Border Effects of the Atlantic Triangle*

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Very preliminary and incomplete. Not for ANY quotation.

Abstract

We investigate trade integration between countries of the Atlantic triangle (members of the EU, NAFTA, MERCOSUR and the ANDEAN pact). The paper evaluates the ease of access to each of those markets from each other based on a benchmark consisting of trade within countries. This methodology, often labelled border effects, furnishes a new tool for the estimation of regional integration and market access in general. This is used here in particular to assess the access to Northern markets of Southern producers, a very sensitive question in the prospect of the new WTO round negotiations. We concentrate on the evaluation of access of certain MERCOSUR countries' exporters (Brazil, Argentina and Uruguay), to the EU and NAFTA markets. Building on those estimates, prospects can be made about possible future schemes of integration between MERCOSUR countries and the two large industrialized and integrated zones of the Atlantic. We evaluate in particular the possible trade effects of free trade agreements between MERCOSUR and the EU and MERCOSUR and NAFTA respectively. We explore finally some possible explanations of border effects like tariffs and bilateral FDI stocks.

JEL classification: F12, F15
Keywords: Border effects, Gravity.

*This paper is in an extremely "raw" version and is part of a more general CEPII project of evaluation of market access in industrial goods, as such it currently incorporates parts of related working papers by the same authors.

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1 Introduction

The proliferation of new regional trading arrangements and deepening of existing integration experiences is probably one of the main phenomenon that has characterized the global trade environment during the last decade. The most important manifestations of this trend have been the formation of NAFTA and MERCOSUR at the beginning of the nineties, almost in conjunction with the end of a major integration phase in Western Europe (the Single Market Programme achieved in 1993) and the enlargement of the EU to three new member countries in 1995.

Those three groups of countries enjoy relatively free movement of goods (with nevertheless important differences in the degree of trade integration) inside each group, while maintaining non-negligible barriers to trade between themselves. As the recent experience of the multilateral trade negotiations in Cancun has shown, those three groups are key players in trade liberalization talks, with sometimes conflicting interests. Those events might even be interpreted as a confirmation of fears expressed by part of the economists that the multiplication of regional arrangements would result in the formation of regional "blocks", deepening their internal integration, while making global trade talks increasingly difficult and slow.

This paper will mostly try to give a rigorous description of the level of integration within and between each of the three"blocks" (the EU, MERCOSUR and NAFTA) of the *Atlantic Triangle*, an expression sometimes used to refer to the common geographic feature of access to the Atlantic Ocean. The paper evaluates the ease of access to each of those markets from each other based on a benchmark consisting of trade within countries. This methodology, often labelled border effects, furnishes a new tool for the estimation of regional integration and market access in general. This is used here in particular to assess the access to Northern markets of Southern producers (MERCOSUR exporters' access to NAFTA and EU markets here), a very sensitive question in the prospect of the new WTO round negotiations.

Three important trade liberalization negotiations are entering into a new and crucial phase for the MERCOSUR: The European Union-MERCOSUR Association Agreement, the Free Trade Area of the Americas (FTAA) and the Doha Round of the WTO. This paper is part of a larger literature attempting to provide negotiators with formal tools of analysis. It completes in particular a literature trying to assess trade effects of "North-South" free trade agreements between MERCOSUR and the EU and MERCOSUR and NAFTA:

Most of the studies based on computable general equilibrium models show that in the area of trade in goods, simultaneous preferential trade negotiations have the potential to provide significant market access gains, as a result of the fact that the structure of protection in the US and the EU is strongly biased against sectors and products where the MERCOSUR countries have clear comparative advantages (see for instance Lacunza et al., 2003, for the effects on Mercosur of the FTTA and the EU agreement,

Bouët et al. (2003) for the costs of the FTAA for the European Union with and without an agreement with Mercosur, Bchir et al. (2003) for the consequences of a free-trade aggrement between EU and Mercosur considering the possibility of FTAA, or Flôres (2003) for the costs and opportunities of different scenarios for Brazil). Clearly, a large determinant of the size and sharing of potential benefits from the prospective agreements depend upon the degree of inclusion of agricultural products in the negotiations. We will here however focus on market access measurement for manufacturing industries. This is a sensitive and important topic on several grounds. It relates in particular to the traditional arguments about the necessary protection of infant industrie in developing countries. Because of EU apparent competitive position in those countries (Castilho, 2003, shows that the EU accounts for around 28% of MERCOSUR's imports despite MERCOSUR's high protection in manufactured goods), the agreement can be thought to represent an important threat to local production. We will here try to provide a detailed empirical account of what is the measured market access for different industries in those North-South trade relationships.

2 Measuring international market openness with border effects.

2.1 Why study the impact of borders on trade flows?

The *international* trade flows are not sufficient to gauge international markets integration. This statement is based on the simple idea that *two countries could be considered perfectly integrated if the national border separating them had no specific impact on where consumers choose to source their purchases and where producers can sell their output.* In fact, in Europe, this is best summarized as the whole idea of the *Single* Market, which explicitly states its goal to be the abolition of the economic significance of national borders. A recent official document (European Commission, 2003) of the European Commission is extremely clear about this in its title: *The Internal Market – Ten Years Without Frontiers.*

The measure of the degree of international fragmentation of market is therefore by nature linked to the assessment of the impact of national borders. In order to make that assessment, one needs to consider international trade flows of course but also flows of goods *inside* each country and see how they compare. To do this comparison, a model of bilateral trade flows is need to describe what a "normal" trade flow should be. The *gravity equation* is the ideal candidate for this role thanks to its old empirical success in describing bilateral trade volumes. This methodology of adding intra-national trade flows to a classical trade equation in order to measure the impact of national borders was the motivation behind the seminal work of McCallum (1995) soon followed by the application and extension of the framework by Wei (1996) for the cases where trade flows between sub-national regions are missing. Indeed, even in the absence of flows between sub-national regions, you can still measure the *total* volume of trade occurring

within a country. This is simply equal to the overall production of the country minus its total exports, which gives the total value of goods shipped from a country to its own consumers. This observation can then be inserted in a bilateral trade equation, together with all the international flows. This is the way we proceed here.

The border effects methodology has important advantages in the study of *regional integration*:

- First, it offers a *better benchmark* of integration than the traditional gravity equation framework. The existing literature seeks to find a positive deviation of internal EU trade compared to a benchmark, which is usually trade among OECD countries. It seems however far more reasonable to inverse the logic and look for negative deviations from what would be a perfectly integrated zone: A nation.

- For a lot of issues, the border effect measure is also a useful methodology because it captures *all* impediments to trade related to the existence of the national borders, through their impact on trade flows. Most of those impediments are hard to measure individually, (one only needs to consider the poverty of available statistics on NTBs even inside the EC at the launching of the SMP), and the global image is therefore useful. Related is the fact that if impediments rise because of deliberate trade policy changes, there will usually be a strong will of countries to hide this behavior by using sophisticated NTB schemes[1] that are very hard to detect for the economist.

- Border effects are more informative in the study of the evolution of trade barriers. In a traditional gravity equation, using for instance a dummy variable for trade taking place inside the EU, how should we interpret a rise in the coefficient on this dummy variable? Using the traditional Vinerian interpretation of regional integration, this rise can first come from consumers in EU countries substituting domestic goods in favor of foreign (EU-origin) goods (*trade creation*). The rise can however also come from substitution among imported goods, in favor of EU producers and reducing imports from third countries (*trade diversion*). The gravity equation in its most traditional form (and even in more elaborated forms like Fukao et al., 2003, recent paper) find it hard to differentiate among the two causes, whereas border effects methodology enables to track a potential fall in the surplus of trade taking place inside countries, and therefore separate trade creation from trade diversion effect. John Romalis (2002) provides an intermediate approach, where a bilateral trade equation of US imports is first run, and US imports from self are then used to compute trade diversion effects of NAFTA and CUSFTA.

[1]Not least because all rules of multilateral agreements signed by countries belonging to RIAs stipulate that regional blocks should not raise their external level of protection.

2.2 The model and estimable equation

We will work here mostly with various forms of gravity-type equations. There are several theoretical foundations to this type of empirical construct. A theoretical prediction of the gravity type will arise in virtually all trade models with complete specialization, as Evenett and Keller (2002) show. Feenstra (2003) provides a very complete description of the link between the gravity equation and bilateral trade patterns in a monopolistic competition framework. We use here a specific form of this model: The Krugman (1980) model of monopolistic competition and trade in an N-country setting, which yield very simple estimable predictions for trade volumes directly extracted from theory.

Suppose that consumers in country i have a two-level utility function where the upper level is Cobb-Douglas with expenditure parameter μ_i, thus giving rise to fixed expenditure shares out of income, Y_i. The lower level utility function is a constant elasticity of substitution (CES) aggregate of differentiated varieties produced in the considered industry, with σ representing an inverse index of product differentiation.

$$U_i = \left(\sum_{j=1}^{N} \sum_{h=1}^{n_j} (a_{ij} c_{ijh})^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}.$$

As is well know, the CES structure implies a love for variety, with consumers willing to consume all available varieties. We will work here with a version where individuals can have different preferences over varieties depending on their place of production, allowing in particular for home bias. This preference parameter of consumers in i for varieties produced in j is denoted a_{ij}.

Some of those varieties being produced in foreign countries, we need to model trade costs, τ_{ij} supposed to be *ad valorem*, and incurred by the consumer when the good is shipped from country j to country i. The delivered price p_{ij} faced by consumers in i for products from j is therefore the product of the mill price p_j and the trade cost. Trade costs include all transaction costs associated with moving goods across space and national borders.

Denoting c_{ij}, the demand for a representative variety produced in j, the demand function derived from this system gives the bilateral total imports by country i from country j for a given industry:

$$m_{ij} = n_j p_{ij} c_{ij} = n_j a_{ij}^{\sigma-1} p_j^{1-\sigma} \tau_{ij}^{1-\sigma} \mu_i Y_i P_i^{\sigma-1}, \tag{1}$$

where $P_i = (\sum_k n_k a_{ik}^{\sigma-1} p_k^{1-\sigma} \tau_{ik}^{1-\sigma})^{1/(1-\sigma)}$ is the "price index" in each location.

We can see from (1) that trade costs influence demand more when there is a high elasticity of substitution, σ. Let us follow Baldwin et al. (2003) and denote $\phi_{ij} \equiv \tau_{ij}^{1-\sigma}$, as the "phi-ness" of trade. This parameter will be a composite index of the degree of bilateral openness between two countries. [2]

[2] As such, it can be used to evaluate the differences in terms of bilateral openness between two

If we take the ratio of m_{ij} over m_{ii}, the region i's imports from itself, the $\mu_i Y_i P_i^{\sigma-1}$ term drops and we are left with relative numbers of firms, relative preferences, and relative costs in i and j:

$$\frac{m_{ij}}{m_{ii}} = \left(\frac{n_j}{n_i}\right)\left(\frac{a_{ij}}{a_{ii}}\right)^{\sigma-1}\left(\frac{p_j}{p_i}\right)^{1-\sigma}\left(\frac{\phi_{ij}}{\phi_{ii}}\right). \tag{2}$$

To estimate (2), we need to specify more fully the model. The first step is to use to supply side characteristics of the monopolistic competition model. Firms producing q_j in country j employ l_j workers in an IRS production function $l_j = F + \gamma q_j$, where F is a fixed (labour) costs, and γ the inverse productivity of firms. Profits are $\pi_j = p_j q_j - w_j(F+\gamma q_j)$, with w_j the wage rate in j. The Dixit-Stiglitz behavior of profit maximizing firms yields the well-known fixed markup over marginal costs ($p_j = \frac{\sigma}{\sigma-1}\gamma w_j$), which gives us a first result to be used in equation (2):

$$\frac{p_j}{p_i} = \frac{w_j}{w_i}.$$

Using the pricing equation, together with the free entry condition, we get the equilibrium output of each representative firm, $q_j = \frac{F(\sigma-1)}{\gamma}$. With identical technologies, $q_j \equiv q,\ \forall j = 1..N$. Noting v_j the value of production for the considered industry in j, $v_j = q p_j n_j$, and we get the second substitution to be made in equation (2):

$$\frac{n_j}{n_i} = \frac{v_j}{v_i}\frac{w_i}{w_j}.$$

Finally, functional forms for trade costs (τ_{ij}) and preferences (a_{ij}) have to be specified in order to get an estimable equation.

- Trade costs are a function of distance (d_{ij}, which proxies for transport costs) and "borders-related costs", which in the more general case can consist of tariffs or broadly defined Non Tariff Barriers (quantitative restrictions, administrative burden, sanitary measures...). We note the ad valorem equivalent of all borders-related costs brc_{ij}:

  $$\tau_{ij} \equiv d_{ij}^{\delta}(1 + \text{brc}_{ij}).$$

  We assume the following structure for border-related costs, which vary across country pair and depend on the *direction* of the flow for a given pair: $1 + \text{brc}_{ij} \equiv (1 + t_{ij})(\exp[\eta E_{ij} + \theta \text{RIA}_{ij} + \varphi F_{ij} + \psi G_{ij}])$. In this specification, t_{ij} denotes the ad valorem bilateral tariff, RIA_{ij} is a dummy variable set equal to 1 when $i(\neq j)$ and j belongs to a regional integration agreement. F_{ij} is a dummy variable set equal to 1 when $i(\neq j)$ belongs to the RIA and j does not belong to RIA. G_{ij}

countries that belong to a regional trade agreement and countries that do not.

is a dummy variable set equal to 1 when $j(\neq i)$ belongs to the RIA and i does not belong to the RIA. E_{ij} is a dummy variable set to one when none of the partners belong to the arrangement. All parameters are expected to be positive, denoting tariff equivalent of non tariff barriers to trade with the following ordering: $\eta > \varphi \approx \psi > \theta > 0$. This means that it is expected (as was found in the previous literature) that all national borders impose transaction costs, the minimum burden of those costs being between RIA members.

- Preferences have a random component e_{ij}, and a systematic preference component for goods produced in the home country, β. Sharing a common language is assumed to mitigate this *home bias*.

$$a_{ij} \equiv \exp[e_{ij} - (\beta - \lambda L_{ij})(E_{ij} + \mathrm{RIA}_{ij} + F_{ij} + G_{ij})].$$

L_{ij} is set equal to one when two different countries share the same language. When L_{ij} switches from 0 to 1, home bias changes from β to $\beta - \lambda$.

We obtain an estimable equation from the monopolistic Krugman (1980) competition equation with home bias. In its more general form, the estimated equation in the next sections will be:

$$\begin{aligned} \ln\left(\frac{m_{ij}}{m_{ii}}\right) &= -(\sigma-1)[\beta+\eta] + \ln\left(\frac{v_j}{v_i}\right) - \sigma \ln\left(\frac{w_j}{w_i}\right) \\ &\quad -(\sigma-1)\ln(1+t_{ij}) - (\sigma-1)\delta \ln\left(\frac{d_{ij}}{d_{ii}}\right) + (\sigma-1)\lambda L_{ij} \\ &\quad -(\sigma-1)[\theta-\eta]\mathrm{RIA}_{ij} - (\sigma-1)[\varphi-\eta]F_{ij} - (\sigma-1)[\psi-\eta]G_{ij} + \epsilon_{ij} \quad (3) \end{aligned}$$

with $\epsilon_{ij} = (\sigma-1)(e_{ij} - e_{ii})$.

The constant of this regression ($-(\sigma-1)[\beta+\eta]$) gives the border effect of international trade for countries that are not part of an RIA in the sample considered. It includes both the level of protection of the importing country (η) and the home bias of consumers (β). The coefficient on RIA_{ij} gives the additional volume of trade generated by the agreement, keeping constant the other characteristics of the member countries. Adding this coefficient to the constant and taking the antilog of the sum, we get the level of the border effect inside the RIA, which consists of both home bias (β) and remaining trade costs (θ). The coefficient on F_{ij} indicates the additional difficulty for third countries in their access to the RIA market. Symmetrically, G_{ij} indicates the additional difficulty when the member countries exporter wants to sell its product outside the RIA. There will be several versions of (3) estimated below, some of which imposing the constraint that the coefficient on relative production should be unitary, some considering reciprocity issues and some considering explanatory factors for market access difficulties. We also present results with and without tariffs in the regression, to provide a view of the part of the border effect they can explain alone. No paper (to

date) incorporates the level of bilateral tariffs in border effects' equations. It is clear from equation (3), that omitting the $\ln(1 + t_{ij})$ term will result in the "missing trade" (caused in reality by tariffs) to be attributed to the impact of crossing national borders (the ones where there are tariffs implemented).

2.3 Data requirements

We estimate equation (3) in order to capture border effects characterizing each of the possible bilateral combinations of trade partners in the Atlantic Triangle.

The needed data involves primarily bilateral trade and production figures in a compatible industry classification. Those come from the Trade and Production 1976-1999 database made available by Alessandro Nicita and Marcelo Olarreaga at the World Bank, which compiles this data for 67 developing and developed countries at the ISIC rev2 3 digit industry level over the period 1976-1999. The original data comes principally from United Nations sources, the COMTRADE database for trade and UNIDO industrial statistics for the production. The World Bank files have a lot of missing values for production figures in recent years. We have largely extended the database on this aspect using more recent versions of the UNIDO CD-ROM together with OECD STAN data for OECD members. We end up with rather complete data in our sample for 26 ISIC 3-digit industries.

Relative prices are captured though a price level of GDP expressed relative to the United States. The data comes from the Penn World Tables v.6.1.

As can be seen in equation (3), we need measures of distances between *and within* countries for the countries in the sample. Two potential problems arise:

- How to define internal distances of countries?
- How to make internal distances construction consistent with international distances calculations?

The second question is in fact crucial for obtaining a correct estimate of the border effect. Take the example of trade between the United Kingdom and Italy. The GDPs of the two countries being quite comparable, this will not affect much the ratio of own to international trade. The first reason why UK and Italy might trade more with themselves than with each other is that the average distance (and therefore transport costs) between a domestic producer and a domestic consumer is much lower than between a foreign producer and a domestic consumer. Suppose now that for some reason, one mis-measures the relative distances and thinks distance from Italy to Italy is the same as distance from UK to Italy. Then the observed surplus of internal trade in Italy with respect to the UK-Italy flow cannot be explained by differences in distances and has to

Table 1: Tariffs in the AT (1999)

	EU			MERCOSUR			NAFTA		
Industry	eu	ms	nt	eu	ms	nt	eu	ms	nt
Apparel	0.00	11.26	11.82	19.84	3.33	19.84	22.05	21.74	3.64
Beverages	0.00	1.04	9.90	18.69	2.56	18.69	16.99	13.23	4.84
Food	0.00	6.84	10.22	12.70	1.41	12.70	16.38	15.05	7.18
Footwear	0.00	8.60	10.60	23.15	6.29	23.15	20.92	20.73	4.50
Furniture	0.00	1.43	1.63	13.99	1.51	13.99	10.79	9.10	1.51
Glass	0.00	4.76	5.17	12.97	1.14	12.97	9.04	7.70	1.98
Ind. Chem.	0.00	3.69	4.85	8.84	0.49	8.84	5.75	4.16	0.74
Iron/steel	0.00	2.16	2.64	10.85	0.78	10.85	5.52	5.19	1.90
Leather	0.00	2.78	4.42	15.51	2.00	15.51	13.06	11.73	2.80
Mach elec	0.00	2.01	2.58	10.91	2.07	10.91	5.68	4.90	0.71
Machines	0.00	1.00	1.14	8.47	2.26	8.47	4.69	4.18	0.57
Metal prod	0.00	2.00	2.39	16.64	2.23	16.64	8.39	7.19	1.53
Misc	0.00	2.33	2.62	16.01	1.58	16.01	8.02	6.97	1.31
Nf metals	0.00	2.32	2.48	6.17	0.15	6.17	3.95	3.45	0.57
Non-metal	0.00	2.04	2.22	9.13	0.46	9.13	8.27	6.99	1.16
Oth Chem.	0.00	1.27	2.09	10.60	0.93	10.60	6.01	4.90	1.28
Paper	0.00	1.85	2.92	11.12	0.90	11.12	4.44	3.98	1.15
Petroleum	0.00	2.26	2.45	2.23	0.12	2.23	6.35	4.08	1.18
Plastic	0.00	3.87	6.85	16.01	1.74	16.01	9.87	7.39	2.61
Pottery	0.00	6.34	6.83	17.17	1.72	17.17	12.38	9.67	1.45
Printing	0.00	1.41	1.52	8.49	1.03	8.49	4.50	3.82	0.14
Prof/Sci	0.00	1.35	1.73	11.79	1.88	11.79	6.06	5.26	0.53
Rubber	0.00	2.88	2.97	12.37	1.34	12.37	8.44	7.66	1.15
Textiles	0.00	8.98	9.46	17.77	2.34	17.77	16.50	16.08	2.85
Tobacco	0.00	35.32	51.69	19.72	4.10	19.72	112.83	30.41	8.56
Transport	0.00	6.41	6.51	15.35	5.92	15.35	8.28	7.84	1.35
Wood	0.00	1.72	1.82	8.62	0.47	8.62	6.65	6.10	1.75

be captured by the only remaining impediment to trade in the equation, the border effect. Any overestimate of the internal / external distance ratio will yield to a mechanic upward bias in the border effect estimate.

CEPII has developed a new database of internal and external distances (available at http://www.cepii.fr/anglaisgraph/bdd/distances.htm), which uses city-level data in the calculation of the distance matrix to assess the geographic distribution of population inside each nation. The basic idea is to calculate distance between two countries based on bilateral distances between cities weighted by the share of the city in the overall country's population. This procedure can be used in a totally consistent way for both internal and international distances, which solves the problems highlighted above. The database also contains the contiguity and common language variables used here, which have been taken from Jon Haveman original data,[3] and extended to cover more countries and deal with countries that have multiple official languages.

Tariffs can be measured at the bilateral level and for each product of the HS6 nomenclature in the TRAINS database from UNCTAD. We base our investigation on a rather crude measurement[4] of tariffs, namely considering weighted averages of MFN tariffs among the partners.

Those tariffs are aggregated from original TRAINS data in order to match our ISIC rev2 industry classification using the world imports as weights for HS6 products, an extract of the data for 1999 is shown in Table 1. Even in manufactured goods, tariffs between industrialized countries are not negligible and (important for our empirical work below) vary quite substantially across industries and countries combinations.

3 The impact of regional agreements in the Atlantic Triangle

The Atlantic Triangle is the host of numerous regional trade agreements, with different levels if formal integration, history and duration. Our objective in this section, is to compare the impact of those agreements between themselves and also with a large scale agreement of the Pacific Ocean, ASEAN. To investigate this issue, we run regressions for different periods over the whole time frame, with dummy variables capturing the lower (or higher) impact of borders on trade inside each RIA, and thus characterizing the extent of integration of the zone, compared to trade taking place in the rest of the sample.[5] We identify five actual RIAs (EU, NAFTA, MERCOSUR, ASEAN, ANDEAN PACT).

[3] http://www.macalester.edu/research/economics/PAGE/HAVEMAN/Trade.Resources/TradeData.html#Gravity

[4] As compared for instance with datasets that take into account the complex system of bilateral preferences across countries in the world at a detailed product level. This type of data however lacks any consistent time coverage which is important to keep here.

[5] The remaining trade flows are taking place between the RIAs but also with and between countries from the rest of the world.

Figure 1: Border effects over time in large RIAs – 1

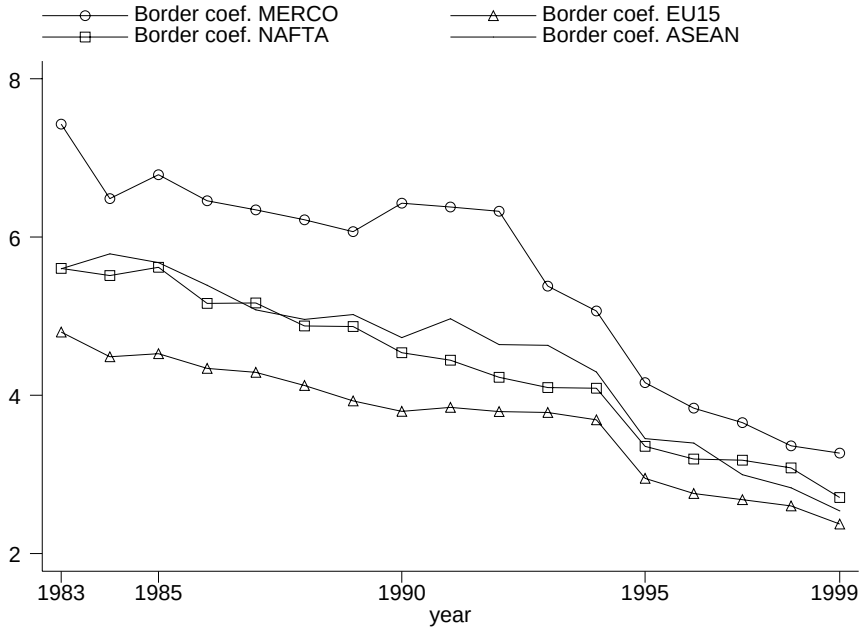


Figure 2: Border effects over time in large RIAs – 2

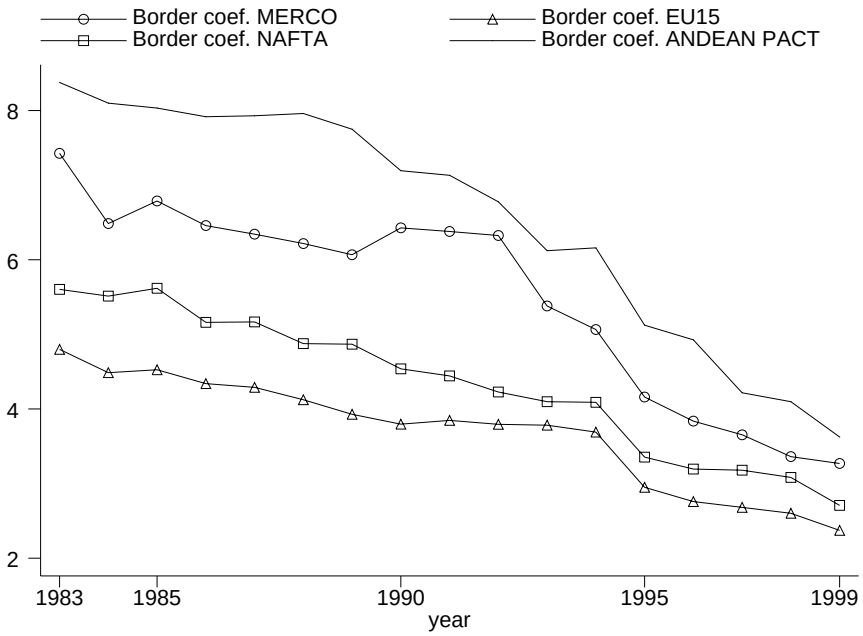


Table 2: Border effects among the large integrating regions

	Dep. Var:Ln Imports Partner/Own		
Model :	83-89	90-94	95-99
Border	-6.80[a]	-6.31[a]	-4.34[a]
	(0.38)	(0.30)	(0.52)
Rel. Production	0.73[a]	0.74[a]	0.84[a]
	(0.03)	(0.03)	(0.03)
Rel. Wages	-0.14[a]	-0.14[a]	-0.24[a]
	(0.04)	(0.04)	(0.05)
Rel.Distance	-0.39[a]	-0.50[a]	-0.95[a]
	(0.11)	(0.08)	(0.15)
Contiguity	1.19[a]	1.25[a]	0.90[a]
	(0.23)	(0.19)	(0.25)
Common Language	0.52[a]	0.48[a]	0.43[b]
	(0.16)	(0.16)	(0.18)
MERCO	0.27	0.67	0.65
	(0.25)	(0.42)	(0.49)
EU15	2.45[a]	2.52[a]	1.66[a]
	(0.22)	(0.20)	(0.24)
NAFTA	1.55[a]	2.02[a]	1.24[a]
	(0.50)	(0.29)	(0.37)
ASEAN	1.43[a]	1.65[a]	1.21[b]
	(0.40)	(0.26)	(0.49)
ANDEAN PACT	-1.21[a]	-0.44[b]	-0.32
	(0.22)	(0.20)	(0.27)
N	279898	221292	284927
R^2	0.44	0.445	0.461
RMSE	2.713	2.677	2.788

Note: Standard errors in parentheses: [a], [b] and [c] represent respectively statistical significance at the 1%, 5% and 10% levels. The reported standard errors take into account the correlation of the error terms for a given importer.

The European Union is undoubtedly the largest experiment of regional integration in the recent period, characterized by a long term commitment of member countries to achieve *wide-range integration*. EU will be here EU15 over the whole period.

MERCOSUR is a customs union signed in 1991 between Brazil, Argentina, Paraguay and Uruguay but implemented in 1995, with member countries substantially liberalizing their internal trade during the transition period. The CET concerned 85% of tariff lines in 1995 and a schedule for convergence towards complete CET and free trade was then agreed upon but significantly disturbed by the macroeconomic problems in Brazil and Argentina.

NAFTA is a free trade agreement that entered into force between the USA, Canada and Mexico in January 1994. Tariff reductions among member countries were scheduled on a 10/15 years agenda.

ASEAN has been officially a free trade agreement between Indonesia, Malaysia, Singapore, Thailand and the Philippines since 1977, but intrabloc trade liberalization was really implemented on a large scale starting with AFTA in 1992 (Soloaga and Winters, 2001).

ANDEAN PACT is a rather old regional trade agreement, but is usually seen as having been less effective in true reductions of the level of protection in those countries.

Table 3 gives results for three different time periods such that we can see the evolution of coefficients over time. Note first that the level of border effects in this global matrix of trade flows is very high: Two countries that do not belong to one of the RIA trade on average 77 times less between themselves than within themselves in 1995-1999. The trend is however clearly one of falling importance of borders over time, which is consistent with a move towards a global integration of industrial products' markets, even outside regional agreements.

For the most recent period, there seems to be a clear ranking of integration with EU countries being the most integrated zone followed by NAFTA and ASEAN. MERCOSUR never seems to exert a significant effect on trade flows. The timing of the NAFTA effect is also insightful. The mid eighties witness the start of a rather sharp increase in the surplus of trade flows inside NAFTA. This seems to correspond to a widely known sequence of trade liberalization in the zone: Mexico unilaterally liberalized trade in 1985, the United States and Canada signed their free trade agreement in 1989, with NAFTA becoming effective in January 1994. Those results point to expected and reasonable estimates of the effect of trading arrangements, somehow more reassuring than Soloaga and Winters (2001) for instance who find an overall *negative* and signigicant impact of EU membership, no significant impact for NAFTA or ASEAN and an extremely important positive impact of MERCOSUR, roughly constant since 1980. ASEAN is found here to have a sizeable impact on trade volumes, that is growing over time, the order of magnitude of the effect is comparable to what is found in Frankel (1997) and points to the dynamism of international trade in the region.

Figure 1 and 2 graphs the evolution of border effects coefficients inside each of

Table 3: Border effects among the large integrating regions - Oceans Dummies

	Dep. Var: Ln Imports Partner/Own
Model :	(1)
Border	-4.14[a]
	(0.53)
Rel. Production	0.83[a]
	(0.03)
Rel. Prices	-0.54[a]
	(0.09)
Rel.Distance	-1.03[a]
	(0.15)
Contiguity	0.87[a]
	(0.26)
Common Language	0.45[b]
	(0.18)
MERCO	0.60
	(0.54)
EU15	1.59[a]
	(0.24)
NAFTA	1.11[a]
	(0.37)
ASEAN	1.15[b]
	(0.52)
ANDEAN PACT	-0.39
	(0.28)
Trans-Atlantic	0.30[c]
	(0.18)
Trans-Pacific	-0.08
	(0.23)
N	329243
R^2	0.464
RMSE	2.792

Note: Standard errors in parentheses: [a], [b] and [c] represent respectively statistical significance at the 1%, 5% and 10% levels. The reported standard errors take into account the correlation of the error terms for a given importer.

the actual RIA (equal to minus the sum of the border coefficient and the coefficient on the RIA). This representation offers a richer picture of how market fragmentation is receding in each of those regional arrangements. A striking characteristic is the apparent convergence in the absolute level of integration of the EU, NAFTA and ASEAN. The EU starts far more integrated than the other two zones, but those gradually catch up and end up very close to the level of EU integration in the latest years. The evolution of MERCOSUR and ANDEAN PACT reveals a downward trend of internal fragmentation that needs to be confirmed, and seems to follow the more general evolution of border effects at the global level as shown in Table 3.

Overall, taking the right benchmark to assess regional integration therefore seems crucial. The puzzling results in the previous literature where the deepest integration experiences did not seem to yield consistent important surpluses of trade are here challenged. The border effect methodology gives us a picture which seems more in line with the priors, with EU and NAFTA having a large impact on trade flows (although it should again be noted that those areas are still far from perfectly integrated even in recent years).

4 Reciprocal Market Access in the Atlantic Triangle

4.1 Overall results

Regional integration agreements can be associated with important fears in non member countries. This was the case in the European integration movement (with claims of a construction of a "Fortress Europe" among Japanese and US authorities) but also in the NAFTA and Mercosur construction. The main concern is that the withdrawal of remaining barriers to trade between member nations would be made at the expense of restricted access of external trade partners to the enlarged market. This question is not unrelated with the old vinerian concept of trade creation / trade diversion.

Indeed, there are some theoretical foundations to those fears. Suppose that the EU integration has indeed the effect of improving the quality of access of each member country's producers to other EU markets (a fall in intra-EU border effect). What will be the result in terms of incentives with respect to imports from third countries? The traditional optimal tariff argument can first be used here. A deepening of the EU integration is very similar to a rise of the size of EU on the world market. Consequently, the terms of trade gains from increased protection with respect to third countries are higher. This can be the basis for a more restrictive trade policy of the EU. However, the process of multilateral negotiations makes it (almost) impossible for a major industrialized country to raise tariffs. The restricted access will therefore have all the chances to take the form of increased NTBs, which are almost impossible to measure directly, but are indirectly detected through a rise in the border effect of third countries. The second

Table 4: Border effects between MERCOSUR, European Union and NAFTA countries (1995-1999)

	Dep. Var: Ln Imports Partner/Own			
Model :	(1)	(2)	(3)	(4)
Rel. Production	0.93^a	0.93^a	0.81^a	1
	(0.04)	(0.04)	(0.03)	
Rel. Prices	-1.08^a	-1.04^a	-1.35^a	-1.69^a
	(0.33)	(0.33)	(0.29)	(0.34)
Rel.Distance	-0.86^a	-0.86^a	-0.46^a	-0.80^a
	(0.08)	(0.08)	(0.14)	(0.18)
Contiguity	0.72^a	0.72^a	0.60^a	0.31
	(0.19)	(0.19)	(0.18)	(0.22)
Common Language	0.61^a	0.61^a	0.26	0.32
	(0.18)	(0.18)	(0.20)	(0.27)
EU15	-2.70^a	-2.70^a	-5.00^a	-3.85^a
	(0.24)	(0.24)	(0.43)	(0.53)
NAFTA	-3.12^a	-3.08^a	-5.14^a	-4.23^a
	(0.42)	(0.44)	(0.46)	(0.59)
MERCOSUR	-3.48^a	-3.38^a		
	(0.33)	(0.34)		
EU15 → MERCOSUR	-4.17^a	-3.98^a	-6.32^a	-4.98^a
	(0.39)	(0.41)	(0.48)	(0.57)
MERCOSUR → EU15	-4.38^a	-4.29^a	-6.50^a	-5.02^a
	(0.41)	(0.43)	(0.70)	(0.85)
NAFTA → MERCOSUR	-4.40^a	-4.21^a	-6.80^a	-5.71^a
	(0.36)	(0.39)	(0.53)	(0.62)
MERCOSUR → NAFTA	-4.82^a	-4.71^a	-6.01^a	-5.04^a
	(0.58)	(0.63)	(0.58)	(0.63)
EU15 → NAFTA	-3.83^a	-3.70^a	-5.75^a	-4.50^a
	(0.42)	(0.46)	(0.43)	(0.53)
NAFTA → EU15	-3.89^a	-3.77^a	-6.43^a	-5.10^a
	(0.46)	(0.48)	(0.75)	(0.93)
Ln (1 + Tariff)		-1.52^b	-2.32^a	-2.22^a
		(0.73)	(0.62)	(0.60)
Ln bilateral FDI stock			0.22^a	0.17^a
			(0.03)	(0.03)
N	24826	24826	16803	16803
R^2	0.904	0.904	0.911	0.896
RMSE	1.96	1.958	1.732	1.757

Note: Standard errors in parentheses: ^{a}, ^{b} and ^{c} represent respectively statistical significance at the 1%, 5% and 10% levels. The reported standard errors take into account the correlation of the error terms for a given importer.

possible channel is through the political economy of protection. An institutional change like the single market represents a major shock of increased openness in EU countries. There might be a temptation to alleviate or at least reduce the adjustment costs of such a move by reducing the access of third country products to national markets in the same time.

The dataset used here offers a new opportunity to investigate the reciprocity of market access of the Mercosur with two of its most important partners in the international trading system (the EU and Nafta), without focusing on a particular pair. Table 4 gives results of regressions pooled over all industries with dummy variables capturing each of six different possible flows between this three RIA and their three dummies concerning intra-RIA flows (first column). We drop the constant of those regressions in order to have the full border effect for each partner combination. The coefficient on relative production stays very stable around 0.9, that is quite near the unitary value predicted by theory. The coefficient on distance is also very comparable with usual findings in gravity equations, with a coefficient of -0.86. It can be seen that speaking the same language multiplies trade volumes by 1.7 and contiguity by 3.3, everything else constant.

The level of trade integration among members of a RIA seems unmatched in the other combinations considered here over the period. For instance, the 32.5 ($\exp(3.48) \approx 32.5$) figure for intra-Mercosur flows compares with 64.7 for European exports to the Mercosur, and 79.8 for the reciprocal flow. With a factor of 124, Mercosur exports to the Nafta appear as the most impeded in our sample, while the EU exports to Nafta have the lower border effect between RIA of this sample (46.1). Lastly, the Mercosur access to the EU and Nafta markets appears less easy than the reverse.

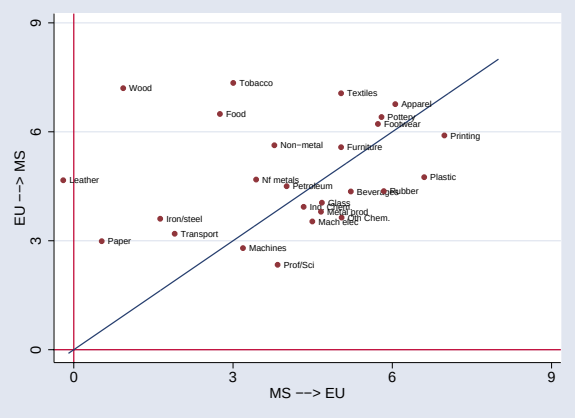
Columns 2, 3 and 4 of Table 4 consider two explanations of bilateral trade flows, tariffs and FDI, which will be discussed in the last section.

4.2 Industry-level market access in the Atlantic Triangle

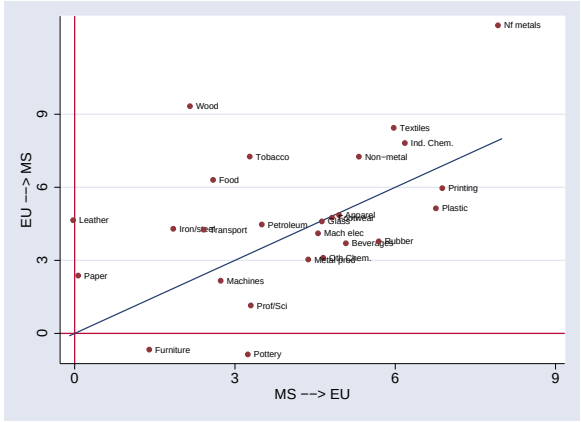
We now conduct estimations at the industry level, in order to evaluate the degree of symmetry of revealed trade obstacles in bilateral relationships between the Mercosur, the EU and the Nafta for specific products. Figures (3, 4, and 5) represent bilateral symmetry in market access in the three different combinations over the years 1995-1999. For instance, in figure (3), the horizontal axis has (the log of) the border effect faced by Mercosur exporters on European markets and the vertical axis has (the log of) the border effect faced by European exporters on the Mercosur market. In this figure, industries located beneath the 45 degree line are those for which the access to European markets is more difficult than the access to the Mercosur market. Results are as follows:

First, there is positive correlation between the reciprocal market access of different industries in each country pair. The most apparent correlation being between the EU and Nafta. This can be interpreted in terms of political economy (similar countries protect their "sensitive" industries in the same way and industries tend to have the

Figure 3: Industry-level market access between the Mercosur and the EU6 - Border Coefficients

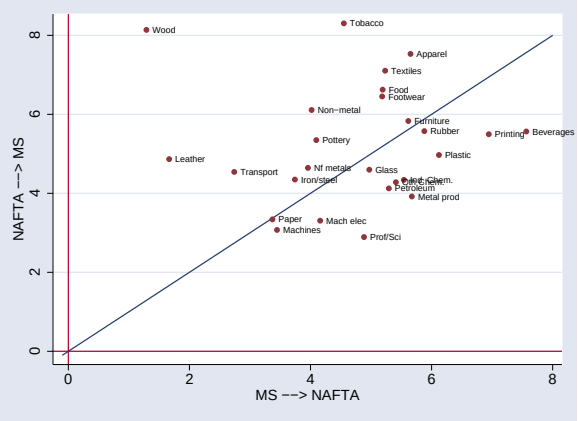


(a) regressions w/o tariffs

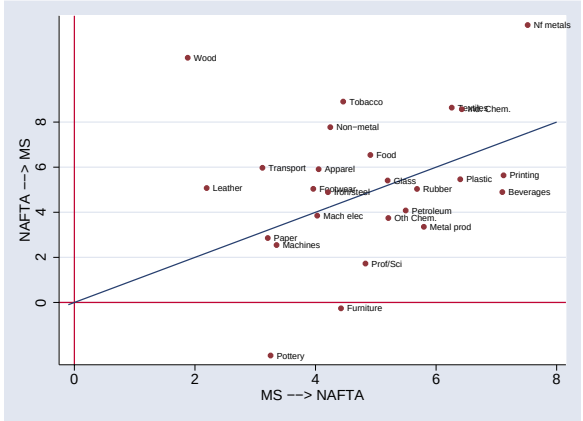


(b) regressions with tariffs

Figure 4: Industry-level market access between the Mercosur and the NAFTA - Border Coefficients

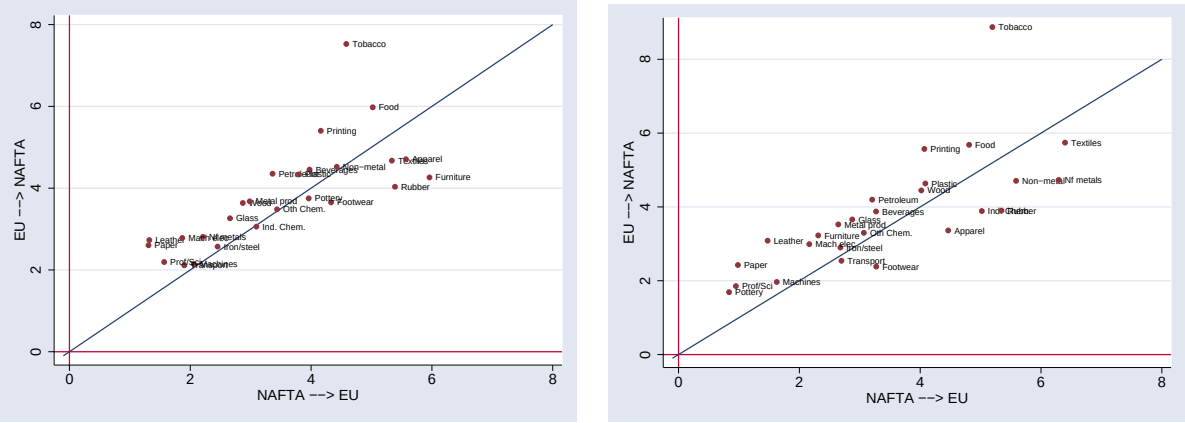


(a) regressions w/o tariffs



(b) regressions with tariffs

Figure 5: Industry-level market access between the EU6 and the NAFTA - Border Coefficients



(a) regressions w/o tariffs

(b) regressions with tariffs

same pattern of sensitivity in all those countries). An additional explanation is in terms of industry characteristics (domestic preferences are more diversified in sectors such as food, leading to a larger border effect in all samples for this industry).

Turning to specific industries, we can note that Tobacco, Wood and Leather industries are systematic outliers, characterized by large border effects, in particular in the access to Mercosur market. Here different tastes, transportation issues[6] and other factors related to distribution networks might explain this result. However, when we control for tariffs in the regressions, Mercosur market access in Non ferrous metals seems also very difficult. Conversely, Machines, instruments and transport equipment for instance do face limited border effects in almost all bilateral relationships. Finally, there is an apparent correlation between the border coefficients and the comparative advantage of the region: Professional and Scientific instruments industry, for instance, seems largely more closed to Mercosur exports in Europe and North America than the reverse. This suggests that comparative advantages must to be taken into account in the regressions.

[6]Those results come from industry-level regressions and therefore industry specific coefficients at least partially capture cross-industry differences in "transportability" of the good.

5 Determinants of Border effects in the Atlantic Triangle

5.1 Possible explanations

This section aims at disentangling the different components of hindrances to market access. Returning to our modelling framework, the coefficient on the dummy variable (multiplied by -1, for ease of interpretation) Mercosur-EU for instance, has a theoretical counterpart of

$$(\sigma - 1)\ln(1 + t_{ij}^s) + (\sigma - 1)\ln(1 + \text{ntb}_{ij}^s) + (\sigma - 1)\beta^s,$$

where i =Mercosur and j =EU and s represents the industry in question. We want to introduce variables or proxies for the different terms in the above expression and measure the resulting fall in the estimated border effect.[7] We therefore need industry-level variables for tariffs, NTBs and home biased preferences. We then use those as explanatory variables for the border effect coefficient, adding bilateral FDI stocks to the determinants dictated by our theory. Note that the coefficient on tariffs also provides an estimate of $\sigma - 1$ in our sample. Tariffs data is described in section 2.3.

There are other obstacles to trade imposed by national states at the border in order to protect national industries and that will be captured by the border effects in the above regressions. Those Non Tariff Barriers, for which tariff equivalent are difficult to compute, take a myriad of different forms, from traditional border formalities and administrative harassment to more sophisticated phyto-sanitary measures (Fontagné et al. 2002). Their direct observation is almost impossible on an exhaustive basis and most researchers use for a given industry the share of imports or the number of goods subject to some NTB measure. We choose here to follow Lee and Swagel (1997) and not to use a proxy for NTBs but rather try to model the political economy determinants of those NTBs and use those determinants in the explanation of the border effects. Industries where a large demand for protection is likely to emerge in the rich countries we consider are the ones which can be endangered by foreign competition, and in particular the ones where low productivity will be reflected in low wages. This will be all the more true when the industry has an important weight in the economy. We therefore use the share of the industry in global output and the level of the industry wage relative to total manufacturing as determinants of border effects, through the channel of higher NTBs.

[7] An alternative procedure would use two steps, first estimating border effects coefficients and then regressing them on the possible explanatory variables. However, this involves the undesirable feature of using an econometric estimate as the dependent variable in the second stage. In addition, exploiting the full dimension of the problem would require estimating 9 different border effects for each industry and year, which results in certain regressions having very few observations, and therefore an increased volatility in estimated border effects.

Note that even if actual protectionist measures are not the only explanation for the border effects differences we want to explain, some alternative explanations work in a quite similar fashion. An important potential explanation can be found in asymmetric preferences among consumers. For instance, EU consumers may have a particular taste for American tobacco products, while the American consumers have on the contrary a particular distaste for EU goods in this industry. This type of preference pattern would therefore dampen, everything else equal, the level of trade from EU countries to the United States and raise the reciprocal flow. This consequence is *observationaly* equivalent to an asymmetric tariff on this good by the trading partners. Our approach here is to contribute to the literature by assessing which part of the variance of the border effects can be explained by simple differences in tariff rates and which part results from other determinants and preferences in particular.

As mentioned earlier, the home bias of consumers is an important candidate explanation in addition to trade policy. We try to capture this component by using the intuitive distinction between final and intermediate goods in terms of home bias. Using IO tables made available in the World Bank Trade and Production database (initially coming from GTAP), we construct a variable consisting of the share of output in an industry going to final consumption. Preferences biased in favor of domestic products are more likely to be important when consumers decide the origin of the good consumed rather than firms, and we thus expect a positive coefficient.

Another possible explanation that has not been subject to precise testing yet is the importance of foreign direct investment. It is well known that European countries usually import very little volumes of American cars (even those cars that have the size and fuel consumption characteristics that actually make them suitable for European streets and fuel prices). Those "missing imports" can alternatively result from actual protection by EU countries or from a home bias of EU consumers. However, it is also quite likely that the important production of cars taking place within Europe in plants owned by American firms limits the actual "need" for important trade flows. It is also likely that this last explanation is not independent from the two former: The theoretical and empirical literature on FDI/export decision suggests that American firms may have decided to produce on the European soil because of a combination of high trade protection and the imperative adaptation of American cars to local tastes and needs.

We use the bilateral stock of FDI between each combination of the triad. The source is the OECD database, often used in gravity-like empirical work on FDI (Wei, 2000 being a recent example), which gives those figures from 1980 to 2000. Although this variable lacks one dimension of our dataset (the industry level), it has the advantage of good overall reliability across the entire period.

Distinguishing between alternative explanations of border effects is an important public policy issue in that actual tariffs and other protective devices' cuts can be nego-

tiated in the multilateral arena, whereas differences in tastes and bilateral FDI patterns are less subject to such negotiations.

5.2 Preliminary Results

We present here the results concerning only the tariffs and FDI explanation. The other possible explanations will be explored soon.

Column 1 of Table 5 gives coefficients for a regression without any variable intended to explain the border effect but with the sample constrained to be the one where the tariff variable is available. This enables a direct comparison of different coefficients when introducing tariffs and other variables accounting for the impact of borders on trade.

We start by introducing tariff in the odds equation in column 2 and 3, in order to have a first estimate of how affected are the estimated border effects when accounting for tariff alone. In the column 3, the coefficient on relative production is constrained to 1.

The first result is that bilateral tariffs indeed impact trade significantly. The estimated price elasticity (σ in our theoretical framework) is relatively high (between 4.02 and 4.83 depending on the specification) considering the level of industry detail. This estimate of σ is slightly lower than recent estimates that have been provided in the literature, but we only have 26 industries here, where Head and Ries (2001) for instance estimate their σ around 8 with 106 industries.

Second, we observe a decrease in border effects for all combinations. Tariff barriers therefore contribute to the impact of national borders in the expected way: They tend to raise the ratio of internal to cross-border trade volumes, although this ratio remains high and significant, pointing to other important explanations.

Column 4 introduce the stock of bilateral FDI. FDI has a positive impact, which represents a confirmation that, at such an aggregate level, FDI and trade are complements rather than substitutes. This limits the validity of the potential explanation of border effects through FDI, although more detailed data at the industry-level would be needed to confirm this result.

In columns 5 and 6 we cross FDI variable with the five RIA considered in this work (regression 6 constraint the coefficient on relative production to 1). While FDI not seems to have a significant additional influence in determining trade flows in direction of EU, Nafta or the Andean Pact, its impact is significant for imports of Mercosur and ASEAN. This additional impact is however of opposite sign for these regions. Indeed, the bilateral FDI stock in Mercosur has a final coefficient of 0.15 whereas the stock of FDI in countries of ASEAN has a final coefficient of 0.42 (0.25 + 0.17 in column 5). This is reflecting the differences in the motivation of FDI in each RIA: While multinatinal firms installed in Mercosur seems interested by local (or regional) market, those present in ASEAN are turned to global markets.

Table 5: Determinants of Border Effects in the AT (1995-1999)

	Dependent Variable: Ln Imports Partner/Own					
Model :	(1)	(2)	(3)	(4)	(5)	(6)
Border	-5.41^a	-5.01^a	-4.26^a	-6.04^a	-5.91^a	-4.91^a
	(0.33)	(0.33)	(0.33)	(0.40)	(0.35)	(0.31)
Ln Rel. Production	0.79^a	0.80^a	1	0.71^a	0.72^a	1
	(0.03)	(0.02)		(0.05)	(0.04)	
Ln Rel. Prices	-0.44^a	-0.29^a	-0.73^a	-0.74^a	-0.79^a	-1.14^a
	(0.08)	(0.08)	(0.11)	(0.10)	(0.08)	(0.13)
Ln Rel. Distance	-0.64^a	-0.66^a	-0.88^a	-0.48^a	-0.53^a	-0.79^a
	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)	(0.09)
Contiguity	1.33^a	1.31^a	0.97^a	0.83^a	0.73^a	0.41^b
	(0.17)	(0.16)	(0.19)	(0.17)	(0.15)	(0.20)
Common Language	0.58^a	0.60^a	0.59^a	0.35^b	0.38^b	0.44^b
	(0.17)	(0.17)	(0.18)	(0.16)	(0.16)	(0.22)
EU15	2.10^a	1.73^a	1.55^a	0.83^a	0.78^a	0.60^a
	(0.19)	(0.19)	(0.21)	(0.21)	(0.19)	(0.19)
NAFTA	1.78^a	1.52^a	1.16^a	0.55^b	0.71^a	0.23
	(0.26)	(0.28)	(0.39)	(0.24)	(0.13)	(0.15)
MERCO	0.94^a	0.80^a	0.77^a			
	(0.24)	(0.21)	(0.28)			
ASEAN	1.60^a	1.72^a	1.50^a			
	(0.49)	(0.44)	(0.42)			
ANDEAN PACT	0.07	0.16	0.00			
	(0.31)	(0.30)	(0.31)			
Ln (1 + tariff)		-3.65^a	-3.83^a	-3.06^a	-3.02^a	-3.17^a
		(0.63)	(0.65)	(0.63)	(0.59)	(0.58)
Ln bilateral FDI stock				0.24^a	0.25^a	0.19^a
				(0.03)	(0.04)	(0.05)
Ln bilateral FDI stock * EU_d					0.00	0.03
					(0.04)	(0.06)
Ln bilateral FDI stock * NAFTA_d					-0.03	0.01
					(0.04)	(0.07)
Ln bilateral FDI stock * Mercosur_d					-0.10^b	-0.08
					(0.05)	(0.06)
Ln bilateral FDI stock * ASEAN_d					0.17^b	0.18^b
					(0.07)	(0.08)
Ln bilateral FDI stock * Andean Pact_d					-0.09	-0.16^b
					(0.07)	(0.07)
N	145927	145927	145927	46565	46565	46565
R^2	0.47	0.48	0.282	0.457	0.463	0.36
RMSE	2.657	2.633	2.682	2.172	2.159	2.226

Note: Standard errors in parentheses: ^{a}, ^{b} and ^{c} represent respectively statistical significance at the 1%, 5% and 10% levels. The reported standard errors take into account the correlation of the error terms for a given importer.

6 Conclusion

To be completed

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