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What Explains Intra-Asian FDI Flows?: Do Distance and Trade Matter?

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Astract

This paper examines intra-Asian FDI flows using bilateral data over the period 1990 to 2005. Does the so-called distance puzzle that has charcterized trade and FDI based gravity models exist in the case of intra-Asian FDI flows as well? And if so, to what extent can it be explained by informational assymetries and international trade as opposed to physical distance? These questions are explored in this paper.

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1. Introduction

Asian companies have become significant foreign direct investors abroad, with a large share of outward investments from Asia recycled intraregionally. For instance, Hattari and Rajan (2008) find that intra-Asian FDI flows have accounted for about 40 percent of Asia's total FDI inflows over the last decade. They also find that greater distance leads to lower FDI flows between two developing Asian economies. Although the idea is intuitive, it is a puzzle. Many have suggested that the distance coefficient may capture informational gaps and assymetries. If so, should not the unprecedented improvements in cross-border telecommunications traffic reduce transactions cost and thus lessen the degree of informational assymetries, thereby increasing cross-border trade and ivestment flows?

Most of the empirical studies on bilateral international asset transaction have been based on gravity models. For instance, Loungani et al. (2002) examine bilateral trade and FDI flows over the period 1981 to 1998 for 12 source countries (all are developed countries) to 45 host countries (22 of which are developed countries and 23 are developing countries). Portes and Rey (2005) investigate bilateral cross-border equity flows in 1989 to 1996 between 14 countries which have deep financial markets. di Giovanni (2005) consider bilateral M&A transactions over the period 1990 to 1999 between 155 countries (consisting of developed and developing countries). All these studies emphasize the importance of bilateral telephone traffic flows as a proxy for informational distance as strongly conditioning cross-border trade and investment flows.

Following the foregoing studies we include a variable of bilateral telephone traffic as a proxy for informational distance in our baseline gravity model. What makes our paper particularly novel is that we have extended the bilateral telephone traffic upto 2005, and our focus is on selected South, Southeast and East Asian developing economies.[1] To preview the main conclusion, we find that both informational distance, physical distance as well as bilateral trade flows strongly condition intra-Asian FDI flows.[2]

2. The Model and Methodology

We follow the basic gravity type framework which argues that market size and distance are important determinants of the choice of location of direct investment's source countries. The theoretical basis for a gravity model of FDI has recently been proposed by Head and Ries (2008). The model has been used in a host of papers with some variations. In setting up our baseline regression model the objective is not to develop a comprehensive model of determinants of flows. Rather, we aim to include only bilateral real variables in addition to the usual gravity model variables.[3] All the econometric work will be built around our baseline specification using annual data.

The baseline specification of our estimated model is outlined below:

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[1] The economies included in our sample are Bangladesh, Cambodia, Mainland China, Hong Kong SAR, India, Indonesia, Malaysia, Pakistan, the Philippines, Singapore, Taiwan POC, Thailand, South Korea, and Vietnam.

[2] Obstfeld and Rogoff (2000) refer to "transactional distance" which includes both physical and informational distance.

[3] For a more comprehensive model, see Hattari and Rajan (2008).

$$\ln(FDI_{ijt}) = \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jit}) + \beta_3 LANG + \beta_4 \ln(DIST_{ij}) + \beta_5 Tele_{ijt} + \beta_6 X_{ijt-1} + \beta_7 Z_{ijt} + \eta_i + \mu_j + \lambda_t + \nu_{ijt}$$

where: FDI_{ijt} denote real FDI flows from source country (i) to host country (j) in time (t); GDP_{it} and GDP_{jt} are real GDPs in US dollar 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; $Tele_{ij}$ is the bilateral telephone traffic flow between the host and source countries; X_{ijt-1} is the lag of real export of goods from the source country to the host country, Z_{ijt} is a vector of control variables influencing FDI outflows; η_i denotes source country dummies; μ_j are host country dummies; λ_t denotes year dummies; and ν_{ijt} is a nuisance term. The set of controls used are: real GDP per capita differentials of the host and source countries and change in bilateral real exchange rate of the source country with respect to the host country.

We expect the coefficients of the real GDP of the source and destination countries to both be positive as they proxy for masses which are important in gravity models. The sign for common official 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. The sign for bilateral telephone traffic ought to be positive as greater bilateral telephone flows reduce informational costs, thereby facilitating FDI flows between countries. The nexus between FDI and trade is ambiguous a priori. Insofar as both are a means of servicing a foreign market, they could be competitive in nature. 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. Clearly there may be issues of reverse causality between FDI and exports. We therefore lag the exports variables by one period.

As for the control variables, the prior sign of the difference in real GDP per capita (source minus host) is unclear, depending on whether FDI flows are vertical or horizontal in nature. We also hypothesize that the change in the real exchange rate should have a negative sign as a real exchange rate depreciation of the host country (i.e. fall in the index) should raise FDI flows from the source country (due to the wealth effects). However, there are other channels that could lead to ambiguity of the signage (Cushman, 1985).

Following di Giovanni (2005) we estimate regression (1) by computing a Tobit model using the two-step procedure. First, a probit model is estimated for whether a deal is observed or not conditional 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.[4]

[4] 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.

3. Data

The FDI data are from the *UNCTAD FDI/TNC* database in millions of U.S. dollars. We deflated it by 1996 U.S. CPI for urban consumers. Real GDP and real GDP per capita in constant 2000 US dollar are taken from the World Bank's *World Development Indicators* database. The source of distance and common official language is CEPII.[5] Bilateral telephone traffic flows is a combination of bilateral telephone traffic from the International Telecommunication Union (ITU) and Telegeography.[6] Exports data from the source to the host countries are taken from the IMF's *Direction of Trade and Statistics* (DOTs) database.[7] We also deflated our exports data by 1996 U.S. CPI for urban consumers. We constructed the real exchange rate index data using monthly exchange rate data and consumer price indices (CPI) from IMF's *International Finance Statistics* (IFS). The depreciation or appreciation rates are calculated by taking the difference of period t and period t-1.

Our sample is based on an unbalanced panel of annual data on 14 source countries and 10 host countries between 1990 and 2005. It is also worth noting that our data contains a large number of missing variables (approximately 48 percent), and a very small number of disinvestment figures (approximately 48 observations) which are shown in the data as negative signs. We treated the divestment figures as 0 observations since they represent no investment in the destination countries. In all of our estimations we deal with the issue of censored data.[8]

4. Results

We consider four specifications (Table 1). First, we start with a baseline specification without bilateral telephone traffic flows or lagged bilateral exports (regression 1). Second, we include the bilateral telephone traffic flows variable in regression 1 (regression 2). Third, we include the lagged exports variables in regression 2 (regression 3). Fourth, as a check, we remove the bilateral telephone traffic flows variable from regression 3 (regression 4).

The distance variable is statistically and economically significant in regression 1. Greater distance between the host and source country tends to lower bilateral FDI. As expected, larger countries receive (and send) greater volumes of FDI. A common official language is also positively associated with FDI inflows, though it is not statistically significant. This may at least partly be reflective of the fact that English dominates official economic transactions, especially within Asia. The difference in GDP per capita between host and source countries is positive and statistically significant, implying that the smaller the degree of income divergence between the countries the more likely there is to be bilateral FDI flows between the countries. This also indicates intra-Asia FDI flows are perhaps more horizontal rather than vertical in nature.

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[5] For more information, see CEPII's website at http://www.cepii.fr/.

[6] Before 1998, the ITU was responsible for tracking bilateral international telephone traffic. However, after 1998, Telegeograpy (the research division of PriMetrica Inc.—a private company which specializes telecommunication) took over the task.

[7] The data are limited to merchandise trade only.

[8] As a robustness check we also added the divestment figures to the source countries (i.e. divestment from host implying investment into source). Given the small number of divestment observations, results remained largely unchanged.

Regression (2) includes bilateral telephone traffic while keeping other variables similar to regression (1). The telephone traffic variable is statistically and economically signficant with an elasticity of 2.1. Its inclusion reduces the distance elasticity (in abolute terms) quite sharply from 0.83 in regression 1 to 0.50 in regression 2. This is a particularly important finding as it suggests that the distance variable may partly be proxying informational gaps and assymetries. The finding is consistent with Loungani et al. (2002) who find informational costs reduce the effects of distance and play an important role in facilitating FDI flows from OECD countries to OECD and non-OECD countries.

From the first two regressions, it is clear that both physical and informational distances are determinants of intra-Asian FDI flows, However, we have yet to analyze the impact of trade in facilitating intra-Asian FDI flows.[9] From regression 3 we see trade and FDI appear to complement each other, with the elasticity of exports being 0.25.[10] Interestingly, we see that the inclusion of lagged exports further reduces the elasticity of distance in abolute terms (from 0.50 to 0.36). The informational distance elasticity is also slightly reduced from 2.10 to 1.54. As a check, in regression 4 we excluded the telephone traffic variable. In comparison to regression 3, the elasticity of distance rose slightly in absolute terms (0.45). Notably, the elasticity of exports rose from 0.25 to 0.42 and increased in statistical signficance as well. These findings suggest that the exports variable may also have partly acted as a proxy for informational assymetries and other gaps.

5. Conclusion

The paper finds that an augmented gravity model fits the data fairly well. Most of the estimated coefficients are the correct signs and are statistically and economically significant. As with other gravity based studies, distance stands out as an important determinant of bilateral FDI flows within Asia even after the inclusion of bilateral telephone traffic. This suggests that transport costs and informational asymmetries are factors that could hinder FDI flows. While relatively little can be done about physical distance (beyond improving transportation channels), Asian economic policymakers can overcome this natural barrier and facilitate intraregional investment flows by investing in superior telecommunications capabilities to boost cross-border informational flows.

[9] We also tested for the endogeneity of bilateral telephone flow, as more FDI may result in greater communication between countries, using the Hausman statistical test. This test essentially involves fitting the model by both fixed effects and IV approaches and comparing the resulting coefficient vectors. Similar to Loungani et al. (2002), we instrumented bilateral telephone flows with telephone densities in the source and host countries. However, in contrast to Loungani et al. (2002), the result shows no endogeneity of bilateral telephone flows.

[10] In regression 3, the sample size is also reduced from 676 to 673 because no data is recorded for exports of goods from Taiwan POC to China (mainland) in 1989 and 1990, and also for export from Philippines to Thailand in 1994.

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Table 1. Gravity Models 1/ 2/ 3/

Dependent variable: Ln of bilateral real FDI outflows	Regression (1)	Regression (2)	Regression (3)	Regression (4)
ln(real GDP i)	3.13***	2.29**	1.78*	2.17**
	(0.98)	(0.98)	(0.94)	(0.94)
ln(real GDP j)	2.75***	2.71***	2.66***	2.33***
	(0.68)	(0.69)	(0.69)	(0.69)
Common official language	0.26	0.07	0.10	0.24
	(0.25)	(0.25)	(0.25)	(0.25)
ln distance	-0.83***	-0.50***	-0.36**	-0.45***
	(0.13)	(0.14)	(0.16)	(0.16)
Bilateral telephone traffic flow between i and j		2.10***	1.54***	
		(0.42)	(0.41)	
Lag ln real export of goods from i to j			0.25**	0.42***
			(0.10)	(0.10)
Difference in real GDP per capita of i and j	0.24***	0.23***	0.20***	0.19***
	(0.06)	(0.05)	(0.06)	(0.06)
Change in real exchange rate of i to j	-0.03***	-0.04***	-0.04***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)
Observations	676	676	673	673
Adjusted R-squared	0.73	0.74	0.74	0.74

Notes: 1/ Robust standard error in parentheses.
2/ * significant at 10%; ** significant at 5%; *** significant at 1%
3/ Year dummies, host/source country dummies, inverse Mills' ratio, and constant are not shown.
Source: Authors calculation