World Input-Output Database

Preferential Trade Agreements and the Structure of International Trade

Working Paper Number: 4

Authors: Neil Foster and Robert Stehrer

Working Paper Series

February 2010

Preferential Trade Agreements and the Structure of International Trade

Neil Foster[‡]
Robert Stehrer

The Vienna Institute for International Economic Studies - wiiw
Rahlgasse 3, A-1060, Vienna, Austria.

Abstract

In this paper we examine the impact of membership in Preferential Trade Agreements (PTAs) on trade between PTA members. Rather than considering the impact of PTA membership on the volume of trade we consider the impact of membership on the structure of trade. For a large sample of countries over the period 1962-2000 we find that membership in a PTA is associated with an increase in the extent of intra-industry trade. In addition, we find that the effect of PTA membership on IIT is larger when a PTA is formed between two developed countries.

Keywords: Preferential Trade Agreements, Intra-Industry Trade, Gravity Equation

JEL Classification: F10, F15

[‡] Corresponding author. Email: foster@wiiw.ac.at, Tel +43 (0)1 533 66 10 55

1. Introduction

In the last two decades there has been a proliferation in the number of Preferential Trade Agreements (PTAs).[1] According to Urata and Okabe (2007) the number of PTAs reported to the WTO was 25 in 1990, 91 in 2000 and 194 in 2007. For a long time most PTAs were regional in focus with members being geographically close to each other (e.g. EU, NAFTA). More recently however countries or regional blocs have signed PTAs with diverse and geographically distant partners.[2] Moreover, regional groupings have become more diverse (e.g. ASEAN).

As discussed in the literature (see for example Frankel, Stein and Wei, 1996) there is a trade-off involved when discussing the benefits of PTA membership. On the one hand, there is a *trade creation* effect that comes from the elimination in distortions between the relative prices of domestic goods and those of other members. On the other hand, there exists the potential for a *trade distortion* effect due to the introduction of distortions between the relative prices of member and non-member goods. By now a large number of empirical papers have addressed the issue of whether membership in a PTA creates trade between members (see Section 2 below). A related issue that has been addressed is whether trade diversion is also an outcome of the presence of a PTA; that is, is trade between a member and a non-member reduced as a result of the presence of the PTA? These issues have usually been addressed using the gravity equation, with the results being mixed depending upon the sample, the time period, the specification of the gravity equation and the particular PTAs considered.

[1] In what follows we take Preferential Trade Agreements (PTAs) to mean any preferential access for members of such an agreement.

[2] For example, the US has signed agreements with Australia (2004), Morocco (2005) and Peru (2009), while the EU has signed agreements with Chile (2004), Algeria (2006) and Cote d'Ivoire (2008).

To date the vast majority of papers considering PTAs have concentrated on the issue of whether trade creation and/or trade diversion effects of PTAs are present, usually using data on total bilateral trade or total exports as the variable of interest and dummies for the presence (or absence) of a PTA between two countries. There are very few papers that consider *how* PTAs affect trade however, recent exceptions being Urate and Okabe (2007) who examine the impact of PTAs on industry-level trade and Egger et al (2008) who consider the effect on the structure of trade.

In this paper, rather than examine whether PTA membership affects the level of trade between members (as well as between members and non-members) we examine whether membership in PTAs is associated with a change in the structure of trade between members. As discussed by Egger et al (2008) this issue has been largely ignored to date in the empirical literature. Yet the issue of whether joining a PTA stimulates gains due to specialisation, i.e. inter-industry trade, or to gains from scale economies and product differentiation, i.e. intra-industry trade, would seem to be an important one when considering the benefits of PTAs and the question of which countries should form a PTA. In particular, if most of the growth in trade due to the presence of a PTA is attributable to intra-industry trade, then the resource reallocation effects in the short- to medium-run are likely to be lower than if inter-industry trade was most affected, since the change would require little inter-industry factor movements. In this paper, we examine whether membership in PTAs has a significant impact upon the popular Grubel-Lloyd index of intra-industry trade (IIT) in a gravity framework. To examine this issue we use data from Feenstra et al (2005) on up to 168 countries over the period 1962-2000[3]. Compared with the data and sample used by Egger et al (2008) the current paper considers a larger sample of countries, with countries at differing levels of development, and a longer time

[3] This number includes countries no longer in existence (e.g. Czechoslovakia, ex-Yugolslavia) along with the countries that replaced them (e.g. Czech Republic, Slovakia).

period. In terms of the method, the current paper makes use of the gravity equation, which is common in this type of literature, while Egger et al (2008) make use of the more advanced matching estimator. Our results indicate that membership in a PTA is associated with an increase in the extent of IIT. In addition, we find that the effect of PTA membership on IIT is larger when a PTA is formed between two developed countries.

The remainder of the paper is set out as follows. Section 2 reviews the existing evidence on the impact of PTAs, while Section 3 discusses our main hypotheses, our empirical approach and the data used. Section 4 discusses our main results and Section 5 reports some robustness results. Section 6 concludes.

2. Existing Evidence on the Impact of PTAs

The gravity equation has been developed as the standard tool to estimate the effects of PTAs on trade between members (early studies include Tinbergen, 1962 and Aitken, 1973). A dummy variable taking the value one if two countries are both members of a PTA is included in the gravity equation and used as an indicator of the effect of PTA membership on trade flows between member countries (i.e. trade creation effects). A number of extensions to this standard methodology have been considered. One such extension has been to consider specific PTAs rather than bundling them all into one dummy variable by constructing PTA dummies for each of a number of specific PTAs. This allows one to examine the impact on trade flows of specific PTAs.

Using such an approach has lead to mixed results. Aitken (1973), Abrams (1980) and Brada and Mendez (1983) for example found membership in the European Community to have a

positive and significant effect on trade flows among members, while Bergstrand (1985) and Frankel, Stein and Wei (1995) found insignificant effects. Frankel (1997) finds a positive impact from MERCOSUR membership, insignificant effects from membership in the Andean pact, and occasionally negative effects from membership in the European Community.

A number of studies have also attempted to examine the potential trade diversion effects of PTAs by including binary variables that take the value one if only one member of a country pair belongs to a PTA. Frankel, Stein and Wei (1996) for example, estimate a gravity model of trade among 63 countries in the period 1965-1992 with a dummy variable for different PTAs included. Trade creation effects are found in the cases of the European Community, MERCOSUR, the Andean Pact, ASEAN and ANZCERTA. Introducing dummy variables to represent trade between PTA members and non-members they find mixed results. Trade diversion effects are found in the case of EFTA, NAFTA and ANZCER, but in other cases (ASEAN, MERCOSUR, Andean Pact, European Community) the coefficient on the dummy is positive, suggesting that the trade bloc lowered its external barriers at the same time as it liberalized internally, a phenomenon often termed *open bloc trade creation*.

A further extension of the literature has been to deal with the potential endogeneity of the PTA variable: membership in PTAs is likely to be endogenous as countries self-select into PTAs for reasons related to the level of trade for example. Baier et al (2008) have noted that the issue of endogeneity has received very little attention in the literature with few studies (exceptions being Baier and Bergstrand, 2002, and Magee, 2003) using instrumental variables or Heckman control functions to address this issue (often with mixed results). They go on to argue that panel regression may be a better solution to address this issue, either through the use of first differences (Bayoumi and Eichengreen, 1997) or country-pair fixed effects (Cheng

and Wall, 2002).[4] Baier et al (2008) use a fixed effects panel model to examine the impact of the EU, EFTA, EEA and all other PTAs using data on 96 countries within the period 1960-2000. When using bilateral fixed effects (with and without time effects) to account for endogeneity the coefficient estimates are all plausible and statistically significant. For each of the European agreements trade is found to increase by at least 75 percent. Overall, the estimates are much larger than existing estimates. They go on to include time-country fixed effects to account for the time-varying multilateral price terms of Anderson and van Wincoop (2003). This tends to lower the estimated effects of the European trade agreements, but with the exception of EFTA, the effect is still substantial.

Baier and Bergstrand (2004) find evidence that country-pairs that have PTAs tend to share similar characteristics. In particular they find that two countries are more likely to have a PTA the larger and more similar their GDPs are, the closer they are to each other but the more remote the pair are from the rest of the world, and the wider (narrower) the difference in their relative factor endowments with respect to each other (rest of the world). Using this information Baier and Bergstrand (2002) use an instrumental variables estimator to examine the impact of PTAs on trade for the year 2000, but find that the exogeneity of the instruments has to be rejected. A Heckman control function approach also does not solve the problem of endogeneity, with the results found to be very unstable.

An alternative method for dealing with one aspect of endogeneity – selection bias – is to use matching econometrics. This is the approach adopted by Baier and Bergstrand (2008) who match country pairs with PTAs to virtually identical country pairs without PTAs, based on a set of common economic characteristics. The average effect of the treated (i.e. country pairs

[4] Baier and Bergstrand (2007) adopt both approaches.

with PTAs) and the untreated are then compared. They again find coefficients that tend to be larger than those in the literature that don't account for endogeneity, with the average long-run effect of a PTA being to increase trade by 100 percent.

All of the above papers consider the effect of PTA membership on trade volumes. A small number of papers however also consider the issue addressed in this paper, namely the effects of PTA membership on the structure of trade. Egger et al (2008) use matching and difference-in-difference analysis on a sample of mainly OECD countries to examine the presence of new PTAs on the popular Grubel-Lloyd index[5] of intra-industry trade. They find a positive effect on intra-industry trade shares of new PTA membership, with new membership in a PTA found to increase intra-industry trade by around 4 percent. From the results they conclude that the often found positive effect of PTA membership on the volume of trade can be mainly attributed to the growth in intra-industry trade. Ekanayake (2001) employs a gravity-type equation to examine the determinants of IIT between Mexico and its major trading partners and finds that participation in PTAs has a positive impact on IIT. Kim and Lee (2003) examine the impact of MERCOSUR on the levels of intra-industry trade amongst its members.[6] They construct the Grubel-Lloyd indicator of IIT over the 1990s and find that the levels of IIT increased dramatically following the establishment of MERCOSUR. While this was true for trade with all partners the effect was more pronounced for trade with partners that were also members of MERCOSUR. Rodas-Martin (1998) calculated measures of both IIT and revealed comparative advantage among Central American countries in 1994 and found that there were generally low levels of intra-industry trade and the presence of many products with high levels of revealed comparative advantage.

[5] They also consider an adjustment to this index that accounts for trade imbalances.
[6] Grubel and Lloyd (1975) also showed that the level of intra-industry trade increased after the formation of the Organisation for European Economic Cooperation (OEEC) and the EEC.

Martincus and Estevadeordal (2009) consider a related issue, concentrating on the specialisation patterns of ten Latin American countries over the period 1985-1998, arguing that these countries are good examples to consider as they have engaged in both unilateral trade liberalisation programs and regional integration. The authors use sectoral value-added data to construct indicators of specialisation and construct most-favoured-nation (MFN) and preferential tariffs to identify a country's trade policy. Their results suggest that reducing MFN tariffs is associated with increasing production specialization. In addition, they find that bilateral preferential trade liberalization and differences in the degree of unilateral openness have resulted in increased dissimilarities in manufacturing production structures across countries. Such results would point to the opposite conclusion reached by Egger et al (2008), with the increasing dissimilarity of countries suggesting greater inter-industry trade flows.

3. Method and Data

3.1. Model Specification

We follow the majority of the literature considering the relationship between PTAs and trade volumes by using the gravity model to examine the effects of PTAs on IIT. A number of other papers have used this model when considering the structure of trade. Ekanayake (2001) for example employ a gravity-type equation to examine the determinants of IIT between Mexico and its major trading partners. He finds that the gravity determinants tend to operate in the same way as for the value of trade, with distance having a negative impact upon IIT and a common border, common language and participation in PTAs having a positive impact. In his model he also includes other variables, such as differences in per capita income and economic size. Caetano and Galego (2007) also estimate a gravity-type model to explain IIT among

CEECs and the EU, replacing physical distance with a measure of economic distance (from the EU15 average).

As discussed by Baier and Bergstrand (2002), two common forms of the gravity equation have been estimated,

$$EXP_{ij} = \beta_0 + \beta_1 GDP_i + \beta_2 GDP_j + \beta_3 POP_i + \beta_4 POP_j + \beta_5 DIST_{ij} + \beta_6 LANG_{ij} + \beta_7 ADJ_{ij} + \beta_8 LOCK_{ij} + \beta_9 PTA_{ij} + \varepsilon_{ij}$$

or,

$$TRADE_{ij} = \beta_0 + \beta_1 (GDP_i \times GDP_j) + \beta_2 (POP_i \times POP_j) + \beta_3 DIST_{ij} + \beta_4 LANG_{ij} + \beta_5 ADJ_{ij} + \beta_6 LOCK_{ij} + \beta_7 PTA_{ij} + \varepsilon_{ij}$$

where EXP_{ij} is the value of merchandise flow imported by country j from exporter i, GDP_i (GDP_j) is the level of nominal gross domestic product of country i (j), POP_i (POP_j) is the level of population in country i (j), $DIST_{ij}$ is the distance between economic centres of countries i and j, $LANG_{ij}$ is a binary variable equal to one if countries i and j share a common language, ADJ_{ij} is a binary variable equal to one if countries i an j share a common border, $LOCK_{ij}$ is a variable accounting for whether none, one or both countries are landlocked, and PTA_{ij} is a binary variable equal to one if countries i and j have a preferential trade agreement. In the second specification the value of exports from i to j is replaced by the total level of trade (i.e. imports plus exports) between the country pair, $TRADE_{ij}$.[7] All variables with the exception of the dummy variables are usually included in log-form.

[7] In the former case we are thus able to examine the coefficients on the level of GDP and population for the exporter and importer separately, while in the latter case we consider the product of the GDPs and populations. Considering these variables separately in this case makes little sense as the classification of country i and j is determined by the ordering of the data.

The starting point for our analysis therefore is the following equation;

$$lnIIT_{ijt} = \beta_0 + \beta_1(GDP_{it} \times GDP_{jt}) + \beta_2(POP_{it} \times POP_{jt}) + \beta_3 DIST_{ij} + \beta_4 LANG_{ij} + \beta_5 ADJ_{ij} + \beta_6 LOCK_{ij} + \beta_7 PTA_{ijt} + \varepsilon_{ijt}$$

where IIT is our indicator of the extent of intra-industry trade (i.e. the. Grubel-Lloyd index) and the addition of the t subscript is due to the panel nature of our regression model. The variable definitions are all as described above, with $LOCK_{ij}$ taking on the value 0, 1 or 2 depending on whether none, one or both countries are landlocked respectively. There has been a great deal of debate in the literature on the appropriate specification of gravity models in a panel context (see Matyas, 1997, 1998; Egger, 2000, Baldwin and Taglioni, 2006), which lead us to make a number of modifications to the above equation. Firstly, in all of our regressions we include a set of time dummies to take account of bilateral-pair invariant time specific effects. Secondly, in some specifications we include a full set of bilateral-pair fixed effects in our model to account for time-invariant bilateral pair specific effects. It has been argued in the literature (Glick and Rose, 2002) that including such effects can account for the multilateral resistance term of Anderson and van Wincoop (2003).[8] The inclusion of bilateral-pair fixed effects means that we cannot estimate the coefficients on time-invariant variables such as distance. Our estimating equation in this case becomes therefore,

$$lnIIT_{ijt} = \beta_1(GDP_{it} \times GDP_{jt}) + \beta_2(POP_{it} \times POP_{jt}) + \beta_3 PTA_{ijt} + \delta_t + \omega_{ij} + \varepsilon_{ijt}$$

where δ_t and ω_{ij} refer to the time and bilateral-pair fixed effects.

In addition to examining the importance of PTAs for total trade and trade structure in general, we also consider the trade creation effects of specific PTAs. To account for trade creation

[8] Alternative approaches in the literature include simple OLS, country specific fixed effects, and time-country specific fixed effects. In a panel context it may be necessary to include time-country fixed effects alongside bilateral-pair fixed effects to take account of the time-varying nature of the multilateral resistance term (see Baier et al, 2008). With such a large number of country and time periods in this paper, it is not practical to adopt such an approach.

effects we include a set of dummies for particular PTAs. The PTAs we consider are the same as used by Eicher et al (2004).[9] The regression model with bilateral-pair fixed effects in this case is thus,

$$lnIIT_{ijt} = \beta_1(GDP_{it} \times GDP_{jt}) + \beta_2(POP_{it} \times POP_{jt}) + \sum_{s=1}^{11} \varphi_s \, PTA_{sijt} + \delta_t + \omega_{ij} + \varepsilon_{ijt}$$

3.2. Data

Data on the GDP and population of the importer and exporter are from the World Development Indicators (2008) dataset. Data on distance, common language and adjacency are from CEPII[10]. The data on the landlocked variable is constructed based on data from Wikipedia[11]. Data on PTAs is taken from the WTO website[12] (accessed at various dates) and complemented with information from Baier et al (2008) and Wikipedia.[13] The PTA dummy variable is defined as equal to one if exporter and importer were in any one of the PTAs listed on either the WTO website or one of the alternative sources. Finally, the trade data is taken from the dataset of Feenstra et al (2005), which reports data on imports and exports at the SITC four-digit level (around 1,000 categories) over the period 1962-2000.

To measure the extent of IIT we use the popular Grubel-Lloyd index.[14] We follow Egger et al (2008) and formulate the Grubel-Lloyd index (GLI) of intra-industry trade as,

[9] These are the Association of South-East Asian Nations (AFTA), Australia-New Zealand Trade Agreement (ANZCERTA), Asian Pacific Economic Cooperation (APEC), Andean Pact (AP), Central American Common Market (CACM), Caribbean Community (CARICOM), European Economic Area (EEA), European Free Trade Agreement (EFTA), European Union (EU), Latin America Integration Agreement (LAIA), Southern Cone Common Market (MERCOSUR) and the North America Free Trade Agreement (NAFTA).
[10] http://www.cepii.fr/anglaisgraph/bdd/distances.htm
[11] http://en.wikipedia.org/wiki/Landlocked
[12] http://rtais.wto.org/UI/PublicAllRTAList.aspx
[13] The reason for considering alternative sources is that the WTO dataset only includes PTAs in force, thus excluding a number of PTAs that are no longer in force, but that would have been in the period of interest, examples being the PTAs agreed between the EU-15 and Romania, Bulgaria and others in the 1990s, but which are no longer in force now that these countries are now members of the EU.
[14] See Grubel and Lloyd (1971 and 1975).

$$GLI_{ijt} = \sum_{k} \frac{2 \times \min\left(export_{ijkt}, import_{ijkt}\right)}{\sum_k export_{ijkt} + \sum_k import_{ijkt}}$$

where i and j refer to countries and k refers to industries or product categories. The measure is an indicator of the intensity of IIT in industry k. The index takes on values between 0 and 1, with higher values indicating more IIT.

This index is often adjusted to take account of the fact that goods trade can be unbalanced due to profit repatriation (see for example Grubel and Lloyd, 1971, and Egger et al, 2008). The corrected index (CGLI) is calculated as follows,

$$CGLI_{ijt} = \sum_{k} \frac{2 \times \min\left(export_{ijkt}, import_{ijkt}\right)}{\sum_k export_{ijkt} + \sum_k import_{ijkt} - \left|\sum_k export_{ijkt} - \sum_k import_{ijkt}\right|}$$

4. Results

The initial results are split into 2 sections. The first section reports the results when we include a dummy for the presence of a PTA between country pairs; the second considers the twelve PTAs considered by Eicher et al (2004) separately and examines how the structure of trade has been affected by each of these PTAs.

4.1. RTAs and the Structure of Trade

The first three columns of Table 1 report the results for total trade, GLI and CGLI respectively from pooled regressions, where no country or country-pair fixed effects are included, while the final three columns report the results when including bilateral-pair fixed effects to control for endogeneity. Including bilateral-pair fixed effects means that we cannot

include time-invariant bilateral-pair specific effects, such as distance, common language, and so on. [15]

In Column (1) we see that the coefficients on the majority of the gravity determinants are as expected, with a negative coefficient on distance (slightly smaller in absolute value than the usual coefficient of around minus one) and landlockedness, and positive coefficients on the common border and common language dummies. The coefficients on the product of the GDP's are positive, with a value around one, as expected, and we obtain small, negative (but significant) coefficients on the product of the importer's and exporter's populations. Finally, the coefficient on the PTA dummy is positive and significant, indicating significant trade creation effects. The size of the coefficient is in line with estimates in the literature (see for example, Baier and Bergstrand, 2002). When considering the GLI and CGLI indices of IIT we find coefficients on the gravity determinants that are consistent, in terms of sign and significance, with those for total trade (except for landlocked, which varies in sign and tends to be insignificant). The coefficients on the PTA variable are also found to be positive and significant, indicating that countries sharing a PTA tend to engage in higher levels of intra-industry trade.

The results in the final three columns are largely consistent with those reported in the first three columns. The coefficients on the product of the GDPs remain positive and significant, though somewhat smaller than in the first three columns, while the coefficients on the product of the populations tend to remain negative and significant. The coefficients on the PTA dummies are again positive and significant for both total trade and GLI and CGLI. When considering total trade the coefficient is larger than that reported in Column 1, consistent with

[15] All regressions include a full set of time dummies (which are in all cases jointly significant).

findings in other studies (e.g. Baier et al, 2008), while the coefficients on the PTA dummies when considering GLI and CGLI are somewhat smaller than the corresponding results in Columns 2 and 3, though they remain highly significant.

Table 1: Initial Results – All PTAs

VARIABLES	(1) Trade	(2) GLI	(3) CGLI	(4) Trade	(5) GLI	(6) CGLI
GDP product	0.963***	0.0181***	0.0234***	0.597***	0.0156***	0.0266***
	(0.00247)	(0.000155)	(0.000260)	(0.00632)	(0.000298)	(0.000772)
Population product	-0.185***	-0.0103***	-0.0165***	-0.0263**	-0.0198***	-0.0334***
	(0.00261)	(0.000129)	(0.000265)	(0.0115)	(0.000541)	(0.00140)
Distance	-0.772***	-0.0263***	-0.0385***			
	(0.00549)	(0.000323)	(0.000558)			
Contiguity	0.454***	0.0375***	0.0409***			
	(0.0268)	(0.00201)	(0.00287)			
Common Language	0.603***	0.0144***	0.0325***			
	(0.0117)	(0.000516)	(0.00113)			
Landlocked	-0.395***	0.00405***	2.58e-05			
	(0.00939)	(0.000416)	(0.000870)			
PTA	0.336***	0.0344***	0.0338***	0.556***	0.0175***	0.0187***
	(0.0127)	(0.000795)	(0.00125)	(0.0144)	(0.000678)	(0.00175)
Bilateral Pair Dummies	No	No	No	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	133465	133465	133465	133465	133465	133465
R-squared	0.722	0.310	0.152	0.589	0.099	0.035
F-Test	7676***	382.1***	354.9***	4193***	321.5***	105.9***

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2. Trade Creating and Diverting Effects of Specific RTAs

Rather than lumping all PTAs together in one dummy variable it may be interesting to examine the impact of specific PTAs on trade and the structure of trade. This could, for example, provide insights into whether PTAs between rich countries produce greater trade creation effects or greater trade structure effects. To consider this we introduce dummies for each of the twelve PTAs considered by Eicher et al (2004) and examine the coefficients on the dummies for both total trade and the measures of IIT. The results are reported in Table 2. Once again the first three columns report the pooled results where no country effects are included, while the final three columns report results including bilateral-pair fixed effects.

The coefficients on the gravity determinants in Table 2 are largely as expected, with the exception of the landlocked variable, which becomes positive and significant for the two measures of IIT in Columns 2 and 3. In Column 1 we find positive trade creation effects for all 12 PTAs with the exception of EEA and NAFTA, for which we find negative and significant coefficients. The results in Column 4 are similar, though ANZCERTA now also shows a negative, albeit insignificant, coefficient. When considering the impacts of specific PTAs on IIT we again find positive and significant coefficients in the majority of cases, indicating that members of these PTAs engage in greater IIT between themselves. The two exceptions are AP and LAIA for which we often find evidence of a negative effect of PTA membership on IIT. The implication for these two PTAs is that the benefits in terms of trade of being a member of these PTAs arises due to increases in specialisation and inter-industry trade. When considering the level of IIT we find relatively large coefficients on the PTA dummy for ANZCERTA, NAFTA, the EU and MERCOSUR (see Columns 5 and 6). The first three of these agreements involve mainly high-income countries, while the latter one also involves countries at similar income levels, i.e. upper-middle income countries according to the World Development Report (2000). For trade volumes however, we tend to find the largest trade creating effects of PTAs to be for agreements between lesser-developed countries, e.g. LAIA, APEC, MERCOSUR and AP.

Table 2: Effects of Specific PTAs

VARIABLES	(1) Trade	(2) GLI	(3) CGLI	(4) Trade	(5) GLI	(6) CGLI
GDP product	0.964***	0.0154***	0.0207***	0.589***	0.0138***	0.0240***
	(0.00256)	(0.000150)	(0.000268)	(0.00641)	(0.000299)	(0.000779)
Population product	-0.183***	-0.00834***	-0.0146***	-0.0102	-0.0160***	-0.0284***
	(0.00265)	(0.000124)	(0.000270)	(0.0117)	(0.000544)	(0.00142)
Distance	-0.770***	-0.0209***	-0.0329***			
	(0.00560)	(0.000306)	(0.000565)			
Contiguity	0.480***	0.0399***	0.0446***			
	(0.0270)	(0.00174)	(0.00276)			
Common Language	0.585***	0.0169***	0.0353***			
	(0.0119)	(0.000506)	(0.00115)			
Landlocked	-0.389***	0.00448***	0.00123			
	(0.00941)	(0.000400)	(0.000867)			
ANZCERTA	0.581***	0.225***	0.162***	-0.368	0.165***	0.0984***
	(0.120)	(0.00927)	(0.0101)	(0.295)	(0.0137)	(0.0358)
APEC	1.245***	0.0534***	0.0834***	0.695***	0.0463***	0.0675***
	(0.0263)	(0.00250)	(0.00447)	(0.0320)	(0.00149)	(0.00389)
AP	0.320***	-0.0103***	-0.00347	0.414***	-0.00569	-0.0402***
	(0.0813)	(0.00266)	(0.00998)	(0.111)	(0.00515)	(0.0134)
AFTA	1.616***	0.0489***	0.0592***	0.382***	0.0274***	0.0469***
	(0.0609)	(0.00540)	(0.00771)	(0.0982)	(0.00457)	(0.0119)
CACM[16]	2.095***	0.151***	0.161***			
	(0.0606)	(0.00862)	(0.0113)			
CARICOM	3.674***	0.0844***	0.118***	0.313	0.0412***	0.0268
	(0.117)	(0.00767)	(0.0149)	(0.219)	(0.0102)	(0.0265)
EEA	-0.123***	0.00108	0.00319	-0.185***	0.00160	0.00759
	(0.0243)	(0.00490)	(0.00526)	(0.0407)	(0.00190)	(0.00495)
EFTA	0.501***	0.0860***	0.0571***	0.186***	0.000620	-0.00855
	(0.0348)	(0.00570)	(0.00606)	(0.0634)	(0.00295)	(0.00770)
EU	0.0739***	0.196***	0.199***	0.316***	0.0678***	0.0758***
	(0.0190)	(0.00377)	(0.00410)	(0.0455)	(0.00212)	(0.00553)
LAIA	-0.0472	-0.0253***	-0.0429***	0.736***	0.00325	-0.0277*
	(0.0306)	(0.00144)	(0.00272)	(0.119)	(0.00555)	(0.0145)
MERCOSUR	0.761***	0.0894***	0.105***	0.661***	0.101***	0.118***
	(0.170)	(0.0198)	(0.0224)	(0.169)	(0.00787)	(0.0205)
NAFTA	-0.764***	0.201***	0.183***	-0.0361	0.121***	0.132***
	(0.162)	(0.0139)	(0.0113)	(0.208)	(0.00970)	(0.0253)
Bilateral Pair Dummies	No	No	No	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.726	0.377	0.174	0.593	0.123	0.043
F-Test	8384***	484.7***	486.3***	2777***	268.0***	86.31***

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3. A Non-Linear Effect of PTAs on IIT?

As discussed above, we may expect a non-linear relationship between PTA membership and the extent of IIT between countries. In particular, we may expect – in line with the Linder hypothesis (Linder, 1961) – that a PTA between developed countries will increase the potential for IIT since their income levels and preferences will be similar. In addition, Rodas-Martini (1998) found that the effects of PTAs and IIT in less developing countries are insignificant. As such, we may expect that an interaction between the PTA dummy and a

[16] Note that we cannot estimate the coefficient for the trade creating effects of CACM in our sample when country-pair fixed effects are included. This is because the PTA was implemented prior to the start of the sample period implying that there is no variation in the dummy over time.

variable capturing the (logged) product of the two countries GDP per capita ($GDPPCPROD$) will be positive.

Globerman (1992) argues however that the formation of a PTA between a developed and a developing country may increase the potential for IIT. Globerman's explanation for this is that developing countries have suffered from high levels of industrial concentration and made scant use of economies of scale, such that developing countries would benefit from the powerful stimulus toward rationalization of production provided by free trade. Mexico, for example, has experienced a rapid increase in IIT since the late 1980s and has simultaneously had trade links with the Unites States following the implementation of various stages of the NAFTA agreement. As a result, the elimination of tariff barriers and Mexico's relatively low labour costs has led to the setting up of the '*maquiladora* ' in the border region, which are devoted to the assembly and re-export of goods. Among them, the scope for IIT in manufactured goods is much higher than other goods. If this hypothesis is correct we would expect there to be a positive coefficient on the interaction between the (logged) absolute difference in GDP per capita ($GDPPCDIF$) between two trade partners.

We re-estimate the regression models in Table 1 including these interaction terms. The results when including these interactions are reported in Table 3. The results for total trade indicate that the trade creating effects of PTAs are smaller for trade partners with a larger value of $GDPPCPROD$. As such, PTA formation between more developed countries has a lower trade creating effect than between either two developing countries or between a developed and a developing country. The coefficients on the interaction with $GDPPCDIF$ are positive when considering trade volumes, suggesting that the trade creating effects of PTA formation are greater when formed between a developed and a developing country, though our results do not show how such benefits are shared between the two countries. When considering our

indicators of IIT the coefficient on the PTA dummy is negative and significant, while that on the interaction with $GDPPCPROD$ is positive and significant, indicating that the formation of a PTA between two developed countries has a greater impact on the extent of IIT.[17] For the interaction with $GDPPCDIF$ the results are mixed, being negative and significant for the pooled results, but positive and significant when bilateral-pair fixed effects are included.[18]

Table 3: Non-Linear Effects – Pooled Results

VARIABLES	(1) Trade	(2) GLI	(3) CGLI	(4) Trade	(5) GLI	(6) CGLI
$GDP\ product$	0.976***	0.0150***	0.0203***	0.593***	0.0139***	0.0246***
	(0.00274)	(0.000149)	(0.000282)	(0.00641)	(0.000300)	(0.000779)
$Population\ product$	-0.198***	-0.00729***	-0.0135***	-0.00320	-0.0161***	-0.0292***
	(0.00288)	(0.000132)	(0.000290)	(0.0116)	(0.000544)	(0.00141)
$Distance$	-0.783***	-0.0236***	-0.0358***			
	(0.00558)	(0.000311)	(0.000562)			
$Contiguity$	0.455***	0.0369***	0.0404***			
	(0.0269)	(0.00181)	(0.00278)			
$Common\ Language$	0.601***	0.0148***	0.0330***			
	(0.0117)	(0.000502)	(0.00113)			
$Landlocked$	-0.390***	0.00271***	-0.00128			
	(0.00941)	(0.000399)	(0.000866)			
PTA	1.309***	-0.199***	-0.195***	1.207***	-0.103***	-0.0931***
	(0.0796)	(0.00562)	(0.00899)	(0.132)	(0.00618)	(0.0161)
$PTA \times GDPPCPROD$	-0.0929***	0.0229***	0.0224***	-0.0783***	0.00616***	0.00619***
	(0.00565)	(0.000535)	(0.000710)	(0.00826)	(0.000386)	(0.00100)
$PTA \times GDPPCDIF$	0.0647***	-0.0169***	-0.0164***	0.0733***	0.00399***	0.00391***
	(0.00829)	(0.000689)	(0.000980)	(0.0124)	(0.000580)	(0.00151)
Bilateral Pair Dummies	No	No	No	No	No	No
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.723	0.341	0.160	0.585	0.108	0.037
F-Test	7793***	447.9***	397.1***	3941***	338.6***	107.7***

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[17] The effect of a PTA on IIT becomes positive at a logged product of per capita GDP of around 13.5. The values of the product of the GDPs range between 7.75 and 21.36.

[18] It should be noted that the negative coefficients in Columns (2) and (3) on the interaction of the PTA dummy with *GDPPCDIF* become positive if the other interaction term is excluded. The sign of the coefficients on the interaction of the PTA dummy with *GDPPCPROD* are also positive and significant if the *GDPPCDIF* interaction is excluded, consistent with the results in Table 3. We choose not to report results when only one of the interaction terms is included for reasons of brevity.

5. Robustness

In this section we report the results from a number of robustness tests. In particular, we consider the results from Tobit regressions, which account for the fact that a large number of the observations on our measures of IIT are censored at either zero or one.

Table 4 reports the results from pooled Tobit regressions that include time dummies in the specification for the GLI and CGLI index (Columns 1-2), as well as random effects panel Tobit results (Columns 3-4). We don't report fixed effects panel Tobit results since there doesn't exist a fixed effects Tobit regression specification, as there does not exist a sufficient statistic allowing the fixed effects to be conditioned out of the likelihood. Honore (1992, 2008) has however developed a semi-parametric estimator for fixed effects Tobit regression models. To be consistent with the above tables however, we drop the time-invariant variables from the random effects specifications in Columns 3 and 4. The coefficients on the gravity determinants are largely consistent with those reported in Table 1, while the coefficients on the PTA dummies are again positive and significant, indicating a positive impact of PTA membership on IIT. If anything, the coefficients are slightly lower than those in Table 1.

Table 4: Initial Results – Tobit Regressions

VARIABLES	(1) GLI	(2) CGLI	(3) GLI	(4) CGLI
GDP product	0.0401***	0.0656***	0.0317***	0.0626***
	(0.000193)	(0.000434)	(0.000387)	(0.000939)
Population product	-0.0190***	-0.0334***	-0.0179***	-0.0371***
	(0.000186)	(0.000420)	(0.000451)	(0.00106)
Log Distance	-0.0489***	-0.0827***		
	(0.000402)	(0.000908)		
Contiguity	0.0393***	0.0459***		
	(0.00172)	(0.00392)		
Common Language	0.0427***	0.0908***		
	(0.000779)	(0.00176)		
Landlocked	-0.00202***	-0.0169***		
	(0.000734)	(0.00165)		
PTA	0.0369***	0.0326***	0.0332***	0.0491***
	(0.000976)	(0.00223)	(0.00111)	(0.00290)
Bilateral Pair Dummies	No	No	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes
Left censored	67427	67427	67427	67427
Right censored	4	853	4	853
Observations	133465	133465	133465	133465
Chi-squared	69557.3***	41138.5***	11795.8***	9831.5***

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 reports Tobit results when individual dummies for different PTAs are included. In the pooled results (Columns 1 and 2) we find evidence of a positive effect of PTA membership on IIT for all PTAs, with the effect usually being significant. The random effects results are somewhat different with negative and significant effects found for AP and in one case EEA. For AP therefore the results are consistent with those reported above. The major difference is that the negative effect of LAIA becomes positive when we account for censoring, while the previous positive effect of EEA is now negative. Once again the coefficients on the PTA variable tend to be relatively large for ANZCERTA, the EU, NAFTA and MERCOSUR, with relatively large coefficients also found for CACM and CARICOM.

Table 5: Effects of Specific PTAs – Tobit Regressions

VARIABLES	(1) GLI	(2) CGLI	(3) GLI	(4) CGLI
GDP product	0.0343***	0.0587***	0.0304***	0.0610***
	(0.000204)	(0.000453)	(0.000384)	(0.000940)
Population product	-0.0177***	-0.0336***	-0.0162***	-0.0351***
	(0.000197)	(0.000439)	(0.000444)	(0.00106)
ANZCERTA	0.263***	0.235***	0.178***	0.131**
	(0.0232)	(0.0519)	(0.0196)	(0.0528)
APEC	0.0738***	0.135***	0.0503***	0.0858***
	(0.00295)	(0.00662)	(0.00225)	(0.00605)
AP	0.0257***	0.0625***	-0.0158**	-0.0555***
	(0.00714)	(0.0159)	(0.00744)	(0.0197)
AFTA	0.148***	0.239***	0.0383***	0.0806***
	(0.00591)	(0.0132)	(0.00678)	(0.0180)
CACM	0.339***	0.501***	0.338***	0.545***
	(0.00741)	(0.0166)	(0.0204)	(0.0461)
CARICOM	0.242***	0.421***	0.0996***	0.192***
	(0.00967)	(0.0217)	(0.0128)	(0.0328)
EEA	0.00388	0.0115	-0.00821***	-0.00936
	(0.00400)	(0.00896)	(0.00276)	(0.00745)
EFTA	0.131***	0.129***	0.0136***	0.0133
	(0.00438)	(0.00985)	(0.00425)	(0.0114)
EU	0.234***	0.260***	0.0827***	0.105***
	(0.00299)	(0.00670)	(0.00302)	(0.00805)
LAIA	0.0508***	0.0954***	0.0352***	0.0751***
	(0.00266)	(0.00595)	(0.00641)	(0.0157)
MERCOSUR	0.145***	0.188***	0.0950***	0.118***
	(0.0157)	(0.0352)	(0.0113)	(0.0305)
NAFTA	0.216***	0.177***	0.119***	0.125***
	(0.0191)	(0.0427)	(0.0139)	(0.0376)
Bilateral Pair Dummies	No	No	No	No
Time Dummies	Yes	Yes	Yes	Yes
Left censored	67427	67427	67427	67427
Right censored	4	853	4	853
Chi^2	52343***	28797***	15808***	8477***

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Finally, we repeat the non-linear results using the Tobit specification, with the results reported in Table 6. The results on the interaction terms in Table 6 are consistent across specifications. As with the results in Table 3 we find a positive coefficient on the interaction with the product of the GDP's per capita ($GDPPCPROD$). The results again suggest therefore that the effects of PTA membership on IIT are strongest when the PTA is formed between two developed countries. The coefficients on the interaction between the PTA dummy and the difference in per capita GDPs are consistently negative, suggesting that the greater the difference in per

capita GDP ($GDPPCDIF$) between trade partners the lower the impact on IIT of the formation of a PTA between partners. The results suggest that forming a PTA between a developed and a developing country is likely to have a negative impact on the extent of IIT, a result against the hypothesis of Globerman (1992).[19]

Table 6: Non-Linear Results – Tobit Results

VARIABLES	(1) GLI	(2) CGLI	(3) GLI	(4) CGLI
GDP product	0.0374***	0.0645***	0.0301***	0.0611***
	(0.000206)	(0.000470)	(0.000394)	(0.000960)
Population product	-0.0166***	-0.0324***	-0.0161***	-0.0354***
	(0.000198)	(0.000452)	(0.000460)	(0.00109)
Distance	-0.0468***	-0.0819***		
	(0.000402)	(0.000917)		
Contiguity	0.0392***	0.0462***		
	(0.00171)	(0.00394)		
Common Language	0.0425***	0.0908***		
	(0.000769)	(0.00176)		
Landlocked	-0.00278***	-0.0173***		
	(0.000724)	(0.00164)		
PTA	-0.114***	-0.0376***	-0.0685***	-0.0479***
	(0.00599)	(0.0137)	(0.00606)	(0.0159)
$PTA \times GDPPCPROD$	0.0151***	0.00645***	0.00736***	0.00834***
	(0.000462)	(0.00106)	(0.000451)	(0.00119)
$PTA \times GDPPCDIF$	-0.0120***	-0.00435***	-0.00243***	-0.00493***
	(0.000649)	(0.00150)	(0.000642)	(0.00170)
Left censored	67427	67427	67427	67427
Right censored	4	853	4	853
Chi^2	70618***	41177***	14741***	8082***

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

6. Conclusions

Over the past two decades there has been a proliferation in the number of PTAs. Originally PTAs were formed between geographically close countries as well as countries with similar levels of income, but more recently PTAs have been agreed with more geographically diverse countries and countries at highly different levels of development. Empirical research over the

[19] When excluding the interaction with *GDPPCPROD*, the coefficients on the interaction with *GDPPCDIF* are found to be positive, though generally not significant. Excluding the *GDPPCDIF* interaction we find coefficients on the interaction with *GDPPCPROD* that are consistent with those in Table 6.

past fifteen years or so has shown that the effects of the formation of such PTAs has been to create trade between PTA members. The evidence on whether such PTAs divert trade from non-members to members of a PTA is more mixed, but some evidence at least exists to suggest that such effects may be present. What has largely been neglected in the empirical literature to date is the question of how such trade creation and diversion effects occur.

In this paper we add to the literature by examining for a large panel of countries the extent to which PTA membership affects the structure of trade, and in particular whether membership affects the extent of intra-industry trade. Our results suggest that the formation of a PTA is associated with an increase in IIT between PTA members. When considering individual PTAs we again find that with only a couple of exceptions the effect of PTA membership on IIT is positive. The cases in which a negative effect is found are for lower- and middle-income Latin American countries, while the largest positive effects tend to be found for PTAs between advanced, high-income countries. Our results also indicate the presence of non-linear effects in the relationship between PTA presence and IIT. In particular, we find that the impact of PTA presence on IIT is stronger when the two trade partners are developed countries. Much of the observed effect of PTAs on IIT would therefore seem to be driven by PTAs agreed between developed countries. When considering non-linearities due to differences in per capita GDPs the results are more mixed, but tend to suggest that the formation of a PTA between a developed and developing country has a negative effect on IIT.

The main results from the above analysis suggest that much of the trade creating effects of PTA formation are due to increased IIT. This conclusion has to be tempered somewhat, since this result seem to be driven by PTAs formed between developed countries (or at least between countries with similar income levels), with the effect on IIT for agreements between

dissimilar countries being negative. Future research in this area may consider examining in more detail the country-pairs that are likely to benefit in terms of trade creation and IIT from forming a PTA. Such factors may include the country's level of development, economic size and factor endowments.

References

Abrams, R.K., 1980. International trade flows under flexible exchange rates. *Federal Reserve Bank of Kansas City Economic Review*, 65(3), 3-10.

Aitken, N.D., 1973. The effect of the EEC and EFTA on European trade: A temporal cross-section analysis. *American Economic Review*, 5, 881-892.

Anderson, J. E. and E. van Wincoop, 2003. Gravity with gravitas: A solution to the border puzzle. *American Economic Review*, 93(1), 170-192.

Baier, S.L. and J.H. Bergstrand, 2002. On the endogeneity of international trade flows and free trade agreements. Mimeo.

Baier, S.L. and J.H. Bergstrand, 2004. Economic determinants of free trade agreements. *Journal of International Economics*, 64(1), 29-63.

Baier, S.L. and J.H. Bergstrand, 2005. Do free trade agreements actually increase members' international trade? Federal Reserve Bank of Atlanta Working Paper Series no. 2005-3.

Baier, S.L. and J.H. Bergstrand, 2007. Bonus Vetus OLS: A simple method for approximating international trade-cost effects using the gravity equation. Mimeo.

Baier, S.L. and J.H. Bergstrand, 2008. Estimating the effects of free trade agreements on trade flows using matching econometrics. Mimeo.

Baier, S.L., Bergstrand, J.H., Egger, P. and P.A. McLaughlin, 2008. Do economic integration agreements actually work? Issues in understanding the causes and consequences of the growth of regionalism. *World Economy*, 31(4), 461-497.

Baldwin, R. and D. Taglioni, 2006. Gravity for dummies and dummies for gravity equations. NBER Working Paper no. 12516, National Bureau of Economic Research.

Bayoumi, T. and B. Eichengreen, 1997. The generalized gravity equation, monopolistic competition and the factor proportions theory in international trade. *Review of Economics and Statistics*, 67(3), 474-481.

Bergstrand, J.H., 1985. The gravity equation in international trade: Some microeconomic foundations and empirical evidence. *Review of Economics and Statistics*, 71(1), 143-153.

Brada, J.C. and J.A. Mendez, 1983. Economic integration among developed, developing and centrally planned economies: A comparative analysis. *Review of Economics and Statistics*, 67(4), 549-556.

Caetano, J. and A. Galego, 2007. In search for the determinants of intra-industry trade within an enlarged Europe. *South-Eastern Europe Journal of Economics*, 2, 163-183.

Cheng, I-H. and H.J. Wall, 2002. Controlling for heterogeneity in gravity models of trade. Federal Reserve Bank of St. Louis Working Paper no. 1999-010C

Eicher, T., Henn, C and C. Papageorgiou, 2004. Trade creation and diversion revisited: Accounting for model uncertainty and natural trading partner effects. Mimeo.

Ekanayake, E.M., 2001. Determinants of intra-industry trade: The case of Mexico. *International Trade Journal*, 15(1), 89-111.

Egger, P., 2000. A note on the proper econometric specification of the gravity equation. *Economics Letters*, 66, 25-31.

Egger, H., Egger, P. and D. Greenaway, 2008. The trade structure effects of endogenous regional trade agreements. *Journal of International Economics*, 74(2), 278-298.

Endoh, M. 2005. The effects of the GSTP on trade flow: Mission accomplished? *Applied Economics*, 37(5), 487-496.

Feenstra, R.C., Lipsey, R.E., Deng, H., Ma, A.C. and H. Mo, 2005. World Trade Flows: 1962-2000. NBER Working Paper no. 11040, National Bureau of Economic Research.

Feenstra, R.C. and H.L. Kee, 2008. Export variety and country productivity: Estimating the monopolistic competition model with endogenous productivity. Journal of International Economics, 74(2), 500-514.

Felbermayr, G.J. and W. Kohler, 2006. Exploring the intensive and extensive margins of world trade. *Review of World Economics*, 142(4), 642-674.

Frankel, J., 1997. *Regional Trading Blocs in the World Economic System*. Institute for International Economics, Washington. DC.

Frankel, J., Stein, E. and S-J Wei, 1995. Trading blocs and the Americas: The natural, the unnatural, and the super-natural. *Journal of Development Economics*, 47, 61-95.

Frankel, J., Stein, E. and S-J Wei, 1996. Regional trading arrangements: Natural or Supernatural? *American Economic Review Papers and Proceedings*, 86(2), 52-56.

Gilbert, J., Scollay, R. and B. Bora, 2004. New regional trading developments in the Asia-Pacific region. In S. Yusuf, M. Altaf and K. Nabeshima (eds.), *Global Change and East Asian Policy Initiatives*. The World Bank, Oxford University Press.

Ghosh, S. and S. Yamarik, 2006. Are regional trading arrangements trade creating? An application of extreme bounds analysis. *Journal of International Economics*, 63(2), 369-395.

Glick, R. and A. K. Rose, 2002. Does a currency union affect trade? The time-series evidence. *European Economic Review*, 46, 1125-1151.

Globerman, S., 1992. North American Trade Liberalization and Intraindustry Trade. *Weltwirtschaftliches Archiv*, 128, 487-497.

Goldberg, P.K., Khandelwal, A.K., Pavcnik, N. and P. Topalova, 2008a. Multiproduct firms and product turnover in the developing world: Evidence from India. NBER Working Paper no. 14127.

Goldberg, P.K., Khandelwal, A.K., Pavcnik, N. and P. Topalova, 2008b. Imported intermediate inputs and domestic product growth: Evidence from India. NBER Working Paper no. 14416.

Goldberg, P.K., Khandelwal, A.K., Pavcnik, N. and P. Topalova, 2009. Trade liberalization and new imported inputs. *American Economic Review*, 99(2), 494-500.

Grubel, H.G. and P.J. Lloyd, 1971. The empirical measurement of intra-industry trade. *Economic Record*, 47, 494-517.

Grubel, H.G. and P.J. Lloyd, 1975. *Intra-industry trade: The theory and measurement of international trade in differentiated products*. London, Macmillan.

Honore, B., 1992. Trimmed LAD and least squares estimation of truncated and censored regression models with fixed effects. *Econometrica*, 60(3), 533-565.

Honore, B., 2008. On marginal effects in semiparametric censored regression models. Working Paper, Princeton University.

Kim, C-S. and K-E. Lee, 2003. Regional trade arrangements and intra-industry trade: The case of Mercosur. *Asian Journal of Latin American Studies*, 16(1), 95-113.

Krugman, P., 1991a. Is bilateralism bad? In E. Helpman and A. Razin (eds.), *International Trade and Trade Policy*. The MIT Press, Cambridge, MA.

Krugman, P., 1991b. The move towards free trade zones. In *Policy Implications of Trade and Currency Zones*, A symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, WY.

Linder, S.B., 1961. *An essay on trade and transformation*. Stockholm, Almqvist and Wicksell.

Magee, C., 2003. Endogenous preferential trade agreements: An empirical analysis. *Contributions to Economic Analysis and Policy*, 2(1), Berkeley Electronic Press.

Martincus, C.V. and V. Estevadeordal, 2009. Trade policy and specialization in developing countries. *Review of World Economics*, 145, 251-275.

Matyas, L., 1997. Proper econometric specification of the gravity equation. *World Economy*, 20(3), 363-368.

Rodas-Martini, P., 1998. Intra-industry trade and revealed comparative advantage in the Central American Common Market. *World Development*, 26(2), 337-344.

Sala-i-Martin, X., 1997. I just ran two million regressions, *American Economic Association Papers and Proceedings*, 87, 178-183.

Schiff, M., 1996. Small is beautiful: Preferential trade agreements and the impact of country size, market share, efficiency, and trade policy. Policy Research Working Paper no. 1668, The World Bank.

Tinbergen, J., 1962. *Shaping the World Economy*. New York, The Twentieth Century Fund.

Urata, S. and M. Okabe, 2007. The impacts of free trade agreements on trade flows: An application of the gravity model approach. RIETE Discussion Paper Series 07-E-052.

World Bank, 2000. *World Development Report 2000*. World Bank, Washington DC.

World Bank, 2008. *World Development Indicators 2008*. World Bank, Washington DC.