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Sector Specific Foreign Direct Investment: A Database

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WORK IN PROGRESS

Abstract

Despite the growing importance of foreign direct investment (FDI) to the global economy, there remains a paucity of data that impedes the much needed research on FDI. There is a great need for this data, particularly as researchers and policy makers increase their focus on services. This paper provides a new database of bilateral FDI stocks and flows data for 57 sectors and 113 countries. Prior attempts have been made to construct a similar database, and this paper seeks to augment these results in several ways. Several country-specific and region specific datasets including the data from the U.S. BEA, ASEAN and the European Commission are brought to bear. Missing values are computed via coefficients obtained from the estimation of sector specific gravity based equations. Particular attention is paid to differences between developed and emerging countries that have not until now been treated in great detail; these will become increasingly important as those countries attract more FDI. Finally, an attempt is made to distinguish between drivers of services FDI and drivers of manufacturing FDI.

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Introduction

Foreign direct investment, despite the fact that is constitutes a large and growing aspect of global economic activity, is poorly measured. This is particularly true at the bilateral-sectoral level or "three dimensional" data. There are currently large gaps in the data, particularly for emerging countries, who are the target (as well as the originator) of an expanding proportion of capital flows. Even for developed countries, there is a large amount of discrepancy between partners' reports as well as a low level of sector specific detail especially in services. This paper seeks to remedy these holes in the data by providing a new database of bilateral FDI stocks and flows data for 57 sectors and 113 countries.[2]

Prior attempts have been made to construct a similar database. The most recent attempt is Boumellassa, Gouel, and Laborde (2007). This paper follows a similar structure to our database; like ours, it was constructed with an eye toward integration into the GTAP database. Boumellassa et al use a gravity type model to obtain estimates for missing values. The model takes into account country-specific characteristics and relationships between partners. This is augmented by taking into account sector specific variables using domestic production and sectoral trade data. Finally, there is the possibility of zero FDI levels which should be distinguished from small but positive FDI. Other, earlier, work has been less detailed: FTAP2 had a similar structure but for far few sectors and countries. Original source data, particularly at the 3D level, is scarce.

The approach outlined in this paper adds to the literature in the following way. Several country-specific and region specific datasets including the data from the U.S. BEA, ASEAN and the European Commission are brought to bear. Missing values are computed via coefficients obtained from the estimation of sector specific gravity based equations. Particular attention is paid to differences between developed and emerging countries that have not until now been treated in great detail; these will become increasingly important as those countries attract more FDI. Finally, an attempt is made to distinguish between drivers of services FDI and drivers of manufacturing FDI.

There are two primary uses for this dataset. One use is as a policy tool. Integrated into a general equilibrium model (and I target, through our sector and geographical definitions, the GTAP model), this dataset can inform the model by providing structure to the capital side of global trade. At least two sets of policy effects can be examined: First, researchers can obtain a better understanding of the effects on

[2] I use the GTAP 7 database as a basis for the FDI database, using its country/regional and sectoral definitions. See https://www.gtap.agecon.purdue.edu/databases/default.asp for a full list of countries/regions and sectors.

welfare of FDI, as well as the effects of changes to investment liberalization policies on welfare. Second, the indirect effect of trade policy (of tariff and non-tariff measures) on capital flows can be measured, as can the indirect effects of investment restrictions on trade policy.

To construct our database, I proceed as follows. First, I construct two sets of estimations based on three dimensional ASEAN and European data. Then I use the results of the estimation equations to formulate links between FDI and certain observed variables such as GDPs of the host and source countries and sector specific production data. I am then able to extrapolate to the unknown data.

Background

Explanations for the drivers of investment across national borders have revolved around the gravity model. This is partly because the model simply seems to work: estimations using gravity models tend to have high explanatory power. This use of the gravity model for FDI follows a similar history in the trade literature, which has found the gravity model to be a very good model for explaining trade between countries. The theoretical background is not fully established (Blonigen, 2005).[3] However, recent work has begun to tackle this issue, with two papers by Bergstrand and Egger (2007 and 2008) providing motivation for the use of gravity-type models in explaining FDI.

Von der Ruhr and Ryan (2005) is one of several papers that explores inter-industry drivers of FDI. They examine the hypothesis that Japanese banks use a "follow the customer" strategy, that banking FDI is a lagging indicator of FDI. In fact, they find results that come to the opposite conclusion, namely that the establishment of a bank triggers non-banking investment from the bank's home country. Although banks are not generally the first sector to establish a presence in a given country (that is usually a wholesaler or retailer), the FDI following the date of bank establishment is significantly greater than the FDI preceding it. These results are obtained via a logit estimation with the dependent variable the investment decision.

Another paper investigates the determinants for outward-bound German FDI. Buch et al (2003) estimate the gravity equation separately for several different sectors both in services and manufacturing. There were few strongly discernable patterns, although high GDP of the target country did seem to be associated

[3] The explanatory variables in a gravity model include a set of "mass" variables such as GDP and GDP per capita. There are also a set of "distance" variables which may be physical distance or a measure of cultural distance such as common language or legal institutions. The dependent variable is a trade (exports or imports) variable.

with sectors requiring more economies of scale, such as the chemicals industry, machinery and information technology.

FDI into emerging countries is under-researched. This is largely because the bulk of FDI does flow between developed countries; it is also partly as a result of the lack of data available. As noted in Blonigen and Wong (2004), there may be some very real differences in the motivation of firms that invest in emerging countries versus the motivation to invest in developed countries. Emerging countries may also exhibit rapid growth, and more dramatic changes in policy. Policies may change abruptly, particularly with respect to opening borders to trade and investment, flooding the market with FDI out of proportion (at least temporarily) to the expected drivers of capital flows. Such changes could include the signing of an investment treaty, release of capital controls, or accession to the WTO.

In addition to a lack of work on emerging countries, services are under-researched relative to manufacturing. Macro-level data does not often come split both by target sector and target country. As a result, the empirical research has been largely confined to treating sectors homogeneously. However there are some papers that do use the available data to analyze sector-specific drivers.

There is a small and growing body of literature that seeks to empirically determine the drivers of FDI in emerging countries. An early paper that examines sectoral differences in emerging countries is Resmini (2000). She examines FDI flows into the Central and Eastern European Countries. The approach used was to estimate separately a gravity-model style equation for each of four categories of manufacturing: scale production, high tech, specialized and traditional. The data also distinguished between flows originating from Western Europe and flows originating from other developed countries, namely the US and Japan. The two manufacturing sectors with the highest capital requirements (scale production and high tech) depended critically on the political stability of the host country. Europeans tended to invest in the lower tech sectors, and non-Europeans in the higher tech. This may partly result from non-Europeans requiring proximity to end users (a market access issue) particularly for the specialized sector, which is generally an end stage product.

Ellingsen et al (2005) apply the gravity equation to Singapore's outward investment. They differentiate aggregate outward investment from manufacturing investments and see differences emerge, driven primarily by Singapore's financial sector investments in Latin America. Per capita GDP is positively associated with aggregate investments abroad, and negatively associated with the manufacturing sector's investments. This would be consistent with an efficiency seeking strategy for manufacturing firms, and a

tendency toward market access strategies for service sector firms. It should be noted however that the effects are only significant in some of the econometric specifications investigated, and therefore do not constitute very strong evidence to support the hypothesis. In addition, the authors pay particular attention to the effects on the home country's labor and trade. They conclude, as do many other studies, that trade and FDI are not substitutes – they are largely complements. This is particularly the case for firms that need to import their own intermediate inputs for final production abroad: exports increase *because* FDI has increased. The main question of their study is whether Singapore, as a recently developed country, invests its outward FDI in a different way than more established developed countries. The authors find that Singapore's FDI is not positively affected by host country per capita income. This suggests that Singapore, unlike more established developed countries, uses FDI primarily as an efficiency seeking investment. Further, Singapore does not exhibit a substitution effect between exports and FDI and more generally does not see an overall negative effect of FDI on the country's balance of payments.

Kinoshita and Campos (2003) examine drivers of FDI in the transition economies, and part of their analysis attempts to assess sectoral differences. They have data for both Central and Eastern European states, as well as for former Soviet republics (the CIS states). The CIS states (which excludes the Baltic states) are resource based economies, while the CEEB countries (Central and Eastern Europe plus Baltic states) are manufacturing oriented economies. In this way a crude measure of sector-specific drivers can be obtained. This is a clever work around of the scarcity of data, but naturally this is not an optimal experiment since there are clearly other factors influencing the two sets of economies, such as degree of ties to (and dependence on) Russia. The results, however, do correspond to expectations. For the manufacturing sector, where a foreign firm may be making a major long term investment in the country, institutions are an important driver. Agglomeration is a strong predictor of continued FDI. For resource based economies, where extraction is the focus, infrastructure is more important, and agglomeration is not a significant factor.

Roberts et al (2008) exploit the natural experiment of Poland's liberalization efforts in the late 1990s. In their work they use firm-level data as well as sector level data to estimate the probability of a state owned company being purchased by a foreign company. The significant drivers of a foreign acquisition were size and profitability. These results fall in line with similar studies on firms in other Central and Eastern European countries. Agglomeration effects are also present. Market access motives are hypothesized: this is consistent both with the lack of evidence for efficiency seeking (i.e. coefficients for low labor costs and productivity are not significant) as well as a positive and significant coefficient on the "consumer industry" dummy variable.

There have been prior attempts to construct a global FDI database. The most recent and comprehensive such attempt was made by CEPII for 2004 data. In the paper Boumellassa, Gouel and Laborde (2007), the authors describe CEPII's FDI database. They use European data taken from the European Commission's Eurostat database, and project estimation results out to other countries.[4]

Boumellassa et al (2007) estimate equations in three ways: (1) using OLS, (2) using Heckman's two-step estimation, and (3) using the method proposed in Santos Silva and Tenreyro (2006) (henceforth SST) called Poisson pseudo-maximum likelihood or PPML. This method is proposed as a way of dealing with the zeros and that are prevalent in FDI data. The latter paper examined the use of log linear estimation generally and found that in the presence of heterogeneity an OLS estimation will lead to significant bias. They apply the method to trade data, where the prevalence of zero trade values is problematic (as it is with FDI), particularly in the case of trade flows data disaggregated by sector.

SST recommends using the PPML in order to solve heteroskedasticity issues that arise from log-linearized gravity equations. They do get promising results for their model when they test it against a Monte Carlo simulation. However, as pointed out in Martin and Pham (2008) the PPML only works for cases where zeros are infrequent. SST do realize that zeros are an issue and try to adjust for this by rounding down during their Monte Carlo simulation; however this is not the same thing as a firm deciding (based on barriers to entry, fixed costs etc) not to invest at all in a particular country and sector. In cases where there are few zeros, the PPML does perform well. Martin and Pham show that in such a case, the PPML is severely biased. Instead, Martin and Pham recommend either an E-T Tobit model (when adjusted appropriately for heteroskedasticity) or a Heckman ML model which performs better when the heteroskedasticity is unknown or not adjusted for.

Another point worth mentioning with respect to the Boumellassa et al database is their reliance on Eurostat data. The extrapolation of European data to other countries in the world may be approximately correct today given the small size of many of these other flows, but that this is changing as emerging countries receive (and originate) more capital flows. Moreover, although the flows are not very significant for the global economy, they are significant for the countries in question and for emerging countries as a whole. They did not use sector specific detail in estimating the data for emerging countries (only dummy variables).

[4] The European Commission's Eurostat database is available at http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

Approach

In order to construct the database, we need to do the following. First, we collect all available data that can be directly inputted into our database (i.e. compatible with our sector and regional parameters). This is a minority of the data and generally has significant holes, even for relatively complete databases such as Eurostat. For flows between emerging countries there is frequently no more than the aggregate bilateral flows with no information at the sector level. The question then becomes how to allocate known bilateral flows among sectors where either partial or no information is available.

In order to fill in the data gaps, it is necessary for us to take the known drivers of FDI and apply them in a sensible way to the known data. To that end, I estimate a number of equations with sector-specific variables. The coefficients on sector variables obtained in the estimations are used to extrapolate to three dimensional data that have not reported. The coefficients can serve as weights to allocate FDI flows across sectors. An innovation in this paper is that I include value of exports and value of imports, as well as GDP by sector for both host and representative countries. Trade data in particular is readily available for most country pairs. If this can reasonably be taken as a robust proxy for FDI I would have a means of allocating FDI flows. Alternatively, if GDP by sector is available, these can be used in a similar way. This may particularly be a possibility for developed host countries, for which I would have such data.

I begin with a baseline OLS regression:

$$\ln FDI_{ijkt} = \alpha_0 + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln GDPcap_{it} + \alpha_4 \ln GDPcap_{jt} + \alpha_5 \ln DIST_{ij} + \alpha_6 COMLANG_{ij} + \alpha_7 CONTIG_{ij} + \delta_t T + \gamma_k SECTOR + \varepsilon_{ijkt}$$

This is the basic gravity equation. FDI is the FDI variable, generally flows although this equation has also been used to estimate stocks as I do below.[5]

Subscripts *i* and *j* denote, respectively, the host and investor of the FDI. GDP values for each country are included as dependent variables, as are measures of the GDP per capita. Distance, common language, and

[5] There is an argument for the addition of lagged variables for FDI stocks, as the existence of investment encourages subsequent investment or reinvestment.

contiguity are also selected from CEPII's geographic databases.[6] A full set of year and sector dummy variables are generally included (in certain cases I remove one or more – this is discussed below).

In subsequent regressions, I add a variety of different variables which vary by availability of data, including permutations of the following variables: value of imports, value of exports, weighted average tariff rates, presence of bilateral investment treaties, and value added of the host industry. I use three datasets: Eurostat, ASEAN and U.S. BEA.

Following Martin and Pham, I also examine the Eaton and Tamura tobit model and the Heckman ML, equations, in addition to the more standard OLS and PPML models.

Data and Empirical Results

As indicated in the literature review, there may be qualitatively different ways in which FDI behaves in the services and the manufacturing sectors. In addition, there may be differences in the drivers that prompt developed and emerging countries provide and receive FDI. In order to explore this, I divide the databases where possible along these lines and obtain coefficients separately for each subgroup.[7]

My empirical approach is to use three databases, each of which provides "three dimensional" data. I estimate the effects of several variables on FDI, guided by the prior literature. The estimates yield a range of coefficients that I can then apply to a broader set of countries and a more disaggregated set of sectors.

Table 1. Schematic of Sector/Development Groups

		Host Country	
Source Country		Developed	Emerging
Developed	- manufacturing	Eurostat, U.S. BEA	ASEAN, Eurostat, U.S. BEA
	- services	Eurostat, U.S. BEA	Eurostat, U.S. BEA
Emerging	- manufacturing	Eurostat	ASEAN
	- services	Eurostat	Eurostat (possibly)

The three datasets each provide partial coverage of the subgroups, as summarized in table 1. Notably, there is a lack of data on services investment between emerging countries, and investment from emerging countries outward to developed countries. However, these flows make up a very small fraction of total

[6] The data can be found on the website: http://www.cepii.fr/anglaisgraph/bdd/distances.htm. Distance used is between capitals of the respective countries; and de fact languages spoken ("comlang_ethno") are used.
[7] The distinction between "developed" and "emerging" is necessarily an arbitrary grouping. In this paper I use the IMF's definitions for Advanced Economies as my definition of developed.

flows. Out of the eight total cells, I have data for four cells, in addition to two more that can be obtained from the reverse Eurostat flows.

ASEAN data

The data available in the ASEAN database is summarized in table 2. ASEAN has provided some three dimensional data for five of its members from 1999 to 2003 inclusive and using ISIC industry groups. They report only *inward FDI flows* on an approval basis, and only report values for manufacturing sectors.

Table 2. Summary data for ASEAN database

Dimension	Quantity
Reporting nations	5
Partner nations	11
Sectors	23 (manufacturing only)
Years	Five years (1999-2003)

Table 3 presents some summary statistics. FDI flows are smaller, and more volatile, than trade flows. In several instances in the data, flows decline in 2003 vis a vis 2000. FDI in Indonesia and Vietnam have grown rapidly. Trade flows have grown more consistently over the same time frame.

Table 3. ASEAN Summary Statistics

Reporting Country	year	GDP (USD millions)	GDP per cap	FDI inflows (USD millions)	Imports (USD millions)	Exports (USD millions)
Indonesia	2000	165,000	800	573	8,743	18,900
	2003	187,000	872	1,473	12,500	32,500
Malaysia	2000	93,790	4,030	1,994	30,400	26,600
	2003	105,000	4,251	1,702	44,200	51,700
Philippines	2000	75,910	977	1,635	21,300	23,600
	2003	84,660	1,028	380	26,100	22,100
Thailand	2000	123,000	1,968	1,844	16,500	24,000
	2003	141,000	2,193	1,848	20,300	27,300
Vietnam	2000	31,170	402	651	8,128	6,110
	2003	38,300	473	2,157	13,200	10,200

I begin by examining the basic gravity based model, comprising GDP variables (aggregate GDP levels, and GDP per capita) of both host and investor countries, and distance variables such as distance between capitals, common language and border contiguity. In addition to the data needed for the conventional gravity based model, I also examine the following variables: (1) value of imports by sector and investor, (2) value of exports by sector and investor, (3) weighted average of tariffs from host countries, (4)

existence of bilateral investment treaties, and (5) GDP (value added) by industry, of both host and investor.

I analyze several cuts of the data in an attempt to fill in values for Table 1. I analyzed the effect of development on FDI levels by running separate regressions for developed country investors (the US, the EU, Japan, Hong Kong and Singapore). This permits me to analyze the drivers of two different types of FDI: developed-to-emerging and emerging-to-emerging. Vietnam, as a recent entrant into the world economy, and as much smaller and poorer than the other reporting countries, was dropped in some regressions to determine its effect. Unfortunately, the ASEAN database examines only the manufacturing sectors so that it is not possible to obtain information on how manufacturing and services differ in their behavior.

Results

I begin the analysis with the "plain vanilla" version of the gravity model, including the use of an OLS model. As the OLS model is in log for, all zero/missing observation of FDI are dropped.[8] For the ASEAN database, the reported data were inward flows. Therefore, the "reporter" country refers to the host country as countries reported inward values; the "partner" refers to the investor.

In the first set of regressions, summarized in table 4, I examine the effects of the dummy variables on years and sectors, then compare the results from the whole set of available countries with results of two subgroups: developed countries ("D") and emerging countries ("E").

The two GDP variables (GDP per capita and overall GDP) are generally positive and significant for the investor (partner) country, denoting that wealthier countries as well as larger countries are more inclined toward investing abroad; this is expected. GDP per capita of the host country (reporter) is also positively associated with FDI flows. Higher GDP of the host country, surprisingly is not associated with higher FDI, and for emerging countries was significantly negatively associated with FDI.[9]

[8] The "1+" version, where a small value is added to the zero/missing observations in order to retain them in the estimation, yields virtually identical results.

[9] Vietnam is something of an outlier in this sample, being significantly poorer than the other countries in the sample, and with a history of being largely closed to the world at the beginning of the time series. I ran several regressions that excluded Vietnam and found several changes took place in the results. Excluding Vietnam, GDP of the reporter is significant and positive. The mechanism at play might be as follows. Vietnam happens to be poorer than the other countries; as it suddenly liberalized, FDI came flooding in to make up for lost time and out of proportion to what its income would otherwise suggest. However, Vietnam is quite possibly more representative of other emerging

Table 4. ASEAN: Basic gravity equation[10]

	All	All	All	D	E
	(1)	(2)	(3)	(4)	(5)
GDP_rep	(-)	(-)	(-)	+	(-)***
GDPcap_rep	+***	+***	+***	+***	+*
GDP_part	+***	+**	+***	+***	(-)
GDPcap_part	+***	+***	+***	(-)	+***
Dist	(-)***	(-)*	(-)**	(-)***	+***
Contig	+***	+***	+***	+	+***
Comlang	(-)***	(-)***	(-)***	(-)***	(-)*
Years	N	Y	Y	Y	Y
Sectors	N	N	Y	Y	Y

Distance is negatively associated with FDI: countries that are closer together tend to have greater investment flows between them. Similarly, a country tends to invest in its neighbors, all else equal (from the *contig* variable). This is expected in *trade-based* gravity regressions: as distance increases, trade tends to decrease. However, for FDI, these are arguably surprising results. Intuitively, one might suspect that distant countries tend to be served more efficiently via production, whereas closer countries can be served via exports. Common language is negatively and significantly related to FDI, in some specifications.[11] This implies that companies prefer to set up shop in a country that does *not* have a common language, which is different from the usual gravity model results. The rationale may be that a foreign presence, and thereby local employees, may be more crucial where countries don't share a language. However, this may not hold outside this group of nations. Excluding Vietnam in this case renders common language insignificant.

Adding year and country dummy variables does not materially change the results. In the three variations on the dummy variables used, neither signs nor significance change although there are some changes in level of significance. As a result, for most subsequent regressions I employ either a full set of year and sector dummies or, in the case where my estimation contains a sector-level variable, year dummies.

countries (particularly those outside of Southeast Asia, who are at a lower level of economic development and global integration). As a result I hesitate to ignore the lessons it may be imparting.

[10] In this table and the ones that follow, the sign and significance is reported for each non-dummy variable. Three stars denotes confidence at the 1 percent level, two stars at the 5 percent, and 1 star at the 10 percent leve. Constants are in place in the estimation equation but are not reported. Full regression results are reported in appendix B.

[11] The dummy variable *comlang* is coded as a 1 when two countries share one (or more) common languages, so that a negative coefficient implies more investment flows when there is *no* common language.

In the next set of regressions (table 5) I add trade variables and reevaluate the three country groupings (all, developed and emerging). In this database, exports and imports refer to the exports and imports of the reporting country.

Table 5. ASEAN: With trade variables

	All	All	All	All	D	D	D	E	E	E
GDP_rep	(-)	(-)***	(-)	(-)***	(-)	(-)	+*	(-)***	(-)***	(-)***
GDPcap_rep	+***	+	+	+*	+	+**	+	(-)	(-)	(-)
GDP_part	+**	+	+	+	+*	+*	+**	(-)	+	(-)
GDPcap_part	+***	+***	+***	+***	(-)	(-)	(-)	+***	+***	+***
Dist	(-)*	(-)	(-)	(-)*	(-)***	(-)***	(-)***	+***	+***	+***
Contig	+***	+***	+***	+***	+	(-)	+	+***	+***	+***
Comlang	(-)***	(-)***	(-)***	(-)***	(-)***	(-)***	(-)***	(-)	(-)	(-)
Imports		+***	+***		+***		+***	+*		+***
Exports		+***		+***	+***	+***		+***	+***	
Years	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sectors	N	N	N	N	N	N	N	N	N	N

Imports and exports are clearly important: they are positive and significant in every regression. This implies that imports from a country are associated with FDI from that country; this is expected as this suggests the global value chain where countries import their own intermediate goods from home to a foreign country for final (or further) assembly. More generally, the imports may be coming from an unrelated supplier to the investor – that is, the goods need not be shipped by the FDI investing country. Exports are also positively associated, suggesting that goods may be being shipped back to the investor country, possibly for sale back home. Additionally, the two trade variables may serve as a general proxy for the closeness of trading relationships.

For the estimations that include all countries, host (reporter) countries' per capita GDP becomes insignificant when imports and/or exports are added. Investor (partner) GDP also becomes less significant. GDP of the host country continues to matter; size of the market, holding income (GDP per capita) constant, may provide a proxy for a large labor supply, and the ability to find labor for a production facility.

Comparing developed and emerging country outcomes, there are a few differences in the GDP variables. For developed country investors, the host country GDP does not matter, whereas for emerging country investors, a large GDP of the host country seems to have a significantly negative effect. It is not clear why such a result might occur. Another stark result is the income level of the investor country: developed

country investors' income level does not have a significant effect, whereas emerging country investors' income level is positively associated with investment levels. Since developed countries are relatively wealthy, it may simply be the case that there is some threshold income level, beyond which there is less effect on its investment levels; or similarly, that there is some level of income below which a country is very unlikely to invest abroad.

Common language no longer matters for emerging countries, although it continues to be negatively significant for developed countries. Distance is significant and negative for developed countries and significant and positive for emerging countries. A developed country invests less the farther away a country is. An emerging country invests more as a country is farther away.

Table 6. ASEAN: value added, imports and exports

	(1)	(2)	(3)	(4)	(5)	(6)
VA_rep_share	+***	+***	+***	+**	+*	+
VA_part_share	+**	+**	+*	+**	(-)	(-)
GDP_rep	+***	+***	+***		+***	
GDPcap_rep	+**	+***	+*	+**	+	+
GDP_part	+*	+**	+**		+	
GDPcap_part	+**	+*	+**	+***	+	+*
Dist	(-)***	(-)***	(-)***	(-)*	(-)**	(-)**
Contig	+**	+	+	+***	+	+*
Comlang	(-)***	(-)***	(-)***	(-)***	(-)***	(-)***
Imports					+***	+***
Exports					+**	+***
Years	N	Y	Y	Y	Y	Y
Sectors	N	N	Y	N	N	N

Table 6 includes value added variables. "VA_rep_share" is the value added by sector of the host (reporter) country – effectively a form of GDP by sector – taken as a share of total GDP.

The inclusion of this variable is motivated by comparative advantage. A country with a comparative advantage in certain sectors may be inclined to expand abroad in those sectors, particularly when there is a technology that can be transferred to the subsidiary. Thus the value added by sector of the investor (the partner) is projected to have a positive effect on FDI. The expected sign on the host (reporter) country is less clear: a positive sign indicates that a country is good at producing certain goods when foreign investment in those sectors helps. This would be the case when parts of a production process are offshored. A negative coefficient might be expected where FDI is being invested opportunistically, to take advantage of insufficient domestic supply. I examine this set of variables both with aggregate GDP levels, and as a replacement for GDP levels.

Value added is significant and positive both with and without aggregate GDP. The addition of imports and exports renders the two value added mostly insignificant (and even reverses the coefficient on the value added of the partner country, albeit not significantly). GDP per capita values become insignificant, or less so. As a result it seems that, at least for the manufacturing sector, value added does not provide better explanatory power than trade data.

Table 7. ASEAN: Policy variables (tariffs and bilateral investment treaties)

	(1)	(2)	(3)	(4)
Tariffs	(-)**		(-)**	+
BIT		+***	+***	+***
VA_rep_share	+**	+***	+***	+
VA_part_share	+*	+*	+	(-)
GDPcap_rep	+*	+***	+***	+
GDPcap_part	+***	+***	+***	+***
Dist	(-)*	(-)	(-)	(-)
Contig	+***	+***	+***	+***
Comlang	(-)***	(-)***	(-)***	(-)***
Imports				+***
Exports				+***
Years	Y	Y	Y	Y
Sectors	N	N	N	N

Finally, we examine policy variables: tariffs, and the existence of bilateral investment treaties. Table 7 summarizes the results. Tariffs are weighted average tariffs imposed by the reporting country, and vary across sectors. BIT is a dummy variable that denotes the existence of a bilateral investment treaty (1 denotes the existence of such a treaty).

Tariffs are sometimes significant. They are generally negatively significant: as tariffs of the recipient country increase, there is *less* FDI. This implies complementarity between FDI and trade. That is, it suggests that firms undertaking FDI also need low tariffs in the host country in order to ship intermediate inputs to their overseas operations. Notably, the significance of tariff rates disappears once actual import and export levels are added. Tariffs may therefore only be relevant to the extent that they are a proxy for trade. The existence of bilateral investment treaties, are positive as expected. Further, they are significant in every case including when imports and exports are included in the regression.

Eurostat data

The most complete original source three dimensional data available is Eurostat. They consolidate reports from countries who together account for 77 percent of all FDI outward stocks and 78 percent of all FDI

outflows.[12] Inward stocks and flows are less concentrated in developed countries: Eurostat countries represent only about 60 percent of inward stocks and flows. Thus coverage by this database of emerging-to-developed flows is much lower than for developed-to-emerging and developed-to-developed flows. Although the data are ostensibly provided for 83 sectors (including totals and subtotals), in reality many data points are missing – frequently due to lack of disaggregated data provided by the reporting countries. For example, the outward stocks data reported by Germany as invested in the Netherlands (both of whom have relatively good reporting standards) provide only 13 out of 83 data points in 2007. Each set of country pairs tends to report a different subset of the 83 sectors so that overall the database can provide good information on sector level data, but as it stands provides only imperfect amounts of data. Eurostat data includes a lengthy time series. Currently I examine the year 2004.

Table 8. Outward FDI stocks from European countries

Dimension	Quantity
Reporting nations	33
Partner nations	45
Sectors	21 (13 manufacturing, 5 services, 3 other)
Years	One (2004)

A summary of the data used is in table 8. For the Eurostat data used in this and the subsequent regressions, the reported data are outward stocks. Therefore, conversely to the ASEAN database, the reporter is the investor and the partner is the host country receiving the investment.

First I examine the full set of observations: manufacturing and services, and developed country partners and emerging country partners.[13] The results are displayed in table 9. The GDP variables behave somewhat similarly to the variables in the ASEAN regressions. Both GDP and GDP per capita of investor countries are significant in both cases. Host country GDP matters (positively) for Eurostat data, whereas it was insignificant for ASEAN countries. GDP per capita of the host country is not significant for Eurostat countries.

[12] The data are based on worldwide FDI data from UNCTAD's FDISTAT database which provides FDI stocks and flows at the aggregate level for most countries in the world, as well as aggregate worldwide estimates. The data are for 2007.

[13] Some reporters are in fact deemed to not be advanced economies according to the IMF definition. Under current data constraints it is not possible to run regressions solely on flows from emerging country to emerging country; however in future iterations it is anticipated that this may be possible, at least for the manufacturing sector.

The gravity variables behave similarly for ASEAN and Eurostat data, although with different levels of significance. Distance is negative and significant for both sets of data; however neither common language nor contiguity is significant for Eurostat data.

Table 9. Eurostat: Main regressions

Outward FDI Stocks (from reporter to partner)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP reporter	+***	+***	+***	+***	+***	+***	+***	+***
GDP per cap reporter	+**	+**	+*	+**	+**	+**	+*	+**
GDP partner	+***	+***	+***	+***	+***	+***	+***	+***
GDP per cap partner	+	+	+	+	+	+	+	+
Dist	(-)***	(-)***	(-)***	(-)***	(-)***	(-)***	(-)***	(-)***
Comlang	+	+	+	+	+	+	+	+
Contig	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
Exports			+***	+***			+***	+***
Big Sector 2 (Manuf)					+	+*	(-)	+
Big Sector 3 (Svce)					(-)***	(-)	(-)***	(-)
Sectors	N	Y	N	Y	N	Y	N	Y

I next include exports in the equation.[14] It should be noted that "exports" refer to the reporting country; as a result, these are exports of the investor rather than – as is the case for the ASEAN data – exports of the host country. Therefore, exports in this dataset are equivalent to imports in the ASEAN dataset. As with the ASEAN dataset, exports are significant and positive for every case in which they are entered into the regression.

I add a dummy variable for the super-sectors (manufacturing, services and other – which includes agriculture and mining). The omitted dummy is for the "other" category, and manufacturing proves to be similar to that sector. The services dummy is negatively significant, when no other sector dummies are added. This implies that there is less investment in services, everything else being equal; this is not surprising as foreign investment in services has been liberalized more slowly.

Table 10. Eurostat: Services and Manufacturing

	Services Only				Manufacturing Only			
Outward FDI Stocks (from reporter to partner)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP reporter	(-)*	(-)	(-)*	(-)	+***	+***	+	+**
GDP per cap reporter	(-)**	(-)**	(-)**	(-)**	+***	+***	+*	+**
GDP partner	+**	+**	+**	+**	+***	+***	+***	+***
GDP per cap partner	(-)	(-)	(-)	(-)	+	+	(-)	+
Dist	(-)*	(-)*	(-)*	(-)**	(-)***	(-)***	(-)*	(-)**
Comlang	(-)	(-)	(-)	(-)	+	+	+	+
Contig	(-)	(-)	(-)	(-)	+	+	(-)	+
Exports			(-)	(-)			+***	+***

[14] Import data have not been collected for this exercise although in a future iteration this will be changed.

Sectors	N	Y	N	Y	N	Y	N	Y

For the results in table 10, I divide the data into two sets: services observations and manufacturing observations. There are dramatic differences between the two sets. First it should be noted that manufacturing observations make up the vast majority of the observations (576 versus 73), so that manufacturing results are nearly identical in sign and significance to the overall results discussed above. For services, therefore, the small number of observations means that many variables are not significant. Three items are of note, however: first is that GDP of the investor country becomes negative, although this result is significant only some of the time. GDP per capita of the investor country turns negative and significant. This is a puzzling result, as it implies that a poorer country is more likely to invest abroad than a rich country – at least in the services sector. Finally, exports are not significant, marking the first time trade data is rendered insignificant in our exercises. It is, however, in line with expectations in that services are not as dependent on intermediate inputs as manufactured goods.

Table 11. Eurostat: Developed versus Emerging

	Emerging Country Dummy		Developed Only		Emerging Only	
Outward FDI Stocks (from reporter to partner)	(1)	(2)	(3)	(4)	(5)	(6)
GDP reporter	+***	+***	+***	+***	+***	+*
GDP per cap reporter	+**	+*	+	+	+*	+
GDP partner	+***	+***	+***	+***	+	+
GDP per cap partner	+***	+***	+**	+***	+	+
Dist	(-)***	(-)***	(-)***	(-)***	+	+
Comlang	+	+	+	+	+	+
Contig	(-)	(-)	(-)	(-)	(-)	(-)
Exports		+***		+***		+
Emerging	+***	+***				
Sectors	N	Y	N	Y	N	Y

The partner countries are next divided into two groups (table 11): developed and emerging. As before, the groups are defined by the IMF's definition of advanced economies. It seems clear, from the first two estimations run (columns (1) and (2)) that emerging countries are significantly different from developed countries, as the dummy variable (1 = emerging) is positive and significant. That is, holding all else constant, emerging countries are more likely to receive FDI than are developed countries. Naturally, since GDP per capita of the host country is significant and positive, it is still the case that emerging countries receive less than developed ones. There is again a problem of lack of data at this level of detail: there are 653 observations for developed countries compared with 137 for emerging countries. As a result, again developed country results closely resemble the results for the whole dataset, and emerging country results are generally not significant. Importantly, exports are not significant in the emerging country regressions despite the fact that most of the observations are for the manufacturing sector (and that they should

therefore be significant). It may, as a result, be premature to speculate the lack of significance of exports both in this case and in the case for the prior table where exports were not significant in the services sector.

Table 12. Eurostat: Developed versus Emerging and Services versus Manufacturing

		Developed		Emerging	
Outward FDI Stocks (from reporter to partner)	All Obs.	Manuf Only	Services Only	Manuf Only	Services Only[1]
GDP reporter	+***	+	(-)	+	
GDP per cap reporter	+**	+***	(-)***	+	
GDP partner	+***	+*	+*	+	
GDP per cap partner	+	+***	+	+	
Dist	(-)***	(-)	(-)*	+	
Comlang	+	+	(-)	+	
Contig	(-)	(-)	(-)		
Exports	+***	+***	(-)	+*	
Sectors	Y	Y	Y	Y	Y
Observations	790	483	65	93	8

[1]Insufficient observations.

Finally, in table 12 I attempt to split the set of observations even further into the four categories (developed, emerging, manufacturing and services). For comparison, I include a prior estimation based on the entire data set (all observations). The main differences between the original estimation and the version with only developed country investors in manufacturing are the coefficients on investor country GDP and distance, both of which lose their significant in the developed and manufacturing subset. For the emerging/manufacturing subset, the only variable that remains significant is exports. Little else can be said without expanding the number of observations.

Database construction

I collect the weighting coefficients in table 13. A high (positive) value of these coefficients implies a relatively high correlation between trade and FDI. For flows from one developed country to another, trade flows are particularly highly correlated with FDI, which is unsurprising given developed countries' relatively long history and comfort with trade and division of production chains. The three other manufacturing sector coefficients are lower but resemble each other quite closely. The sole services coefficient that I was able to obtain is problematic, as it is insignificant and therefore does not provide us with a solid basis for allocating FDI flows.

Table 13. Coefficients

		Host Country	
Source Country		Developed	Emerging
Developed	- manufacturing	0.671 (exports)	0.338 (imports), 0.223 (exports)
	- services	-0.00278 (exports)[15]	n.a.

[15] Not significant

Emerging	- manufacturing - services	0.352 insufficient obs.	0.107 (imports), 0.304 (exports) n.a.

There remain several issues. In particular there is the inclusion of the trade variables in the OLS equations, which raises the issue of endogeneity. FDI may draw exports (from investor to host) as intermediate inputs or produce imports (back to the investor or to a third country), while at the same time the level of exports and imports denote the strength of trade ties between two countries that in turn encourages FDI. A possible solution is to use lagged imports (for example) which intuitively seem less likely than other trade variables to expand at the same rate as other trade variables.

Services remain problematic. It is unsurprising, yet inconvenient, that trade variables do not seem to be robust predictors of FDI. Most other variables that might reasonably be expected to have explanatory power over FDI are likely to be unavailable for countries for which there is also scarce FDI data. A more appropriate, yet widely available, measure is still needed to satisfactorily construct a weighting mechanism for services FDI data.

Conclusion

In this paper, I examined sector- and development-specific parameters. I gathered a set of coefficients that can now be applied to a country's exports and imports in order to more accurately weight its aggregate bilateral trade flows with a given partner. Work remains: in particular it remains to check for robustness using other econometric techniques. Further, it remains to consider alternative data to partially replace or augment trade data for the services sector.

Appendix A

Table A1. ASEAN Database Summary

Dimension	Quantity	Coverage
Reporting nations	5	Indonesia, Malaysia, Philippines, Thailand, Vietnam[16].
Partner nations	11	Japan, USA, Republic of Korea, Hong Kong, Taiwan, China, Malaysia, Philippines, Singapore, Thailand, Vietnam. In addition, the reporting nations also provide European Union[17] aggregate values, ASEAN totals, and grand totals.
Sectors	23	Manufacturing: Food Products & Beverages, Tobacco Products, Textiles, Wearing Apparel; Dressing & Dyeing of Fur, Tanning & Dressing of Leather; Luggage, Handbags, Saddlery, Harness & Footwear, Wood & Wood Products & Cork, Except Furniture; Articles of Straw & Plaiting Materials, Paper & Paper Products, Publishing, Printing & Reproduction of Recorded Media, Coke, Refined Petroleum Products & Nuclear Fuel, Chemicals & Chemicals Products, Rubber & Plastics Products, Other Non-Metallic Mineral Products, Basic Metals, Fabricated Metal Products, Except Machinery & Equipment, Machinery & Equipment N.E.C., Office, Accounting & Computing Machinery, Electrical Machinery & Apparatus N.E.C., Radio, Television & Communication Equipment & Apparatus, Medical, Precision & Optical Instruments, Watches & Clocks, Motor Vehicles, Trailers & Semi-Trailers, Other Transport Equipment, Furniture; Manufacturing N.E.C., Recycling
Years	5	1999-2003

Table A2. Bilateral investment treaties

	Reporter				
	Indonesia	**Malaysia**	**Philippines**	**Thailand**	**Vietnam**
Indonesia					
Malaysia	1				
Philippines	0	0			
Thailand	1	0	1		
Vietnam	1	1	0	1	
China	1	1	1	1	1
Hong Kong	0	0	0	1	0
Japan	0	0	0	0	1
Others	0	0	0	0	0
ROK	1	1	1	1	1
Singapore	1	0	0	0	0
Taiwan	0	0	0	1	0
USA	0	0	0	0	0

[16] For Vietnam, year coverage is from 2000 to 2003, inclusive.
[17] EU data includes the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

Table A3. Common Language (de facto)

	Reporter				
	Indonesia	**Malaysia**	**Philippines**	**Thailand**	**Vietnam**
Indonesia					
Malaysia	1				
Philippines	0	0			
Thailand	0	0	0		
Vietnam	0	0	0	0	
China	0	1	0	0	0
Hong Kong	0	1	1	0	0
Japan	0	0	0	0	0
ROK	0	0	1	0	0
Singapore	1	1	1	0	0
Taiwan	0	1	0	0	0
USA	0	0	1	0	0

Table A4. Eurostat Countries (reporters):

Dimension	**Quantity**	**Description**
Reporting nations	33	Austria, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States
Partner nations	45	Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Denmark, Egypt, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Rep., Luxembourg, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Nigeria, Norway, Philippines, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States, Uruguay, Venezuela
Sectors	21 (13 manufacturing, 5 services, 3 other)	Manufacturing: Food Products, Manufacture of Chemicals and Chemical Products, Medical Precision Instruments, Mechanical Products, Metal Products, Miscellaneous Manufacturing, Motor Vehicles, Office Machinery and Computers, Other Transport Equipment, Refined Petroleum Products, Rubber and Plastic Products, Texture and Wearing Apparel, Wood Publishing and Printing; Services: Advertising, Architectural Engineering and Other, Motion Picture Radio and Television, Other Service Activities, Radio and television communication; Other: Agriculture and Fishing, Electricity Gas and Water, Mining and Quarrying
Years	One (2004)	

Appendix B: Regression Results

Table B1. ASEAN Data: main regressions
Columns (1), (4), (5): All countries; Column (2): Developed countries only; Column (3): Emerging countries only

	(1) ln_fdival	(2) ln_fdival	(3) ln_fdival	(4) ln_fdival	(5) ln_fdival
ln_valimp	0.261***	0.338***	0.107*	0.317***	0.326***
	(9.43)	(9.47)	(2.54)	(6.39)	(5.99)
ln_valexp	0.218***	0.223***	0.304***	0.145**	0.280***
	(7.64)	(5.28)	(7.83)	(2.65)	(4.77)
ln_gdp_rep	-0.364***	-0.0317	-0.958***	0.792***	
	(-3.70)	(-0.22)	(-6.73)	(4.09)	
ln_gdpcap_~p	0.0121	0.0686	-0.101	0.148	0.258
	(0.17)	(0.64)	(-0.97)	(1.27)	(1.79)
ln_gdp_part	0.000855	0.466*	-0.0210	0.248	
	(0.02)	(2.00)	(-0.21)	(1.91)	
ln_gdpcap_~t	0.375***	-2.424	0.600***	0.0822	0.955***
	(8.06)	(-1.46)	(9.40)	(0.52)	(6.27)
ln_dist	-0.140	-0.735***	0.876***	-0.658**	-0.207
	(-1.34)	(-3.69)	(3.96)	(-3.22)	(-1.79)
contig	0.822***	0.202	1.479***	0.390	1.922***
	(4.70)	(0.45)	(6.70)	(1.06)	(5.02)
comlang_et~o	-0.787***	-1.411***	-0.218	-0.925***	-1.627***
	(-6.90)	(-7.92)	(-1.33)	(-4.07)	(-6.68)
ln_va_rep_~e				0.159*	0.104
				(2.30)	(1.40)

ln_va_part~e				-0.0215	-0.0696
				(-0.28)	(-0.84)
ln_wtdavg					0.0167
					(0.24)
bit					1.931***
					(8.41)
_cons	2.481	13.36	9.701*	-26.40***	-15.39***
	(0.96)	(1.08)	(2.48)	(-4.86)	(-7.46)
Years	Y	Y	Y	Y	Y
Sectors	N	N	N	N	N
N	2067	1012	1055	677	566
R-sq	0.217	0.277	0.227	0.299	0.369

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B2. ASEAN data with trade variables

	(1) ln_fdival	(2) ln_fdival	(3) ln_fdival	(4) ln_fdival	(5) ln_fdival	(6) ln_fdival
ln_gdp_rep	-0.0916	-0.0989	-0.154	-0.364***	-0.108	-0.504***
	(-0.93)	(-1.00)	(-1.63)	(-3.70)	(-1.15)	(-5.08)
ln_gdpcap_~p	0.361***	0.375***	0.289***	0.0121	0.0760	0.153*
	(5.07)	(5.28)	(4.21)	(0.17)	(1.07)	(2.18)
ln_gdp_part	0.185***	0.167**	0.176***	0.000855	0.0591	0.0699
	(3.53)	(3.19)	(3.53)	(0.02)	(1.10)	(1.29)
ln_gdpcap_~t	0.560***	0.556***	0.556***	0.375***	0.456***	0.353***
	(12.05)	(12.01)	(12.61)	(8.06)	(9.95)	(7.44)
ln_dist	-0.280**	-0.244*	-0.291**	-0.140	-0.189	-0.233*
	(-2.66)	(-2.32)	(-2.91)	(-1.34)	(-1.79)	(-2.19)
contig	1.214***	1.199***	1.065***	0.822***	0.961***	0.719***
	(6.66)	(6.61)	(6.14)	(4.70)	(5.48)	(4.03)
comlang_et~o	-0.885***	-0.843***	-0.775***	-0.787***	-0.738***	-0.860***
	(-7.73)	(-7.39)	(-7.11)	(-6.90)	(-6.39)	(-7.40)
ln_valimp				0.261***	0.344***	
				(9.43)	(13.41)	
ln_valexp				0.218***		0.326***
				(7.64)		(12.24)
_cons	-7.583**	-7.593**	-4.919*	2.481	-4.972*	5.740*
	(-3.02)	(-3.03)	(-2.05)	(0.96)	(-2.04)	(2.20)
Years	N	Y	Y	Y	Y	Y
Sectors	N	N	Y	N	N	N
N	2233	2233	2233	2067	2075	2067
R-sq	0.130	0.141	0.233	0.217	0.193	0.183

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B3. ASEAN data, developed countries only

OLS: Developed

	(1) ln_fdival	(2) ln_fdival	(3) ln_fdival	(4) ln_fdival
ln_gdp_rep	0.206	-0.0317	-0.260	0.268*
	(1.56)	(-0.22)	(-1.74)	(1.98)
ln_gdpcap_~p	0.342***	0.0686	0.308**	0.124
	(3.35)	(0.64)	(2.85)	(1.16)
ln_gdp_part	0.794***	0.466*	0.508*	0.609**
	(3.53)	(2.00)	(2.09)	(2.61)
ln_gdpcap_~t	-2.735	-2.424	-1.982	-3.021
	(-1.68)	(-1.46)	(-1.14)	(-1.80)
ln_dist	-1.048***	-0.735***	-0.869***	-0.815***
	(-5.55)	(-3.69)	(-4.20)	(-4.06)
contig	0.140	0.202	-0.153	0.295
	(0.32)	(0.45)	(-0.33)	(0.66)
comlang_et~o	-1.148***	-1.411***	-1.422***	-1.358***
	(-6.96)	(-7.92)	(-7.65)	(-7.55)
ln_valimp		0.338***		0.411***
		(9.47)		(12.32)
ln_valexp		0.223***	0.376***	
		(5.28)	(9.25)	
_cons	8.759	13.36	14.78	9.925
	(0.71)	(1.08)	(1.14)	(0.79)
Years	Y	Y	Y	Y
Sectors	Y	N	N	N
N	1082	1012	1012	1015
R-sq	0.311	0.277	0.212	0.257

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B4. ASEAN data, emerging countries only

	(1)	(2)	(3)	(4)
	ln_fdival	ln_fdival	ln_fdival	ln_fdival
ln_gdp_rep	-0.803***	-0.958***	-1.012***	-0.661***
	(-5.70)	(-6.73)	(-7.16)	(-4.69)
ln_gdpcap_~p	0.247*	-0.101	-0.0497	-0.000212
	(2.37)	(-0.97)	(-0.48)	(-0.00)
ln_gdp_part	-0.00424	-0.0210	0.0384	-0.0609
	(-0.05)	(-0.21)	(0.39)	(-0.59)
ln_gdpcap_~t	0.735***	0.600***	0.617***	0.617***
	(11.68)	(9.40)	(9.70)	(9.41)
ln_dist	1.000***	0.876***	0.824***	0.871***
	(4.80)	(3.96)	(3.74)	(3.84)
contig	1.845***	1.479***	1.478***	1.585***
	(8.39)	(6.70)	(6.68)	(7.08)
comlang_et~o	-0.406*	-0.218	-0.256	-0.203
	(-2.52)	(-1.33)	(-1.56)	(-1.20)
ln_valimp		0.107*		0.254***
		(2.54)		(6.64)
ln_valexp		0.304***	0.350***	
		(7.83)	(10.14)	
_cons	4.685	9.701*	10.00*	3.897
	(1.23)	(2.48)	(2.56)	(0.99)
Years	Y	Y	Y	Y
Sectors	Y	N	N	N
N	1151	1055	1055	1060
R-sq	0.242	0.227	0.222	0.179

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B5. ASEAN data with value added, imports and exports

Value Added, Imports and Exports

	(1) ln_fdival	(2) ln_fdival	(3) ln_fdival	(4) ln_fdival	(5) ln_fdival	(6) ln_fdival
ln_va_rep_~e	0.242***	0.234***	0.365***	0.211**	0.159*	0.105
	(3.82)	(3.72)	(3.94)	(3.29)	(2.30)	(1.53)
ln_va_part~e	0.213**	0.208**	0.273*	0.218**	-0.0215	-0.0135
	(3.20)	(3.15)	(2.42)	(3.23)	(-0.28)	(-0.17)
ln_gdp_rep	0.782***	1.053***	1.090***		0.792***	
	(4.60)	(5.89)	(6.26)		(4.09)	
ln_gdpcap_~p	0.309**	0.404***	0.281*	0.362**	0.148	0.111
	(2.73)	(3.50)	(2.38)	(3.07)	(1.27)	(0.94)
ln_gdp_part	0.279*	0.358**	0.312**		0.248	
	(2.35)	(3.02)	(2.71)		(1.91)	
ln_gdpcap_~t	0.476**	0.384*	0.455**	0.745***	0.0822	0.257*
	(3.05)	(2.47)	(2.95)	(7.21)	(0.52)	(2.27)
ln_dist	-0.649***	-0.728***	-0.768***	-0.213*	-0.658**	-0.301**
	(-3.40)	(-3.84)	(-4.20)	(-2.08)	(-3.22)	(-2.84)
contig	0.960**	0.642	0.602	1.452***	0.390	0.788*
	(2.64)	(1.73)	(1.68)	(4.44)	(1.06)	(2.40)
comlang_et~o	-1.109***	-0.848***	-0.864***	-1.113***	-0.925***	-1.023***
	(-5.57)	(-4.01)	(-4.23)	(-5.41)	(-4.07)	(-4.60)
ln_valimp					0.317***	0.310***
					(6.39)	(6.23)
ln_valexp					0.145**	0.224***
					(2.65)	(4.34)
_cons	-25.64***	-33.99***	-32.79***	-4.909***	-26.40***	-4.659***
	(-5.43)	(-6.77)	(-6.74)	(-3.50)	(-4.86)	(-3.40)
Years	N	Y	Y	Y	Y	Y

Sectors	N	N	Y	N	N	N
N	746	746	746	746	677	677
R-sq	0.224	0.247	0.333	0.210	0.299	0.281

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B6. ASEAN data, with policy variables

	(1) ln_fdival	(2) ln_fdival	(3) ln_fdival	(4) ln_fdival
ln_wtdavg	-0.218**		-0.211**	0.0167
	(-3.06)		(-3.09)	(0.24)
ln_va_rep_~e	0.219**	0.231***	0.238***	0.104
	(2.94)	(3.68)	(3.33)	(1.40)
ln_va_part~e	0.181*	0.167*	0.133	-0.0696
	(2.34)	(2.51)	(1.78)	(-0.84)
ln_gdpcap_~p	0.348*	0.496***	0.492***	0.258
	(2.30)	(4.24)	(3.36)	(1.79)
ln_gdpcap_~t	0.816***	1.177***	1.461***	0.955***
	(6.66)	(9.63)	(9.88)	(6.27)
ln_dist	-0.231*	-0.0661	-0.0479	-0.207
	(-2.00)	(-0.64)	(-0.42)	(-1.79)
contig	1.668***	2.266***	2.733***	1.922***
	(4.55)	(6.58)	(7.15)	(5.02)
comlang_et~o	-1.229***	-1.434***	-1.624***	-1.627***
	(-5.47)	(-6.93)	(-7.29)	(-6.68)
bit		1.310***	1.703***	1.931***
		(6.24)	(7.21)	(8.41)
ln_valimp				0.326***
				(5.99)
ln_valexp				0.280***
				(4.77)
_cons	-5.001**	-11.86***	-14.56***	-15.39***
	(-2.83)	(-6.72)	(-6.77)	(-7.46)
Years	Y	Y	Y	Y
Sectors	N	N	N	N
N	626	746	626	566
R-sq	0.215	0.250	0.276	0.369

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B7. ASEAN data, without Vietnam: developed countries only (columns 1 and 2) and emerging countries only (column 3 and 4)

	(1)	(2)	(3)	(4)
	ln_fdival	ln_fdival	ln_fdival	ln_fdival
ln_gdp_rep	0.206	-0.0317	-0.803***	-0.958***
	(1.56)	(-0.22)	(-5.70)	(-6.73)
ln_gdpcap_~p	0.342***	0.0686	0.247*	-0.101
	(3.35)	(0.64)	(2.37)	(-0.97)
ln_gdp_part	0.794***	0.466*	-0.00424	-0.0210
	(3.53)	(2.00)	(-0.05)	(-0.21)
ln_gdpcap_~t	-2.735	-2.424	0.735***	0.600***
	(-1.68)	(-1.46)	(11.68)	(9.40)
ln_dist	-1.048***	-0.735***	1.000***	0.876***
	(-5.55)	(-3.69)	(4.80)	(3.96)
contig	0.140	0.202	1.845***	1.479***
	(0.32)	(0.45)	(8.39)	(6.70)
comlang_et~o	-1.148***	-1.411***	-0.406*	-0.218
	(-6.96)	(-7.92)	(-2.52)	(-1.33)
ln_valimp		0.338***		0.107*
		(9.47)		(2.54)
ln_valexp		0.223***		0.304***
		(5.28)		(7.83)
_cons	8.759	13.36	4.685	9.701*
	(0.71)	(1.08)	(1.23)	(2.48)
Years	Y	Y	Y	Y
Sectors	Y	N	Y	N
N	1082	1012	1151	1055
R-sq	0.311	0.277	0.242	0.227

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B8. Eurostat Data.

Cols (1)-(2): developed only, manuf then svces; Cols (3)-(4): emerging only, manuf then svces

	(1) ln_fdi	(2) ln_fdi	(3) ln_fdi
ln_exports	0.671***	-0.00278	0.352**
	(9.24)	(-0.05)	(2.86)
ln_gdp_rep	0.0729	-1.057*	0.391
	(0.60)	(-2.20)	(1.50)
ln_gdpcap_~p	1.980*	-18.73**	-0.106
	(2.31)	(-2.99)	(-0.10)
ln_gdp_part	0.130	0.437*	1.414**
	(1.67)	(2.33)	(2.73)
ln_gdpcap_~t	0.912***	0.419	0.567
	(3.56)	(0.56)	(1.90)
ln_dist	-0.183	-0.626*	-0.238
	(-1.89)	(-2.27)	(-0.27)
comlang_et~o	0.0283	-0.470	1.502
	(0.08)	(-0.54)	(1.44)
contig	-0.471	-0.783	
	(-1.22)	(-0.81)	
colony	0.822**	0.144	
	(2.86)	(0.19)	
_cons	-38.69***	217.0**	-50.81**
	(-3.42)	(2.96)	(-2.78)
N	483	65	93
R-sq	0.426	0.255	0.370

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Bibliography

Bergstrand, Jeffrey H., and Peter Egger. "A knowledge-and-physical-capital model of international trade flows, foreign direct investment, and multinational enterprises." *Journal of International Economics* 73 (2007): 278-308.

Bergstrand, Jeffrey H., and Peter Egger. *The Growth of FDI Relative to Trade: Measurement, Determinants, and Consequences of International Trade Flows in Intermediates.* Mimeo (2008).

Blonigen, Bruce A. "A Review of the Empirical Literature on FDI Determinants." *Atlantic Economic Journal* 33 (2005): 383-403.

Blonigen, Bruce A. and Miao Wang, "Inappropriate Pooling of Wealthy and Poor Countries in Empirical FDI Studies," in T. Moran, E. Graham and M. Blomstrom (Eds.), Does Foreign Direct Investment Promote Development? Washington, DC: Institute for International Economics, 2005, pp. 221-243.

Boumellassa, Houssein, Christophe Gouel, and David Laborde. "Bilateral and Sectoral Investment Relationships at a World Scale Impact on Trade". CEPII Working Paper (2007).

Buch, Claudia, Joern Kleinert, and Farid Toubal. Determinants of German FDI: New Evidence from Micro-Data". Discussion Paper 09/03. Economic Research Center of the Deutsche Bundesbank.

Ellingsen, Gaute, Winfried Likumahuwa, and Peter Nunnenkamp. "Outward FDI by Singapore: A Different Animal?" *Transnational Corporations* 15 (August 2006).

Kinoshita, Yuko and Nauro F. Campos. "Why Does FDI Go Where It Goes? New Evidence From The Transition Economies." William Davidson Institute Working Paper No. 573 (2003).

Martin, Will and Cong S. Pham. "Estimating the Gravity Model When Zero Trade Flows are Frequent." Mimeo (2008).

Resmini, Laura. "The Determinants Of Foreign Direct Investment In The CEECs: New Evidence From Sectoral Patterns." *Economics of Transition* 8 (2000): 665-689.

Santos Silva, J.M.C. and Silvana Tenreyro. "The Log of Gravity". *The Review of Economics and Statistics* 88 (2006): 641-658.

Roberts, Barbara M., Steve Thompson, and Katarzyna Mikolajczyk. "Privatization, Foreign Acquisition and the Motives for FDI in Eastern Europe." *Review of World Economics* 144 (2008): 408-427.

Van der Ruhr, Marc and Michael Ryan. " 'Following' or 'Attracting' the Customer? Japanese Banking FDI in Europe." *Atlantic Economic Journal, 33 (2005): 405-422.*