Global Scientific JOURNALS

GSJ: Volume 8, Issue 5, May 2020, Online: ISSN 2320-9186
www.globalscientificjournal.com

THE NEXUS AMONG FOREIGN DIRECT INVESTMENT (FDI), TRADE AGREEMENTS (RTAs) AND BILATERAL TRADE: EMPIRICAL EVIDENCE FROM ECOWAS, NAFTA, EU AND ASEAN REGIONS

Dr. Momodou Mustapha Fanneh

THE UNIVERSITY OF THE GAMBIA

ABSTRACT

This paper examines how foreign direct investment (FDI) and trade agreements interact to affect bilateral trade in manufacturing industry. Trade agreements and FDI have been increasing throughout the world. Most of the studies focus on whether trade agreements are trade creating or diverting. The fact that trade agreements interact with other factors such as FDI, outsourcing, etc to affect trade get little attention. This paper addresses this issue using ECOWAS, NAFTA, EU, ASEAN, and the rest of the world (ROW) from 1996-2004 for 28 manufacturing industries and uses fixed effects and random effects estimation methods in a gravity model framework.

Exporter and importer GDP are significant and positively related with bilateral trade, international distance between exporter and importer country negatively and significantly affect bilateral trade, speaking the same language and sharing the same border significantly increases bilateral trade. Foreign direct investment inflows drive trade among NAFTA, EU, ASEAN, ECOWAS and the ROW countries. Interaction terms are used to isolate the combined effects of FDI and trade agreements on bilateral trade. The intracbloc interaction with FDI generally diverts trade in almost all the regions significantly.

Keywords: Bilateral trade, Foreign Direct Investment, interbloc, intrabloc, Fixed effects, Random effects, Instrumental variable

1. Introduction

The best policy from the world point of view is free trade due to the maximum specialization in world production and the maximum gains to be distributed. Free trade leads to first-best or most efficient utilization of world resources in the strict sense of Pareto optimality (Klein & Salvatore, 1995). Despite the arguments that free trade is good, nations impose restrictions (tariff and Non-tariff barriers) some of the reasons of which are to protect industries where they have comparative disadvantage and to protect infant industries (infant industry argument).

Currently, we see a proliferation of trade agreements all over the world. Countries form trade agreements for a host of reasons. If trade agreements are trade creating, welfare of the members will increase. Trade Agreements, although create trade can also be trade diverting. The static welfare effects of RTA or RTAs are measured in terms of trade creation and trade diversion. The dynamic or long run effects of trade creation and trade diversion are more important and result from greater competition, economies of scale and the higher level of investment made possible by economic integration.

Investment is a tool to achieve economic growth and development. There are different reasons that explain why firms invest in foreign countries. The capital market theory of FDI states that FDI depends on interest rates (rates of return of capital flow from capital-abundant to capital-scarce country). The microeconomic theory of FDI stated that FDI depends on market imperfections and the monopolistic power of multinational firms to expand (Caves, 1971). FDI is also due to firm specific advantages such as product superiority or cost advantages due to economies of scale, advanced technology, superior marketing and distribution (Helpman, 1984).

Countries involve in bilateral trade to achieve welfare and growth. The size of this bilateral trade depends on inter alia distance, history, economic size, market size, foreign direct investment (FDI), Trade Agreements (RTAs/RTAs), outsourcing, exchange rates, and trade barriers.

This paper examines FDI and RTA as determinants of the bilateral trade between (extra) or within (intra) NAFTA, EU, ASEAN,ECOWASand ROW using the gravity model. It investigates the combined effects of FDI and trade agreements on bilateral trade. Interaction terms will be used in a gravity panel data model framework to isolate the combined effects of the variables of interest.

The research aims to fill the void in the literature about how FDI might have interacted with trade agreements to affect bilateral trade. It examines the effects of FDI, trade agreements and their interactions on bilateral trade using NAFTA, EU, ASEAN, ECOWAS and ROW countries.Although Trade Agreements, FDI and trade have been extensively studied in the literature, there is limited literature on FDI and Trade agreements as jointly determining bilateral trade. Furthermore, the empirical literature on the combined effect of FDI and RTA (through an interaction term) is non-existent.

The paper has the following objectives: to analyze the effects of FDI on trade, the effects RTA on trade, and how FDI does interact with RTA to affect trade.

Section 2 provides a review of the literature and section 3 discusses the methodology and analytical framework and section 4 discusses the empirical results. Section 5 addresses endogeneity issues and section 6 concludes the study.

2. Literature Review

2.1 Theoretical literature

Foreign Direct Investment and Bilateral Trade

There are different types of FDI. Horizontal FDI is the replacing of exports to the host country by local production. The horizontal FDI view is that multinationals arise because trade barriers make exporting costly.[1]FDI can substitute for trade, when production in the host country replaces exports i.e., horizontal FDI (Markusen&Venables (1998 and 2000), De Santis&Stähler (2004)). Vertical FDI is the importing of goods that were previously produced in the source country. The vertical FDI view is that multinationals arise to take advantage of international factor price differences.[2] It can be complementary to trade, when a part of the production in the host country is shipped back to the home country, i.e., vertical FDI (Helpman (1984), Helpman&Krugman (1985)).

Trade Agreements and Bilateral trade

Formation of trade agreements is expected to increase trade. Because of the proliferation of protectionist policies due to revenue benefits for the government, infant industry arguments, and benefits to some special groups, the expected benefits from free trade predicted by the traditional trade theorists will never be realized.

Economic integration includes preferential trade arrangements, free trade areas, customs unions, common markets and economic unions. Forming these trade agreements depend on a host of factors e.g. distance, common border, economic stability and policies.

Studies on the theories of RTA dated as far back as Viner (1950). Viner used a partial equilibrium welfare analysis to determine trade creation or diversion resulting from a Trade Agreement. James Meade (1955) extended Viner's analysis showing that by considering not only the production effects of RTA but also the consumption effects of a RTA, then even a trade-diverting RTA could improve members' and world's welfare. This was a general equilibrium welfare analysis.

2.2 Empirical literature

The review of the empirical literature addresses the following issues: effects of FDI on exports and trade; RTA/RTA and trade; and effects of FDI and RTA on exports and trade.

Effects of FDI on exports and trade

Since FDI affects trade, then the determinants of FDI also affect trade. FDI can substitute for trade when production in the host country replaces exports i.e., horizontal FDI (Markusen&Venables (1998 and 2000), De Santis&Stähler (2004)). Thus FDI negatively affects exports and trade.FDI can be complementary to trade when part of the production in the host country is shipped back to the home country, i.e., vertical FDI (Helpman (1984),

[1] See Markusen (1984), Egger and Pfaffermayr, 2000 and Markusen and Venables (1998, 2000)
[2] See Helpman (1984) and Helpman and Krugman (1985)

Helpman&Krugman (1985)). Hence, FDI positively affects exports and trade (Brenton et al., (1999), Wong (1988), and Brouwer, Paap&Viaene, (2008))

Trade Agreements (RTAs) and Trade

The economic effects of Trade Agreements have been discussed extensively in the literature. For example, Frankel, Stein and Wei (1997) studied regional trading blocs using a gravity model. They concluded that preferential trade agreements (PTAs) and regional trade agreements (RTAs) such as APEC positively affect trade. They used dummy variables to capture this effect. The usual procedure to capture the effects of economic integration on trade is to use dummy variables (see, for example Ghosh and Yamarik, 2004; Eicher, et al., 2007).

The empirical literature of international integration has been using extensively two criteria of welfare and efficiency, the Vinerian concepts of trade creation and trade diversion, (Morais& Bender, 2006).The conclusion in the literature is that an RTA or RTA is not always welfare improving. RTAs are welfare improving or welfare diverting depending on the region under study and the type of agreement (Carrere, 2004 &Soloaga and Winters (2000). RTAs are trade creating (Carrère, 2004 and 2006; Soloaga& Winters, 2000; Frankel, Stein and Wei, 1997) or trade diverting (Dee &Gali, 2003; Krueger, 1999).

Effects of FDI and Trade Agreements on exports and trade

The factors that affect trade and exports are FDI, outsourcing, RTAs inter alia. These factors interact to affect exports and trade. Membership in a trade agreement affects FDI and FDI affects Trade Agreements. In addition to membership in a free-trade agreement, a set of global variables, namely world FDI flows, and a set of domestic variables seem to determine FDI (Cuevas et al. (2005)).

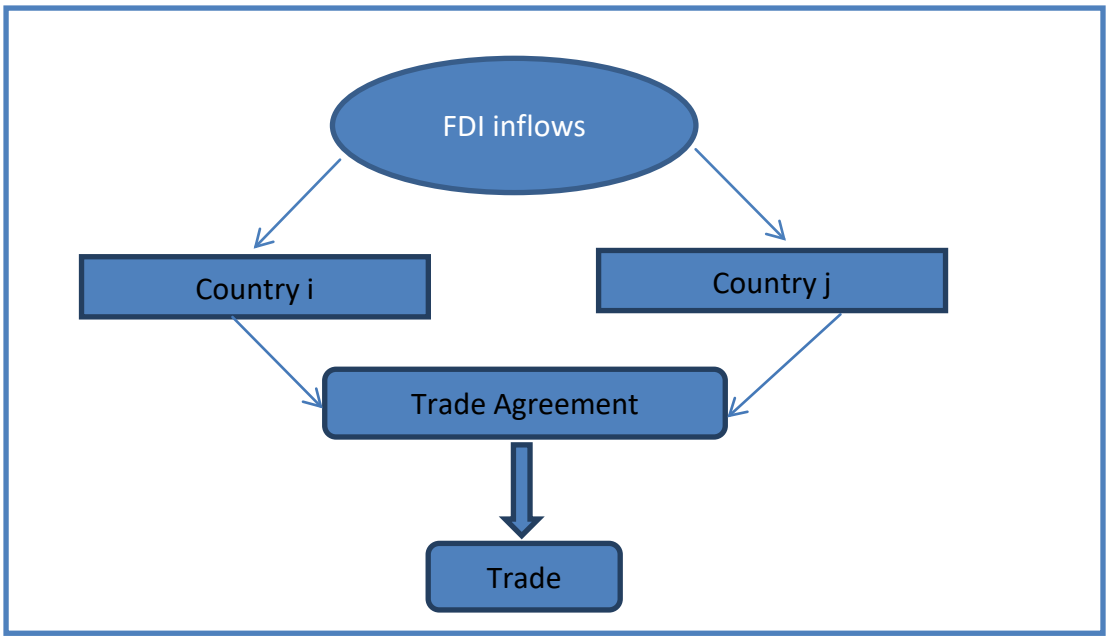
Most studies focus on the effects of regional trade agreements (RTAs) on trade and the effects of FDI on trade. Regional Integration Agreements affect the inflow and outflow of FDI. The introduction of the Euro raises FDI stocks among EU countries by about 29% on average (De Sousa &Lochard, 2006). EMU increases inward FDI flows by about 16% within the Euro area (Petroulas, 2007). Cuevas et al. (2005), used cross-country panel data and concluded that free-tradeagreements have a significant positive effect on FDI flows, and free-trade agreements are found to matter morefor the smaller members of the agreement (e.g., the NorthAmerican Free-Trade Agreement's effect on FDIflows into Mexico is much larger than its effect on flows intothe United States). This relationship need not be positive (Cuevas et al. (2005). In contrast, in a Heckscher-Ohlin model with free trade leading to factor price equalization, capital has no incentive to cross borders and hence Trade Agreement could reduce the incentive for FDI (Cuevas et al. (2005). Brenton et al. (1999) used the gravity model to arrive at a conclusion about the domino effects of European integration on FDI.

3. Data, Methodology and Model Estimation

3.1 Data

The data for the study covers NAFTA, EU, ASEAN, ECOWAS and ROW countries. This study uses disaggregated trade data at the manufacturing industry level (28 products or sectors, 75 countries over 10 years (1995-2004))[3]. Thebilateral trade across industriesis available at the World Bank Development Research Group's Trade, Production and Protection database, 1976-2004.[4] The 3-digit level International Standard Industrial Classification (ISIC), Revision 2 is used to classify imports and exports across industries. The common language, common border and distance are from the CEPII database[5]. Gross domestic product, population, and exchange rates are from United Nations Statistics Division[6] and foreign direct investment data is from UNCTAD Handbook of Statistics, 2009[7]. A table of descriptive statistics is provided in the appendix.

3.2 Methodology and Analytical Framework



The gravity model is widely used in the study of exports, imports and trade with panel data. It can factor whether there are group and /or time effects in the model. The OLS specification ignores these effects which can lead to misspecification of the model. Mátyás

[3] See appendix C for product classification and countries used in the study
[4]Nicita, Alessandro and Marcelo Olarreaga, (2006) "Trade and Production: 1976-2004".
[5] CEPII databasehttp://www.cepii.fr/francgraph/bdd/distances.htm
[6]United Nations Statistics Division http://unstats.un.org/unsd/snaama/selcountry.asp
[7]UNCTAD Handbook of Statistics 2009
http://stats.unctad.org/Handbook/TableViewer/tableView.aspx?ReportId=2079

(1997) suggested including exporter, importer and time effects in the specification of the gravity model to control for any factor affecting trade that is exporter, importer or time specific.Hummels&Levinsohn (1995), applied panel data techniques that account for country-pair instead of exporter and importer effects. The omission of country-pair effects is likely to result in biased parameter estimates (Cheng & Wall, 1999; Egger &Pfaffermayr, 2003). Moreover, some variables do interact to affect trade. For example, outsourcing, membership in a Trade Agreement and foreign direct investment interact to affect trade. Baltagi, Egger &Pfaffermayr, (2003), showed interaction effects are significant and that the omission of one or more interaction effects can lead to biased estimates and misleading inference.

In gravity panel data studies there are different specifications used in the literature, e.g. ordinary least squares regressions, Fixed Effects regressions, Random Effects regressions, Poisson estimations, Generalized Method of Moments (GMM), Generalized Least Squares (GLS), Hausman-Taylor estimation.

3.3 Model Estimation

Studies augmented the gravity model by adding more explanatory variables in the model to capture the areas of interest in the study. The study will augment the gravity model to capture the effects of FDI, RTAs and their joint effect on bilateral trade. According to Salvatore (2007), another way by which a RTA can benefit a member nation is by encouraging an inflow of FDI, thereby stimulating growth in the nation. Therefore RTA interacts with factors such as outsourcing, foreign direct investment to name but a few to affect trade and growth in a country. To analyze how FDI interact with RTA to affect trade, interaction terms are added in the model as well as dummy variables to represent qualitative information which is a common approach in gravity model studies.

Early studies of gravity models in the study of trade theory used cross-sectional data (for example, Bergstrand, (1985)). Estimating the gravity model using cross-sectional data generates biased estimates since heterogeneity among countries is not controlled for and cross-section gravity equations ignore the dynamic or intertemporal effects on international trade and suffer from heteroskedasticity and autocorrelation. Panel data gravity models are more popular (Mátyás (1997), Wall (2000), Glick and Rose (2001)). Panel data allows for heterogeneity by means of country-pair specific effects.

Gravity models are widely used in the study of exports, imports and trade with panel data.[8]The gravity model is augmented to include RTA and FDI (see for example Sousa &lochard, 2009 ,Xuan& Xing, 2009, Anderson & Van Wincoop (2003) and Brouwer&Viaene (2008). The estimated gravity equation is:

$$LnT_{ijt}^{k} = \alpha_0 + \alpha_1 LnY_{it} + \alpha_2 LnY_{jt} + \alpha_3 LnD_{ij} + \alpha_4 L_{ij} + \alpha_5 A_{ij} + \alpha_6 LnFDII_{ijt} + \alpha_7 LnTariff_{ijt}^{k} +$$

[8](See for example Thornton and Goglio (2002), Montanari (2005), Blomqvist (2004), and Hummels&Levinsohn (1995)).

$$\sum_{g=1}^{g=4} \theta_{gt} IRTA_{gt} + \sum_{s=1}^{s=4} \xi_{st} [LnFDII_{st} * IRTA_{st}] + \varepsilon_{ijt} \ldots (1)$$

Error term =
$\varepsilon_{ijt} \sim$ i. i. d $N(0, \sigma^2) i, j = 1, 2, \ldots\ldots\ldots\ldots\ldots N; i \neq j; t = 1, 2, \ldots\ldots\ldots\ldots\ldots T.$
$i = Importer, j = Exporter$, and $t = Time\ period\ or\ number\ of\ years$. $\alpha_0$is the effect common to all years and pairs of countries.

Where LnT_{ijt} is the logarithm of bilateral trade between country i and country j in sector k in year t , LnY_{it} is the logarithm of nominal GDP (GDP at current prices) of country i in year t, LnY_{jt} is the logarithm of nominal GDP of country j in year t, LnD_{ij} is the logarithm of bilateral distance between country i and country j, L_{ij} is a dummy variable that is equal to 1 when country i and country j have a common official language, and A_{ij} is a dummy variable with a value of 1 when country i and country j have a common border. $LnFDII_{ijt}$ is the logarithm of inward foreign direct investment (FDI to country i and country j at time t) and ε_{ijt} is the error term.$LnFDII_{it}$ is the logarithm of inward foreign direct investment (FDI) to country i at time t (FDI into importer country). $LnFDII_{jt}$ is the logarithm of FDI to country j at time t and ε_{ijt} is the error term.

The logarithm of bilateral trade (LnT_{ijt}^{k}) is the dependent variable and is measured in thousands of US dollars. Trade is the sum of exports and imports. Since export figures are not reliable, the study uses imports to measure exports.

Discussion of Explanatory Variables in the Model and their Hypothesized Signs

Gross Domestic Product (Y_{it} and Y_{jt}) is the gross domestic product in nominal terms, measured in US dollars. GDP is positively related with trade. Larger economies are likely to trade more. The coefficients that explain these are α_1 andα_2.Distance (D_{ijt}) is the distance between country i and country j in time t, measured in kilometers. Distance measure is based on a great circle distance between the largest cities in each of the trading partners. The distances are weighted by the share of the city in the overall country's population[9]. Distance is a measure of transportation cost. Distance is negatively related with trade. The greater the distance between two countries, the higher the transportation cost. The increased transport cost, increases prices of goods and hence reduces trade. The coefficient that explains the relationship between bilateral trade and distance is α_3.Common Language (L_{ijt}) is directly related with trade. It is expected to reduce transport cost and hence increases trade. Speaking the same language facilitates trade (cultural similarity). It is a binary variable which is equal to 1 if i and j share a common language and 0 otherwise. The coefficient that explains this relationship is α_4. Sharing a common border is positively related with trade. Countries with a common language or same border are expected to trade more with each other. It is a binary variable which is equal to 1 if i and j share a common border and 0 otherwise. $\alpha_5$explains the border effects on trade. FDI flows (inward and outward Foreign Direct Investment) are measured in millions of US dollars at current prices and current exchange rates. $FDII_{ijt}$ is

[9] See Head and Mayer (2002)

inward foreign direct investment into country i and country j at time t. The relationship between trade flows and FDI in theory is ambiguous since international trade and FDI are substitutes or complements. Positive sign means they are complements. The coefficients that explain FDI effects on trade is α_6.

$LnTariff_{ijt}^{k}$ is the logarithm of bilateral industry-level tariff between country i and country j in sector k in percentages.Anderson (1979) and Bergstrand (1985) introduced bilateral trade barriers, such as tariffs and transportation costs, explicitly in their respective gravity models

Regional integration agreements benefit some industries but harm others (H-O-model). A dummy or binary variable is used to capture economic integration (common approach in the literature). Slootmaekers (2004), in order to capture the trade effect of the EU-Mexico RTA extended the standard gravity equation and added a dummy that equals one if both countries belong to the EU-Mexico RTA at time t, and zero otherwise. Endoh (1999), Bayoumi&Einchengreen (1995) evaluated intra and extra bloc effects using dummy variables. A positive coefficient indicates that the RTA tends to generate more trade to its members.

Interaction terms

FDI and Trade Agreements

The formation of trade agreements is expected to increase bilateral trade and welfare among members if it is trade creating and may increase or decrease it if it is trade diverting. The effect of foreign direct investment on trade is ambiguous. Therefore, the interaction effect of FDI inflow and RTA membership is ambiguous.

(i). Intra-Bloc Effect$(IRTA_{gt})$

To capture intra-bloc effect 4 dummy variables are constructed ($IRTA_{gt}$), each of which equals to one when country i and country j are members of an intra-bloc (same regional trade agreement) at time t, and 0 otherwise. The intra-blocs are NAFTA (North American Trade Agreement), European Union (EU), ASEAN (Association of Southeast Asian Nations), and ECOWAS. g=1 is NAFTA, g=2 is EU, g=3 is ASEAN and g=4 is ECOWAS. A positive coefficient captures Trade Creation and Trade Diversion a negative sign. The coefficient explains the effects of intra-bloc trade or membership of a particular trade agreement on total trade.

(ii). FDI and Intra-Bloc Trade $[(LnFDII_{st}) * IRTA_{st}]$

$[(LnFDII_{st}) * IRTA_{st}]$is intra trade and inflow of FDI into the intra bloc at time t. s=1 is NAFTA, s=2 is EU, s=3 is ASEAN and s=4 is ECOWAS The coefficients explain the interaction effect of FDI inflows and intra bloc trade on total trade.

Empirical Estimation

The gravity model has been widely used in the international trade literature to study the determinants of trade in both goods and services. The most common specification used in the literature is the log-linear specification. Ordinary least squares estimation, fixed effects and random effects estimation techniques to name a few are applied to the data. Exporter, importer, product, country-pair and time effects are studied. Pooled Ordinary Least Squares ignores heterogeneity i.e. heterogeneity bias and cannot be used if we expect significant time,

exporter, importer and country effects. Fixed Effects Estimation models assume unobserved variables differ between groups but constant across time for thesame group, i.e., it controls for omitted variables that differ between groups but constant over time.To capture the exporter, importer (group) and/or time effects, the fixed effects model is modeled as a least squares dummy variable regression (LSDV). The country-pair fixed effects model is the most general formulation of the gravity equation (Cheng and Wall, 2005) and a substantial literature emphasizes that formulations without controls for unobserved heterogeneity are misspecified and biased (e.g., Egger, 2000; Baldwin, 2005). The Fixed effects specification is as follows:

$$LnT_{ijt}^{k} = \alpha_0 + \alpha_1 LnY_{it} + \alpha_2 LnY_{jt} + \alpha_3 LnD_{ij} + \alpha_4 L_{ij} + \alpha_5 A_{ij} + \alpha_6 LnFDII_{ijt} + \alpha_7 LnTariff_{ijt}^{k} + \sum_{g=1}^{g=4} \theta_{gt} IRTA_{gt} + \sum_{s=1}^{s=4} \xi_{st} [LnFDII_{st} * IRTA_{st}] + \alpha_{ij} + \varepsilon_{ijt} \quad \ldots . (2)$$

Where α_{ij} is the country fixed effects or unobserved heterogeneity that is fixed over time. This effect is common to all years but specific to each pair of countries. It includes effects of all omitted variables that are specific but remain constant over time such as distance, common language and common border.A similar specification is used by Anderson and Van Wincoop (2003) and Brouwer, Paap and Viaene (2008), but the time-invariant unobserved country pair effect (α_{ij}) is divided into country specific effects (α_i *and* α_j).

The Random Effects Estimation assumes no correlation between individual effects and explanatory variables, and the error term is serially correlated across time. The Random effects specification is as follows:

$$LnT_{ijt}^{k} = \alpha_0 + \alpha_1 LnY_{it} + \alpha_2 LnY_{jt} + \alpha_3 LnD_{ij} + \alpha_4 L_{ij} + \alpha_5 A_{ij} + \alpha_6 LnFDII_{ijt} + \alpha_7 LnTariff_{ijt}^{k} + \sum_{g=1}^{g=4} \theta_{gt} IRTA_{gt} + \sum_{s=1}^{s=4} \xi_{st} [LnFDII_{st} * IRTA_{st}] + \eta_{ijt} \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots . (3)$$

Where $\eta_{ijt} = \alpha_{ij} + \varepsilon_{ijt}$ *and*

$$\alpha_{ij} \sim i.i.d\ N(0, \sigma_{\alpha}^2)$$
$$\varepsilon_{ijt} \sim i.i.d\ N(0, \sigma_{\varepsilon}^2)$$

Model Estimation Issues

In the estimation of the effects of FDI and RTA on bilateral trade, we are faced with problems of endogeneity of the explanatory variables (i.e., independent variables are correlated with the errors). Potential sources of endogeneity bias of right hand side variables generally fall under three categories: omitted variables, simultaneity, and measurement error (see Wooldridge, 2002, pp). Endogeneity leads to biased and inconsistent estimates. To address this problem, lags of independent variables can be added to the explanatory variables or aninstrumental variable (IV) estimation can be used. Suspected variables are lagged by one or more periods. Instrumental variable estimation includes identifying instruments that are highly correlated with FDI (or trade) but not with the error term e.g. interest rates and lagged values of FDI.

4. Empirical Results

In deciding the specification to use for the study, I ran an ordinary least square (Pooled OLS) regression, a Fixed Effects regression and a Random Effects regression. Table 1 reports the specification tests.

Table 1: OLS, FE and RE estimation

© GSJ

The dependent variable is log of nominal bilateral trade between country i and country j ($ln\ T_{ijt}^{k}$)	Pooled Ordinary Least Squares	Fixed Effects Estimation	Random Effects Estimation
lnYi	0.946***	1.011***	1.011***
	(0.00194)	(0.00172)	(0.00172)
lnYj	0.957***	1.018***	1.018***
	(0.00167)	(0.00167)	(0.00167)
lnDij	-0.983***	-1.074***	-1.074***
	(0.00382)	(0.00337)	(0.00337)
Lij	0.644***	0.701***	0.701***
	(0.00940)	(0.00827)	(0.00827)
Aij	0.772***	0.742***	0.742***
	(0.0232)	(0.0204)	(0.0204)
LnFDIIij	0.0225***	0.0409***	0.0409***
	(0.00224)	(0.00224)	(0.00224)
LnTariffij	0.0103***	0.00617***	0.00617***
	(0.00163)	(0.00143)	(0.00143)
NAFTAij	3.088**	4.133***	4.132***
	(0.983)	(0.865)	(0.865)
EUij	0.525***	0.311***	0.311***
	(0.0986)	(0.0868)	(0.0868)
ASEANij	2.099***	2.575***	2.574***
	(0.121)	(0.106)	(0.106)
ECOWASij	3.908***	4.078***	4.077***
	(0.336)	(0.296)	(0.296)
NAFTA*LnFDIIij	-0.228**	-0.340***	-0.340***
	(0.0871)	(0.0766)	(0.0766)
EU*LnFDIIij	-0.0694***	-0.0494***	-0.0494***
	(0.0115)	(0.0101)	(0.0101)
ASEAN*LnFDIIij	-0.233***	-0.276***	-0.276***
	(0.0142)	(0.0125)	(0.0125)
ECOWAS*LnFDIIij	-0.672***	-0.706***	-0.706***
	(0.0496)	(0.0436)	(0.0436)
Constant	-34.12***	-36.71***	-36.95***
	(0.0717)	(0.0634)	(0.1240)
Number of observations	736639	736639	736639
R-squared	0.485	0.575	
Adj. R-squared	0.485	0.575	
F test [OLS versus FE]: F(27, 736596) =		7994.70*** (p= 0.00)	
Breusch Pagan LM test [RE versus OLS]: $\chi^2(01)$			4.3e+08***(p=0.00)
Hausman (FE versus RE): $\chi^2(24)$		124.89***(p=0.00)	
AIC (Akiake Information Criterion)	3374029.8	3184712.8	
BIC (Baysian Information Criterion)	3374214	3184897	

Standard errors in parentheses AND * p<0.05, ** p<0.01, *** p<0.001

Pooled ordinary least square regression and the fixed effects regression are compared using the F test. The significant F statistic (F = 7994.70*** (p=0.00))rejects the null at 5% and 1% level of significance. This means we have country specific effects which mean fixed effects regression should include country-pair dummies. Also, the Breusch Pagan Lagrangian Multiplier (LM) test gives a significant χ^2 at 5% and 1% level of significance (chi2(01) = 4.3e+08***(p=0.00)) which favors random effects to OLS. Finally, the Hausmanspecification test is used to test fixed effects versus random effects. A significant p-value (124.89***(p=0.00) atat 5% and 1% showed that fixed effects model is the favorable model.

Modified Wald test for groupwiseheteroskedasticityin fixed effect regression model of$\chi^2(28)$ = 11739.05 (Prob> χ^2 =0.0000) showed the presence of heteroscedasticity. Hereroskedasticity is controlled using robust fixed effects estimation (this givesheteroskedasticity-robust standard errors or Huber/White or Sandwich estimators).Different fixed effects regressions are reportedin table 2. In regression1 there is no fixed effects and the rest has fixed effects.

© GSJ

Table 2: Different Fixed effects regressions

Variables	The dependent variable is log of nominal bilateral trade between country i and country j (T_{ijt}^{k})							
	Fixed Effects Robust	FE Exporter	FE Importer	FE Time	FE Product	FE Exporter - Importer	FE Product - Time	FE importer exporter product
lnYi	1.011***	.145*	1.041***	1.009***	1.012***	.2052***	1.009***	.20516***
lnYj	1.018***	1.066***	.141**	1.013***	1.018***	.1446***	1.013***	.14459***
lnDij	-1.07***	-1.223***	-1.164***	-1.07***	-1.07***	-1.438***	-1.07***	-1.438***
Lij	.701***	.741***	.832***	.699***	.7007***	.789***	.699***	.7889***
Aij	.742***	.571***	.617***	.743***	.742***	.341***	.743***	.34114***
LnFDIIij	0.0409	-0.034	0.0263	0.0495	0.0409	-.114***	0.0495	-.1142***
LnTariffij	0.006	-0.016	.0316***	0.00241	0.0062	-0.0003	0.00241	-0.00029
NAFTAij	4.133***	4.774***	5.205***	4.031***	4.133***	5.372***	4.031***	5.372***
EUij	0.311	0.478	0.1754	0.5476	0.31135	0.2553	0.5476	0.2553
ASEANij	2.574***	3.507***	3.171***	2.737***	2.575***	3.378***	2.737***	3.3775***
ECOWASij	4.078***	2.229**	2.616***	4.231***	4.078***	-0.408	4.231***	-0.40836
NAFTA*LnFDIIij	-.340***	-.375***	-.392***	-.331***	-.34***	-.423***	-.331***	-.4233***
EU*LnFDIIij	-0.0494	-0.0423	-0.0157	-0.0527	-0.0494	0.00153	-0.0527	0.00153
ASEAN*LnFDIIij	-.276**	-.401***	-.349***	-.290***	-.276**	-.452***	-.290***	-.4519***
ECOWAS*LnFDIIij	-.706***	-.390***	-.439***	-.725***	-.706***	-0.0081	-.725***	-0.00807
Constant	-36.7***	-13.16***	-13.80***	-36.6***	-36.7***	11.805***	-36.6***	11.805***
Number of observations	736639	736639	736639	736639	736639	736639	736639	736639
R-squared	0.575342	0.61217	0.60741	0.576172	0.57534	0.6488999	0.576172	0.6488999
Adj.R-squared	0.575334	0.61211	0.60735	0.576159	0.57533	0.64879835	0.5761587	0.64879835
AIC (Akiake Information Criterion)	3184711	3117908	3126901	3183287	3184711	3044617.3	3183286	3044617.3
BIC (Baysian Information Criterion)	3184884	3118219	3127212	3183551	3184884	3044928.1	3183551	3044928.1
Importer FE	No	Yes	No	No	No	Yes	No	Yes
Exporter FE	No	No	Yes	No	No	Yes	No	Yes
Year FE	No	No	No	Yes	No	Yes	Yes	Yes
Sector FE	No	No	No	No	Yes	No	Yes	Yes

legend: * p<0.05; ** p<0.01; *** p<0.001. Time dummies, importer dummies, exporter dummies and sector dummies are not reported
***Significant at 99% confidence level, **significant at 95% confidence level, and *significant at 90% confidence level.

It is important in the fixed effects regressions to check whether in our model we need to include exporter, importer, time and sector effects. The fixed effect regression is tested to see whether we need to include these dummies.

The model is tested for the inclusion of exporter and importer dummies. F test statistic showed that exporter and importer dummies are jointly significant at 5% and 1% (F(95, 1276286 = 494.95)) and (F(95, 1276286 = 494.95)). Hummels (2001), Rose and van Wincoop (2001), Anderson and van Wincoop (2003) and Eaton and Kortum (2003), include importing and exporting country specific dummies, to correct for multilateral trading resistance factors.

The F test is also used to check for the inclusion of time effects. The F test statistic is significant at 5% and 1% level of significant (F(9, 1276372 = 346.70)) , hence the fixed effects regression should include time dummies.

The F test is also used to check for the inclusion of sector effects. The F test statistic is significant at 5% and 1% level of significant (F(9, 1276372 = 346.70)) , hence the fixed effects regression should include time dummies.

The traditional gravity variables are all significant and carry the expected signs. Exporter and importer GDP are significant and positively related with bilateral trade between country i and country j (Similar to Linnemann, 1966 and Bergstrand, 1989)). The income elasticity of trade or the estimated coefficients for the logarithm of importer GDP and exporter GDP are less than 1 (i.e., .20516 and .14459 respectively).

A 1% increase in GDP increases trade by .20516 in the importer country and .14459 in the exporter country. Therefore, trade increases with size but less than proportionately. The international distance between exporter and importer country negatively and significantly affect bilateral trade. Distance is a measure of transportation cost and is negatively related with trade.Speaking the same language and sharing the same border significantly increases bilateral trade between country i and country j.

FDI and bilateral trade

Foreign direct investment inflows into the exporter and importer countries negatively and significantly affect bilateral trade (it is trade diverting). FDI inflow replaces exports and hence bilateral trade decreases. This means that FDI inflow into these countries and trade are substitutes to one and other.

Intrabloc trade

Economic integration is captured through the intra-bloceffect (or membership of a particular trading bloc). To explain the interaction effect of FDI inflow and trade agreements on bilateral trade across industries, it is important to explain the concept of inter and intra-industry trade. Inter-industry trade explained the trade between developed and developing countries. This type of trade is due to differences in factor endowments. This trade is mostly in raw materials. Developed countries export physical and human-capital intensive products of high quality and import unskilled labor-intensive product of low quality from developing countries. Intra-industry trade is mostly between developed countries. This is a two-way trade in similar products with differentiated varieties (horizontal intra-industry trade) or trade in vertically differentiated products (vertical intra-industry trade). In intra-industry trade, similar products are simultaneously imported and exported due to product differentiation and increasing returns to scale. Also, intra-industry trade involves import and export of

goods in the same industry but at different stages of production (vertical intra industry trade (Grubel& Lloyd, (1975)). According to Feenstra (2005), countries with similar economic size or level of development tend to engage more into intra-industry trade. Intra-industry trade is low for unskilled labor intensive sectors and high for technology intensive sectors.

According to Shaked& Sutton, (1994) & Motta, (1992), if intra industry trade leads to higher quality products displacing lower quality products, then countries that produce the latter are likely to suffer unemployment, which if not compensated by lower prices and access to higher quality products will cause negative welfare effects . The extent of intra-industry trade is typically much higher across categories of manufactured goods than it is across trade in non-manufactured goods, and highest for the more sophisticated manufactured products such as chemicals, machinery and transport equipment, electrical equipment and electronics (OECD, 2002)

Intra-bloc trade coefficient if positive means countries that are members of the agreement trade more among themselves and less with the rest of the world. This coefficient being negative means members of the bloc trade less among themselves and more with the rest of the world.The coefficients on NAFTA and ASEAN positively and significantly affect trade in the manufacturing sectors. The result is consistent with Carrère, (2004 and 2006); Soloaga& Winters, (2000); Frankel & Rose, (2000); Frankel, Stein and Wei, (1997); and Schumacher &Siliverstovs, (2004); andFrankel & Rose, (2002).

The interaction effect which is the main focus of the paper is addressed by looking at the coefficients on FDI*Intrabloc.Anegative coefficient mean FDI inflows decreases intra-industry trade within the bloc but it increases trade with 3rd countries.A positive coefficient mean FDI inflows increases intra-industry trade within the bloc but it decreases trade with 3rd countries.

The intrabloc interaction with FDI tends to divert trade in all the regions but it is significant in NAFTA and ASEAN blocs. The inflow of FDI in the intrabloc has a dampening effect. Therefore FDI inflows divert the potential trade creating effect of integration in the trading blocs.

5. Robustness tests

FDI is an endogenous variable. Instrumental variable estimation is used which reduces the correlation between the independent variable sand the error term. We need instruments that are correlated with FDI and uncorrelated with the error term. The Instrumental Variable (IV) estimation can eliminate omitted variable bias, simultaneous causality bias (reverse causality), and errors in variables bias (measurement errors).

The test for endogeneity showed that the instruments are endogenous. The null hypothesis of the Durbin and Wu-Hausman test is that the variables, foreign direct investment and exchange rates(LnFDIIij,xratei and xratej) can be treated as exogenous. The tests are highly significant ($p = 0.00$ and $p = 0.00$ respectively). Therefore we reject the null of exogeneity and hence we must treat the variables in question as endogenous. Adding lag of GDP gave a similar conclusion.

The test for overidentifying restrictions showed that we do not reject the null of overidentifyingrestriction in the model (the null is that the overidentifying restrictions are valid, i.e. uncorrelated with the error term). Since the p value is not significant (p>0.05) our instruments are appropriate.Alfaro *et al.* (2004) for example, have used the real exchange rates as an instrument for FDI.

Instrumental Variable Results showed that all the traditional gravity variables carry the expected signs. FDI effect is positive and significant, all the intrabloc effects are positive and significant and all the interaction effects are negative and significant

6. Conclusion

In conclusion, the traditional gravity variables receive the expected signs. Exporter and importer GDP are significant and positively related with bilateral trade, international distance between exporter and importer country negatively and significantly affect bilateral trade, speaking the same language and sharing the same border significantly increases bilateral trade between country i and country j.

Foreign direct investment inflows into the exporter and importer countries positively and significantly affect bilateral trade. Therefore inflow of foreign direct investment drives trade among NAFTA, EU, ASEAN, ECOWAS and the ROW countries. This supported the complementary view of FDI (Brenton et al., 1999; Wong, 1988, and Brouwer, Paap&Viaene, 2008, Helpman (1984), Helpman&Krugman (1985)).

Economic integration is captured by intra bloc effects. Intra-bloc trade coefficient are all positive meaning that countries that are members of the agreement trade more among themselves and less with the rest of the world or 3rd countries.

The intracbloc interaction with FDI diverts trade (decrease in intra-industry trade) in almost all the regions significantly (except ASEAN bloc). Therefore inflow of FDI dampens trade in the intrablocs.

The instrumental variable estimation using FDI and exchange rates as instruments give the same results for the intrabloc effects.

References

Alfaro, L., Chanda, A., Kalemhi-Ozcan, S., &Sayek, S. (2004). FDI and economic growth: the role of local financial markets. *Journal of International Economics, 64*(1), 89-112.

Anderson, J.E., 1979. A theoretical foundation for the gravity equation.*American Economic Review 69*(1), 106–116.

Anderson, J. E. and van Wincoop, E. (2003), "*Gravity with Gravitas: A Solution to the Border Puzzle".*American Economic Review 93(1):170-193.

Baier, S.L. and Bergstrand, J.H. (2002), "*On the Endogeneity of International Trade Flows and Free Trade Agreements*", Manuscript.

Baier, S.L. and Bergstrand, J.H. (2007), "*Do Trade Agreements Actually Increase Members' International Trade?*", Journal of International Economics, Elsevier 71(1): 72-95.

Baltagi, B.H., Egger, P. and Pfaffermayr, M. (2003), "*A Generalized Design for Bilateral Trade Flow Models*", Economic Letters 80: 391-397.

Bayoumi, T. and Eichengreen, B. (1995), "*Is Regionalism Simply a Diversion? Evidence from the evolution of the EC and the ERTA*", National Bureau of Economic Research, Cambridge, Working paper 5283.

Bergstrand, J. H. (1985), "*The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence*", The Review of Economics and Statistics67: 474-481.

Bergstrand, J. H. (1989), "*The Generalised Gravity Equation, Monopolistic Competition, and the Factor-Proportions Theory in International Trade*", The Review of Economics and Statistics71:143-153.

Bergstrand, J.H. and Egger, P. (2007), "*A Knowledge-and-Physical-Capital Model of International Trade Flows, Foreign Direct Investment, and Multinational Enterprises*", Journal of International Economics,73, no. 2 : 278-308

Blomstrom, M. and Kokko, A. (1997), "*Regional Integration and Foreign Direct Investment*", NBER Working Paper no. 6019.

Blonigen, B.A. (2005), "*A Review of the Empirical Literature on FDI determinants*", NBER Working Paper No 11299.

Brenton, P., Di Mauro, F. and Lucke, M. (1999), "*Economic Integration and FDI: An Empirical Analysis of Foreign Investment in the EU and in Central and Eastern Europe*", Empirica, 26(2): 95-121.

Brouwer, Paap and Viaene (2008), "*The trade and FDI effects of EMU enlargement"*, Journal of International Money and Finance 27, 188-208.

Carrère, C. (2004), "*Revisiting the Effects of Regional Trading Agreements on Trade Flows with Proper Specification of the Gravity Model*", forthcoming in European Economic Review.

Carrere, C. (2006), "*Revisiting the Effects of Regional Trade Agreements on Trade Flows with Proper Specification of the Gravity Model*", European Economic Review, Volume 50, Issue 2, Pages 223-247

Caves, R.E. (1971), "*International Corporations: The Industrial Economics of Foreign Investment*", Economica, Vol. 38 (February), pp. 1-27

Cheng, I-H.and Wall, H. (1999), "*Controlling for Heterogeneity in Gravity Models of Trade*", Federal Reserve Bank of St. Louis Working Paper No. 1999-010C.

De Sousa, J. and Lochard, J. (2006), "*Does the Single Currency Affect Foreign Direct Investment? A Gravity-Like Approach"*, mimeo, University of Paris.

Di Mauro, F (2000), "*The Impact of Economic Integration on FDI and Exports: A gravity Approach",* Centre For European Policy Studies, Working Document No. 156.

Eaton, J. and Kortum, S. (2002), "*Technology, Geography, and Trade*", Econometrica, 70(5), pp.1741-1779.

Egger, P. and Pfaffermayr, M. (2003), "*The Proper Panel Econometric Specification of the Gravity Equation: A three-way model with bilateral interaction effects*", Empirical Economics,28:571-580.

Egger, P. and Pfaffermayr, M. (2004), "*Trade, Multinational Sales, and FDI in a Three-Factors \ Model*", Review of International Economics 12, forthcoming. http://www.econ.jku.at/papers/2000/wp0013.pdf

Eicher, T., Henn, C. and Papageorgiou, C. (2007), "*Trade Creation and Diversion Revisited: Accounting for Model Uncertainty and Natural Trading Partner Effects*", mimeo, IMF Working Paper WP/08/66, International Monetary Fund.

Endoh, M. (1999), "*Trade Creation and Trade Diversion in the EEC, the LARTA and the CMEA:*

*1960-1994",*Applied Economics, Vol. 31, p. 207-216.

Ethier, W.J. and Horn, H. (1990), *"Managerial Control of International Firms and Patterns of Direct Investment",* Journal of International Economics, Elsevier, vol. 28, No.1-2, pp. 25-45.

Evenett, S. and Keller, W. (2002), "*On Theories Explaining the Success of the Gravity Equation*", Journal of Political Economy,110; 281-316.

Feenstra, R.C., *Advanced International Trade*, Chapter 5.

Frankel, J. (1997), "*Regional Trading Blocs in the World Economic System*", Institute for International Economics, Washington, D.C.

Frankel, J. and Romer, D. (1999), "*Does Trade Cause Growth?*", American Economic Review, 89(3), 379-399.

Frankel, J.A. and Rose, A.K. (2000), "*An Estimate of the Effects of Currency Unions on Trade and Growth*", Rose's web site. First Draft May 1; revised June 10, 2000.

Frankel, J.A. and Rose, A.K. (2002), "*An Estimate of the Effect of Common Currencies on Trade and Income*", The Quarterly Journal of Economics, 117(2), pp.437-466.

Frankel, J. A., Stein, E. and Wei, S-J. (1997), "*Regional Trading Blocs in the World Economic System*",Institute for International Economics. Washington, D.C. Processed.

Glick, R. and Rose, A.K. (2001),"*Does a Currency Union Affect Trade? The Time Series Evidence*", NBER Working Paper 8396. Cambridge, United States: National Bureau of Economic Research.

Gosh, S. and Yamarik, S. (2004), "*Are Regional Trading Arrangements Trade Creating? An Application of Extreme Bounds Analysis. Journal of International Economics*", 63(2):369-395.

Grubel , H.G., and Lloyd, P.J., (1975), *Intra-Industry Trade: The Theory and Measurement of International Trade in Differentiated Products*, London.

Gujarati, D. (2003), "*Basic Econometrics*", 4th Edition. New York: McGraw Hill.

Head & Mayer, (2002), *Illusory Border Effects*, CEPII Working Paper No. 2002-01

Helpman, E. (1984), "*A Simple Theory of Trade with Multinational Corporations*", Journal of Political Economy 92: 451-471.

Helpman, E. and Krugman, P. (1985), "*Market Sturcture and Foreign Trade: Increasing Returns, Imperfect Competition and the International Economy"*, Cambridge, MA: MIT Press.

Hummels, D. (1999), "*Toward a Geography of Trade Costs*", mimeo, University of Chicago

Hummels, D. (2001), "*Toward a Geography of Trade Costs*", Working Paper, Purdue University.

Hummels, D. and Levinsohn, J. (1995), "*Monopolistic Competition and International Trade: Reconsidering the Evidence*", Quarterly Journal of Economics 110, 799–836.

Hunya, G. and Geishecker, I. (2005), "*Employment Effects of Foreign Direct Investment in Central and Eastern Europe*", The Vienna Institute for International Economic Studies, Research Reports, 321

Jensen, P.E. (2000), "*Analysis of Bilateral Trade Patterns with Panel Data*", Review of International Economics 8, 86–99.

Kimura, F. and Lee, H.H. (2006), "*The Gravity Equation in International Trade in Services*", Review of World Economics, 142, 1, 92-121.

Klein, L.R. and Salvatore, D. (1995), "*Welfare Effects of North American Trade Agreement*", Journal of Political Modeling,17(2):163-176

Levy-Yeyati, E. , Stein, E. and C. Daude (2001), "*Regional Integration and the Location of FDI*", Universidad Torcuato Di Tella, Buenos Aires; Inter-American Development Bank, Washington, DC.; University of Maryland, College Park.

Levy Yeyati E., E. Stein and C. Daude (2003), "*Regional Integration and the Location of FDI",Inter-American Development Bank*," Research Department Working Paper 492, Washington D.C.

MacDermott, R. (2007), "*Regional Trade Agreement and Foreign Direct Investment*", North American Journal of Economics and Finance, 18, 107-116.

Markusen, J.R. and Venables, A.J. (1998), "*Multinational Firms and the New Trade Theory*", Journal of International Economics, 46: 183-203.

Markusen, J.R. and Venables, A.J. (2000), "*The Theory of Endowment, Intra-Industry and Multinational Trade",* Journal of International Economics 52: 209-234.

Masson, P. and Pattillo, C. (2004), "*A Single Currency for Africa*", Finance & Development.

Mátyás, L. (1997), "Proper Econometric Specification of the Gravity Model", The World Economy 20(3), pp.363-368.

Montenegro, C.E. and Soloaga, I. (2006), "*NAFTA's Trade Effects: New Evidence With a Gravity Model*", Estudios de Economia, Vol.33 no. 1, pages 45-63.

Motta, M. (1992), "*Sunk Costs And Trade Liberalization*", Economic Journal, 102, 578-587.

Nicita, A. and Olarreaga, M. (2006), "*Trade, Production and Protection, 1976-2004*", World Bank Economic Review, 21 (1).(available at http://siteresources.worldbank.org/INTRES/Resources/469232-1107449512766/Nicita-Olarreaga_TPP_DATABASE.pdf)

Oguledo, V.I. and MacPhee, C.R. (1994), *"Gravity Models: A Reformulation and an Application to Discriminatory Trade Arrangements*", Applied Economics, 26(2), pp. 107-20.

Petroulas, P. (2007), "*The Effect of the Euro on Foreign Direct Investment*", European Economic Review, 51(6), 1468-1491.

Pontes, J.P. (2004), *"A theory of the relationship between foreign direct investment and trade"*, Economics Bulletin, 6(2), pp. 1-8.

Rose, A.K. (2000), "*One Money, One Market: Estimating the Effect of Common Currencies on Trade*", Economic Policy 30: 7-46.

Rose, A. and van Wincoop, E. (2001), "*National Money as a Barrier to Trade: The Real Case for Currency Union",* American Economic Review Papers and Proceedings91: 386-390.

Sachs, J. and Shatz, H. (1994), "*Trade and Jobs in U.S. Manufacturing*" ,Brookings Papers on Economic Activity(1994): 1-69.

Salvatore, D. (2001), "*International Economics*", 7th Edition, John Wiley & Sons.

Salvatore, D. (2007),"*Economic Effects of NAFTA on Mexico*", Global Economy Journal, vol 7, Issue 1.

Santos Silva &Tenreyno, (2006), "*The Log of Gravity*," The Review of Economics and Statistics, 88(4), pp. 641-658.

Santos-Silva &Tenreyro (2009), "*Further Simulation Evidence on the Performance of the Poisson Pseudo-Maximum Likelihood Estimator,*" Department of Economics, University of Essex, Discussion Paper No 666.

Schumacher, D. and Silverstovs, B. (2004), "*Size and Factor-Endowment Effects on Comparative Advantage in a Gravity Model*", DIW Berlin (German Institute For Economic Research).

Shaked, A. and Sutton, J. (1994), "*Natural Oligopolies and International Trade.In Kierzkowsky, H. (ed), Monopolistic Competition And Competition In International Trade.*" Oxford University Press.

Slootmaekers, V. (2004), "*Trade Effects of the EU- Mexico Trade Agreement*", Catholic University Leuven, May, available at http://www.econ.kuleuven.be/ew/academic/intecon/Home/WorkingGroupSeminars/Files/Slootmaekers-Trade.pdf

Soloaga, I. and Winters, A.L. (1999), "*Regionalism in the Nineties: What effects on trade?*",

Development Economic Group of the World Bank, mimeo.
Soloaga, I. and Winters, A.L. (2000), "*Regionalism in the Nineties: What Effect on Trade?*", North American Journal of Economics and Finance, 12(1):1-29.
Thornton, J. and Goglio, A. (2002), "*Regional Bias and Intra-Regional Trade in Southeast Asia*", Applied Economics Letters, 9(4): 205-208.
Wall, H.J. (2000), "*Gravity Model Specification and the Effects of the Canada - U.S. Border*", Federal Reserve Bank of St. Louis Working Paper
Wei, S.J. (2000), "*How Taxing is Corruption on International Investors?*" Review of Economics and Statistics, 82(1): 1-11.
Wei, S.J. (2000), "*Local Corruption and Global Capital Flows*", Brookings Papers on Economic Activity, 0(2): 303-46.
Wong, K.-Y. (1988), "*International Factor Mobility and the Volume of Trade: An Empirical Study*", in Feenstra, R.C.(ed.), Empirical Methods for International Trade (Cambridge: MIT Press), 231-250.
Wooldridge, Jeffrey M. *Econometric Analysis of Cross-Section and Panel Data*. Cambridge, MA: MIT Press, 2002.

Appendix A: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
logarithm of bilateral trade (LnT_{ijt})	btradeij	2485589	32674.21	534981.1	0	1.16e+08
Logarithm of importer GDP (lnYi)	gdpconsti	1627997	7.87e+11	1.97e+12	1.64e+09	1.27e+13
Logarithm of exporter GDP (lnYj)	gdpconstj	1813667	7.74e+11	1.94e+12	1.64e+09	1.27e+13
Logarithm of international distance (lnDij)	distwces	2348428	6994.494	4363.565	134.644	19734.89
Common language (Lij)	comlang	2376370	.1240169	.3296009	0	1
Common border (Aij)	comborder	2376370	.0209033	.1430607	0	1
Logarithm of FDI inflow (LnFDIIij)	FDIIij	1095782	23395.22	41711.67	-21049.17	512273.7
NAFTAij	tariffij	2485589	8.714174	18.07846	0	1001.629
EUij	NAFTAij	2485589	.0006083	.0246564	0	1
ASEANij	EUij	2485589	.0598659	.2372383	0	1
ECOWASij	ASEANij	2485589	.0295837	.169436	0	1
	ECOWASij	2485589	.009158	.0952582	0	1

Appendix B: Variable Description and data Sources

Variable Name	Variable Definition	Data Source
LnT_{ijt}	Logarithm of bilateral trade between country i and country j in year t	The world bank, development economics research group http://www.worldbank.org/research/trade/ Trade, Production and Protection, 1976-2004
LnY_{it}	Logarithm of nominal GDP (GDP at current prices) of country i in year t	United Nations Statistics Division http://unstats.un.org/unsd/snaama/SelectionCountry.asp or http://unstats.un.org/unsd/snaama/selcountry.asp
LnY_{jt}	Logarithm of nominal GDP (GDP at current prices) of country j in year t	United Nations Statistics Division http://unstats.un.org/unsd/snaama/SelectionCountry.asp or http://unstats.un.org/unsd/snaama/selcountry.asp
LnP_{it}	Logarithm of	United Nations Statistics Division

	population of country i in year t	http://unstats.un.org/unsd/snaama/SelectionCountry.asp or http://unstats.un.org/unsd/snaama/selcountry.asp
LnP_{jt}	Logarithm of population of country j in year t	United Nations Statistics Division http://unstats.un.org/unsd/snaama/SelectionCountry.asp or http://unstats.un.org/unsd/snaama/selcountry.asp
LnD_{ijt}	Logarithm of bilateral distance between country i and country j at time t	www.cepr.org http://www.cepii.fr/francgraph/bdd/distances.htm http://www.cepii.fr/distance/noticedist_en.pdf
LnD_{iit}	Logarithm of internal distance of country i at time t	www.cepr.org http://www.cepii.fr/francgraph/bdd/distances.htm http://www.cepii.fr/distance/noticedist_en.pdf
L_{ijt}	Common official language between country i and country j at time t	www.cepr.org http://www.cepii.fr/francgraph/bdd/distances.htm http://www.cepii.fr/distance/noticedist_en.pdf
A_{ijt}	Common border between country i and country j at time t	www.cepr.org http://www.cepii.fr/francgraph/bdd/distances.htm http://www.cepii.fr/distance/noticedist_en.pdf
LnFDI$_{it}$	Logarithm of inward foreign direct investment (FDI to country i at time t).	UNCTAD Handbook of Statistics 2009 http://stats.unctad.org/Handbook/TableViewer/tableView.aspx?ReportId=2079
LnFDI$_{jt}$	Logarithm of inward foreign direct investment (FDI to country j at time t).	UNCTAD Handbook of Statistics 2009 http://stats.unctad.org/Handbook/TableViewer/tableView.aspx?ReportId=2079

APPENDIX C: COUNTRIES USED IN THE STUDY AND PRODUCT CLASSIFICATION

Table 1A: Countries (75 countries)

1. NAFTA

USA
Mexico
Canada

4. EU (EuropeanUnion)

Austria	BLX (Belgium-Luxemburg)	Bulgaria
Cyprus	Czech Republic	Denmark
Estonia	Finland	France
Germany	Greece	Hungary
Ireland	Italy	Latvia
Lithuania	Malta	Netherlands

Poland Portugal Romania
Slovakia Slovenia Spain
Sweden United Kingdom (Great Britain & Ireland)

5. ASEAN (ASEAN &ASEAN+3)

Brunei China
Cambodia Japan
Indonesia Korea
Laos
Malaysia
Myanmar
Philippines
Thailand
Singapore
Vietnam

12. ECOWAS

Burkina Faso
Benin
Cote D'Ivoire
Ghana
Gambia
Guinea Bissau
Cape Verde
Guinea Conakry
Liberia
Mali
Niger
Nigeria
Senegal
Sierra Leone
Togo

13. OTHER COUNTRIES

Hong Kong Brazil
South Africa Turkey
Australia
Switzerland
Norway
Russia
India
Iceland

© GSJ

Note: countries are both exporters and importers

Table 1B: Product/sector classifications (industry imports and exports)

Product groupings	Isic rev2	ISIC name	United Nations Classification[10]
A	311 313	Food products Beverages	Manufacture of food, Beverages and Tobacco

[10] UN Statistics Division (http://unstats.un.org). OECD has a similar classification called the STAN classification (www.oecd.org).

	314	Tobacco	
B	321 322 323 324	Textiles Wearing Apparel except footwear Leather products Footwear except rubber or plastic	Textile, Wearing Apparel & Leather Industries
C	331 332	Wood products except furniture Furniture except metal	Manufacture of Wood and Wood products, including Furniture
D	341 342	Paper and products Printing and publishing	Manufacturing of Paper and Paper Products, Printing & Publishing
E	351 352 353 354 355 356	Industrial chemicals Other chemicals Petroleum refineries Miscellaneous petroleum and coal products Rubber products Plastic products	Manufacture of Chemicals and **Chemical Products**, Petroleum, Coal, Rubber, and Plastic Products
F	361 362 369	Pottery china earthenware Glass and products Other non-metallic mineral products	Manufacture of Non-Metallic Mineral Products, except products of Petroleum and Coal
G	371 372	Iron and steel Non-ferrous metals	Basic Metal Industries
H	381 382 383 384 385	Fabricated metal products Machinery except electrical Machinery electric Transport equipment Professional and scientific equipment	Manufacture of Fabricated Metal Products, Machinery & Equipment
	390	Other manufactured products	Other Manufacturing Industries

© GSJ