraregional FDI flows to developing Asia. However, there is clearly a time zone difference effect that, ceteris paribus, reduces the amount of FDI flows to developing Asia from extraregional sources. One other interesting discovery is the significant rise in import elasticity (0.167+0.479=0.666). This suggests that extra-regional FDI is much more sensitive to bilateral import flows than intraregional FDI, and that FDI from extra-regional sources uses developing Asia relatively more intensively as a source of imports (i.e., as an export platform back to the home country). This is also consistent with the fact that many of the developing Asian economies run bilateral trade deficits with the US and EU.

V. CONCLUDING REMARKS

This paper investigated sources and determinants of foreign direct investment (FDI) flows to developing Asia using bilateral FDI flows for the period 1990–2005. Our panel dataset allowed us to take advantage of the time series, as well as cross-country variations in the data. The data indicated that Triad accounted for 40% of total inflows for the decade since 1995. Intra-developing Asian flows accounted for an average of 35% of total inflows to the region, with a slight decline over the last fifteen years. The bulk of the remaining inflows is

[9] While not statistically significant, the net elasticity of distance from extra-regional sources is 0.056. Positive distance elasticity may have some economic basis. For instance, if the foreign firm is looking to service the destination country's market, a longer distance also makes exporting from source countries more expensive and might therefore make local production more desirable and thus, encourage investment.

from offshore financial centers (OFCs). Flows from Hong Kong, China to the People's Republic of China (PRC) and vice versa dominate FDI flows to developing Asia. Flows from Japan, Singapore, and the US to the People's Republic of China (PRC) and Hong Kong, China also stand out.

With regard to the determinants of FDI flows, the augmented gravity model for FDI flows to developing Asia fits the data well, regardless of the FDI source. However, the analysis clearly emphasizes that there are notable differences in the determinants of FDI flows from the OECD to the region as compared to intraregional flows. In particular, we find that the elasticity of distance is greater for FDI from non-Asia-Pacific OECD economies than for intra-developing Asian flows. However, this distance effect disappears when the differences in time zones are accounted for. Stein and Daude (2006) appear to be correct; the world is not flat. Differences in time zones appear to act as a hindrance to FDI.

APPENDIX: DATA SOURCES

Table A1: Variables Included in the Dataset

Variables	Source
FDI Inflows	UNCTAD FDI/TNC database and the EIU's World Investment Service databases
Real GDP in US dollar	World Development Indicators, World Bank
Real GDP per capita in US dollar	World Development Indicators, World Bank
Consumer price indices	International Financial Statistics, IMF
Imports of goods	Direction of Trade Statistics, IMF
Distance	CEPII
Common Official Language	CEPII
Trade Openess	World Development Indicators, World Bank
Financial Openess	Chinn-Ito index
Time Zone differences	Stein and Daude (2006)

Source: Authors' own calculations.

Table A2: Summary Statistics

	Units	Obs.	Mean	Std. Dev.	Min.	Max.
Bilateral FDI flows from i to j	US$ millions	1,792	412.2	1,672.7	-6,359.5	20,809.7
Real GDP country i	US$ billions	2,992	157.6	767.4	0.0	10,995.8
Real GDP country j	US$ billions	2,992	38.9	133.4	0.0	1,893.4
Common official language Dummy	1 = yes 0 = no	2,992	0.3	0.4	0.0	1.0
Distance	Kms	2,992	6,185.6	3,992.4	315.5	16,180.3
Imports from i to j	US$ millions	2,985	3,176.7	8,812.4	0.0	169,085.6
Average annual US CPI	Index: 2000 = 100	2,985	103.5	14.5	83.3	128.5
Trade Openness Index in j	In % of GDP	2,992	111.75	93.5	13.1	368.2
Normalized Financial Openness Index in j	100 = Max 0 = Min	2,992	50.6	33.6	0.0	100.0
Time Zone differences	In hours	2,992	4.0	4.0	0.0	15.0

Source: Authors' own calculations.

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