Market Access in Global and Regional Trade

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Abstract

This paper develops a new method to measure difficulties in market access over a large sample of countries (both developing and developed), industries and years. It also offers a renewal of the assessment of the impact of regional trading arrangements. We use a micro-founded gravity-type model of trade patterns to estimate in particular the impact of national borders on revealed access to Northern markets by Southern producers. Everything else equal, in the nineties, a rich country imports on average 281 times more from itself than from a developing country, only 61 times more when importing from another rich country. Those difficulties in Northern market access have however experienced a noticeable fall during the last thirty years. While tariffs still have in general an influence on trade patterns, our estimates suggest that they are not an important component of market access difficulties faced by Southern exporters on Northern markets. The EU, CUSA/NAFTA, ASEAN/AFTA and MERCOSUR agreements all tend to reduce the estimated degree of market fragmentation within these zones, with an expected ranking between the respective impact of these agreements.

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1 Introduction

Despite complex and sometimes wide-ranging preferential access granted by rich countries to the exporters of the developing world, there are claims that market access remain limited. Those claims have been an important component of the arguments of developing countries in the recent steps of multilateral trade liberalization talks. Leaders of the developing world insist that access to Northern countries' markets is a much needed pre-requisite to further progress in the talks. The frustration of those countries is of course important for agricultural goods, but there is also a widespread feeling that, even for manufactured goods, the market access commitments of the Uruguay Round have not been fully implemented. Those protests from officials which culminated at the WTO Cancún ministerial meeting in September 2003, are seemingly backed up by the apparently low level of the market share detained by exporters from Least Developed Countries (LDCs) in rich countries. The WTO reports that the share of LDCs in total imports of Northern America was 0.8% in 1980 and 0.6% in 2000. The corresponding figures for the Western Europe were 1% and 0.5%, Japan's figures were 1% and 0.3% (WTO, 2001).

However instructive, this type of figure cannot be sufficient to draw conclusions on the level of market access experienced by Southern producers on Northern markets. The first limitation is that we do not know *a priori* what to compare those numbers to. Any assessment of market access based on trade flows needs to specify a *benchmark* of trade patterns, to which actual international exchanges of goods will be compared. Such a benchmark can only be provided by theory. We use here a theoretical framework of the "new trade" type, which combines imperfect competition and trade costs to give an empirically estimable gravity-type equation. Difficulties in market access are measured as a (negative) deviation from this benchmark.[1]

A second problematic issue with the use of market shares to assess market access such as the WTO figures above mentioned is that it usually misses most of the action. When saying that in 1999, the EU countries on average had only 0.4% of their imports originating from LDCs, one is in fact only comparing relative access among *foreign* producers on the EU market. The problem with this is that, in most products, the large majority of overall demand in a country is met by domestic producers, not foreign. A more sensible index of market access must take into account the market share of foreign producers in the overall demand. This is what the *border effect* literature does: Consider trade flows inside countries as well as among countries and compare imports from foreign countries to "imports" from domestic producers in order to have a benchmark based on a situation of the best possible market access, the one faced by national producers.

We follow this method of market access measurement here and develop it to provide new results focused on developing countries' access to the Northern markets. This is made possible by the construction and use of a new database extending the Trade and Production database recently issued by the World Bank (based primarily on COMTRADE and UNIDO data) to cover more countries and years. A specific feature of our study is to identify in

[1]We therefore rely on an indirect measure of protection: Protection is revealed by distortions in trade flows, after having controlled for supply capacity, distance costs, prices as dictated by the theoretical framework. Alternatively, one can try to measure protection directly through the collection of formal trade barriers whether tariff-related or not. Anderson and van Wincoop (2004) survey both types of works.

the border effect measurement of market access, the part to be associated with observed direct protection (tariffs and non-tariff barriers). A "by-product" of the method is the provision of new estimates of the impact of Regional Trading Arrangements (RTAs), both involving Northern and Southern countries' combinations, on trade patterns. Here again border effects renew the analysis: The benchmark against which trade patterns inside the RTA are compared is the national market, supposedly highly integrated.

The remainder of the paper is as follows. Section 2 motivates the use of the border effects methodology when measuring market access and specifies the theoretical foundations of our model, the empirical specification derived from it as well as the data used. Section 3 provides results for overall market access to North by Southern producers and for the impact of regional trade agreements and gives details concerning the evolution of this access over recent years as well as differences across industries. Section 4 concludes.

2 Measuring international market openness with border effects.

Why do we need to study the impact of national borders on trade flows? The reason lies in the fact that *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 the European Union, 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 compare the two. To do this comparison, a model of bilateral trade flows is needed 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 bilateral 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 not available. Indeed, even in the absence of flows between sub-national regions, you can still measure the total volume of trade occurring within a country. For a given industry, this is simply equal to the overall production of the country minus its total exports, which gives the 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. Our framework also incorporates recent advances in the modelling of gravity equations, turning back to trade theory to guide the empirical specification (recent examples and surveys of those approaches include Anderson and van

Wincoop, 2003 and 2004, and Feenstra, 2003).

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

- First, it offers a *more intuitive benchmark* of integration than the traditional gravity equation framework. Take as an example the attempts to measure the impact of EU membership on trade flows (Aitken, 1973 is one of the first such study, Frankel, 1997, Frankel et al., 1995 and Soloaga and Winters, 2001 are recent examples of such work). 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 this 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 non-tariff barriers even inside the European Community at the launching of the Single Market Programme) 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 non-tariff barriers (NTBs) schemes[2] 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, but European, 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 find it hard to differentiate among the two causes (even if more elaborated forms like Fukao et al., 2003 or Carrère, forthcoming, have made progress possible in that direction), 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.

We will therefore use the border effects methodology here, combining international and intra-national trade flows in a gravity-type equation. The precise specification of this equation stays however to be described, and this requires the presentation of our theoretical model, to which we know turn.

[2]If only because all rules of multilateral agreements signed by countries belonging to regional integration arrangements stipulate that regional blocks should not raise their external level of protection.

2.1 The model and estimable equation

We will work here with a specific form of a gravity-type equation. 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 (2003) 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. Following Head and Mayer (2000), we take the ratio of m_{ij} over m_{ii}, country i's imports from itself, the $\mu_i Y_i P_i^{\sigma-1}$ term then drops and we are left with relative numbers of firms, relative preferences, and relative costs in i and j:

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

To estimate (2), we need to specify more fully the model. The first step is to use the 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. 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, $q_j \equiv q$, $\forall j = 1..N$ and noting v_j the value of production for the considered industry in j, $v_j = q p_j n_j$, and we get the first substitution to be made in equation (2):$\frac{n_j}{n_i} = \frac{v_j}{v_i}\frac{p_i}{p_j}$.

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 "border-related costs", which can consist of tariffs and/or broadly defined NTBs (quantitative restrictions, administrative burden, sanitary measures...). We note the *ad valorem* equivalent of all border-related costs brc_{ij}:

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

  Border-related costs must be allowed to be quite flexible in our framework. Our primary goal is to assess a possible North-South divide in market access, we therefore need to allow for different levels of broadly defined protection in each (North-South and South-North) direction. An important issue is also the impact of regionalism. We want to control for the impact of membership of Regional Trading Arrangements (RTAs) in the assessment of North markets' access by Southern exporters. Finally, we observe some of the actual protection taking place between importing and exporting countries (tariffs and NTBs). We want in particular to be able to control for tariffs, in order to assess the share of border effects that can actually be explained by this simple determinant.

  In the most general formulation, 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:

  $$1 + \text{brc}_{ij} \equiv (1 + t_{ij})(1 + ntb_{ij})(\exp[\eta E_{ij} + \varphi \text{NS}_{ij} + \psi \text{SN}_{ij}])$$

  . In this specification, t_{ij} denotes the *ad valorem* bilateral tariff, ntb_{ij} is a frequency index of NTBs. NS_{ij} is a dummy variable set equal to 1 when $i(\neq j)$ belongs to the North and j belongs to the group of Southern countries. SN_{ij} is a dummy variable set equal to 1 in the reverse case. E_{ij} is a dummy variable set to one when both partners belong to the same group of countries (North or South depending on the model estimated).[3] All parameters are expected to be positive, denoting tariff equivalent of the other non-tariff barriers. The ranking of φ , ψ and η is the primary open question we want to answer here.

[3]When we turn to the impact of regional integration, our specification of border-related costs is different: $1 + \text{brc}_{ij} \equiv (1 + t_{ij})(1 + ntb_{ij})(\exp[\eta E_{ij} + \theta \text{RTA}_{ij}])$, where RTA_{ij} is a dummy variable set equal to 1 when $i(\neq j)$ and j belongs to a regional integration agreement and E_{ij} is the intercept. We expect $\theta > 0$ to be the lowest of those parameters, which will be true if, all national borders impose transaction costs, with the minimum burden of those costs being between RTA 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*.

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

  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:

$$\begin{aligned} \ln\left(\frac{m_{ij}}{m_{ii}}\right) &= -(\sigma-1)[\beta+\eta] + \ln\left(\frac{v_j}{v_i}\right) - \sigma\ln\left(\frac{p_j}{p_i}\right) - (\sigma-1)\ln(1+t_{ij}) \\ &\quad -(\sigma-1)\ln(1+ntb_{ij}) - (\sigma-1)\delta\ln\left(\frac{d_{ij}}{d_{ii}}\right) + (\sigma-1)\lambda L_{ij} \\ &\quad -(\sigma-1)[\varphi-\eta]\mathrm{NS}_{ij} - (\sigma-1)[\psi-\eta]\mathrm{SN}_{ij} + \epsilon_{ij}, \end{aligned} \tag{3}$$

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 belong to the same group, the North for instance. It includes both the level of protection of the importing country (η) and the home bias of consumers (β). The coefficient on NS_{ij} indicates the additional difficulty for developing countries in their access to the Northern markets. Symmetrically, SN_{ij} indicates the additional difficulty when the Northern exporters want to sell their products on Southern markets. There will be several versions of (3) estimated below. No paper (to date) incorporates the level of bilateral tariffs and NTBs in border effects' equations on a worldwide basis. It is clear however from equation (3), that omitting the $\ln(1+t_{ij})$ and $\ln(1+ntb_{ij})$ terms will result in the "missing trade" (caused in reality by tariffs and NTBs) being attributed to the impact of crossing national borders (the ones where there are observed protection implemented).

2.2 Data requirements

The needed data involves primarily bilateral trade and production figures in a compatible industry classification for developed and developing countries. 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 production. The World Bank files have a lot of missing values for production figures in recent years. We largely extended the database on this aspect using more recent versions of the UNIDO database together with OECD STAN data for OECD members. We also completed the trade data, using the CEPII database of international trade (BACI[4]). We end up with rather complete database for 26 ISIC 3-digit

[4]http://www.cepii.fr/anglaisgraph/bdd/baci/baci.pdf

industries (available at http://www.cepii.fr/anglaisgraph/bdd/TradeProd.htm). Northern countries are high-income countries, as defined by the World Bank classification of economies. The South is defined as the group of countries with a low or medium income.

The relative prices are captured by the price level of GDP expressed relative to the United States. This data comes from the Penn World Tables v.6.1. We also experiment with a more detailed –but more incomplete, and maybe more noisy– variable of relative wages by industry.[5] In the end, the results are slightly better with the global price variable and we therefore present results only with this one.

As can be seen in equation (3), we need measures of distances between (d_{ij}) *and within* (d_{ii}) countries for the countries in the sample. Two potential problems arise: How to define internal distances of countries and how to make those constructed internal distances consistent with "traditional" 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 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. We have developed a new database of internal and external distances[6], 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, common language, colonial relationship and common colonizer variables used here.

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 weighted averages of bilateral tariffs obtained from TRAINS. Those tariffs are aggregated from Jon Haveman's treatment of TRAINS data (UTBC Database[7]) in order to match our ISIC rev2 industry classification using the world imports as weights for HS6 products. The obtained variable is a rather crude measurement of protection, when compared for instance with a dataset recently made available (called Market Access Map, MacMap, see Bouët et al., 2004) that takes into account the complex system of bilateral preferences across countries

[5]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 $\frac{p_j}{p_i} = \frac{w_j}{w_i}$. The relative wages come from UNIDO and consist of the industry's wage bill divided by the number of employees.

[6]Available at http://www.cepii.fr/anglaisgraph/bdd/distances.htm

[7]http://www.eiit.org/Protection/extracts.html

in the world at a detailed product level. This type of data however lacks any consistent time coverage which is an important issue here. We thus use MacMap data (aggregated at the relevant ISIC level as for the TRAINS data) to confirm our results for the last year available in the TRAINS data used here.[8] Even in manufactured goods and between industrialized countries, tariffs are not negligible and vary quite substantially across industries and countries combinations. Tariffs in South-North and North-South combinations are of course even larger and we are interested in particular in assessing their impact on trade flows and market access.

Besides tariffs, there are other obstacles to trade imposed by governments 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 (NTBs), for which tariff equivalent are difficult to compute, take a myriad of different forms, from traditional border formalities and administrative harassment to more sophisticated sanitary and phyto-sanitary measures. For a given HS6 category, the NTB variable is set equal to 1 if at least one of the underlying tariff lines in that category is subject to a NTB, and 0 otherwise. As for tariffs data, this information on NTBs comes from Jon Haveman's treatment of TRAINS data and is then aggregated to match with the 3-digit ISIC rev2 classification by calculating a frequency index.

We also incorporate a set of variables intended to account for different levels of "bilateral affinity", which can result from historical and cultural links. Those links can promote trade either through a positive effect on bilateral preferences (a_{ij}) or through more complex channels involving the existence of business networks or similarity in institutional frameworks that potentially reduce transaction costs τ_{ij}. The common language variable already captures part of this effect. The colonial links variables further belong to this set of variable that can affect bilateral North-South bilateral trade patterns in an important way. We also add the amount of bilateral aid between the trade partners, as a potentially distinct proxy for this type of political/cultural proximity. As has been shown in the literature (see Wagner, 2003 for a recent example), both directions of the relationship between trade and aid can be present. The data comes from Eurostat and we construct two related variables: One calculating the cumulated bilateral flow of aid per head received between the years 1985 and 1996, and the other one the same bilateral cumulated flow given by the developed country. Finally, bilateral foreign direct investment can be thought to interact with bilateral market access. One channel is through horizontal-type export substituting FDI. If entry through exports is too difficult on a particular market, firms might decide to set up production affiliates there, which will substitute for the trade flow. Another channel is though vertical-type FDI of multinational firms in developing countries, which typically boost exports of intermediate products in the direction of the home country. We investigate how bilateral FDI affect trade patterns and revealed market access using OECD data on bilateral FDI stocks to control for these effects on trade flows.

All regressions from section 3.1 to section 3.3 are pooled across the set of industries used, while subsection 3.4 gives industry-level results.

[8]The Market Access Map (MAcMap) dataset provides a disaggregated, exhaustive and bilateral measurement of applied tariff duties, taking regional agreements and trade preferences exhaustively into account for 2001. Since Jon Haveman's treatment of TRAINS data does not cover 2001, we match it with MacMap tariffs using the last available year (1999 or 2000, depending on the declaring country).

3 Market access between Northern and Southern countries

3.1 Global results

Table 1 presents a simple version of equation (3). Column (1) involves the whole sample. Column (2) introduces the bilateral stock of FDI and bilateral aid. Columns (3) and (4) give results when the sample is restricted to imports of developed countries, and columns (5) and (6) take the reciprocal case, considering imports by developing countries and distinguishing between different exporters in terms of market access. Tariffs and NTBs are included and data availability on this variable restricts the sample to the years 1991-2000.

The coefficient on relative production is relatively close to the unitary value predicted by theory and often found in the gravity equation literature. The relative prices are not significant in the whole sample but significant when Northern and Southern imports are distinguished. The coefficient on distance is in line with the common findings of this type of regressions (see Disdier and Head, 2004). Coefficients on contiguity have a higher magnitude than usual and language has the usual signs and magnitude.[9]

The first line of the first column gives the world average border effect. This estimate implies that, on average during the nineties, each country traded around 89 times more (exp(4.49)) within its national borders than with another country of the world. In the Northern markets, the estimated border effect from column 3 falls to 61 when the exporter is a Northern country but jumps to 281 when the exporter is a Southern country.

The tariff equivalent of the difference in market access is quite substantial. The calculation of tariff equivalent requires an estimate of the price elasticity σ. There are several possible source for this parameter. The first one is the coefficient on the price variable. While generally negative, the coefficient on the price term is however disappointing here, with a lot of volatility and too small implied values of σ to be consistent with theory ($\sigma < 1$ implies negative prices). This result of low price elasticities when using directly proxies for prices is usual in the literature (see Erkel-Rousse and Mirza, 2002, for instance). The coefficient on tariffs can also be used and reveals an estimate of $\sigma - 1 = 6.9$ in column (1), which seems consistent with other recent estimates of elasticities of substitution in the literature.[10] The tariff equivalent of North-North fragmentation level is then still $\exp(4.11/6.9) - 1 = 81\%$ while the figure is $\exp(5.64/6.9) - 1 = 126\%$ for imports coming from Southern countries. Note that those are the tariff equivalents of preferences and trade restrictions, *after having controlled for tariffs and NTBs*, that exert a negative impact on trade on their own. Although North-North trade is far from free, column (3) therefore reveals that, expressed in tariff equivalent, South-North trade is about 50% harder.

Column (4) details this revealed additional difficulties of Southern countries in market access by income level and adding FDI and given aid. It appears that the more restricted access in Northern markets is encountered by lower middle income exporters. The point estimates indicate that these exporters face a tariff equivalent of the border effect

[9] We use the "comlang_ethno" variable of the CEPII distances and geographical data, which set to one if a language is spoken by at least 9% of the population in both countries.

[10] Head and Ries (2001), Eaton and Kortum (2002) and Lai and Trefler (2002), for instance, suggest that σ might be around 8 for developed countries in recent years.

Table 1: North-South market access, by income levels

Model :	Dependent Variable: Ln Imports Partner/Own					
	World	World	North imp.	North imp.	South imp.	South imp.
Border	-4.49^a	-6.05^a				
	(0.08)	(0.12)				
Ln Rel. Production	0.79^a	0.76^a	0.79^a	0.76^a	0.78^a	0.80^a
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)
Ln Rel. Prices	0.02	-0.63^a	-0.28^a	-1.09^a	-0.38^a	-0.10
	(0.03)	(0.05)	(0.05)	(0.08)	(0.06)	(0.13)
Ln Rel. Distance	-0.70^a	-0.51^a	-0.53^a	-0.46^a	-0.83^a	-0.55^a
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.06)
Contiguity	1.44^a	0.85^a	1.51^a	0.86^a	1.00^a	1.16^a
	(0.05)	(0.04)	(0.06)	(0.04)	(0.06)	(0.14)
Common Language	0.37^a	0.09^c	0.63^a	0.02	0.71^a	0.64^a
	(0.04)	(0.05)	(0.06)	(0.06)	(0.05)	(0.08)
Ln (1+Tariff)	-6.90^a	-4.34^a	-3.62^a	-5.36^a	-2.72^a	-2.49^a
	(0.35)	(0.36)	(0.44)	(0.62)	(0.39)	(0.60)
NTBs Freq. Index	-0.37^a	-0.67^a	-0.22	-0.60^a	-0.35^a	-0.62^a
	(0.10)	(0.12)	(0.14)	(0.15)	(0.13)	(0.21)
Same Country	0.22^a	0.63^a	0.74^a	-0.08	0.83^a	1.60^a
	(0.06)	(0.15)	(0.11)	(0.18)	(0.08)	(0.25)
Colonial Link	0.79^a	0.40^a	0.44^a	0.37^a	0.67^a	0.21^b
	(0.06)	(0.05)	(0.07)	(0.06)	(0.07)	(0.10)
Common Colonizer	1.53^a	-1.25			1.00^a	-0.58
	(0.12)	(0.93)			(0.12)	(0.94)
Bilateral FDI		0.25^a		0.24^a		0.23^a
		(0.01)		(0.01)		(0.01)
Ln Aid Given		-0.05^a		0.07^a		
		(0.01)		(0.02)		
Ln Aid Received		-0.06^a				0.00
		(0.01)				(0.02)
Northern Exporters			-4.11^a	-5.09^a	-4.64^a	-6.53^a
			(0.08)	(0.12)	(0.12)	(0.23)
Southern Exporters			-5.64^a		-5.70^a	
			(0.10)		(0.12)	
Upper Mid. Inc. Exp.				-6.20^a		-6.16^a
				(0.13)		(0.21)
Lower Mid. Inc. Exp.				-6.63^a		-5.96^a
				(0.15)		(0.23)
Low Inc. Exporters				-6.30^a		-6.03^a
				(0.18)		(0.32)
N	164101	48619	105913	38153	58188	10466
R^2	0.482	0.517	0.908	0.894	0.905	0.902
RMSE	2.639	2.072	2.549	2.008	2.517	2.187

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.

of $\exp(6.63/6.9) - 1 = 161\%$, while the figure for upper middle income exporters is only 145%. Note that the amounts of aid given to a developing country are positively and significantly associated with market access of the donator, probably indicating that this variable is a good proxy for bilateral North-South affinity, in complement to colonial links and the "same country" variable that also very strongly promotes trade[11]. The bilateral stock of FDI has a positive and significant impact on trade flows in all regressions, which confirms the usually found complementary link between FDI and trade at an aggregate level in the literature.

The contrast with developing countries' results shown in columns (5) and (6) is important. The overall level of openness of those markets is lower than the Northern markets. However, while those countries trade on average about 299 ($\exp(5.7)$ in column 5) times more with themselves than with another developing country, this figure only goes down to 104 when the exporter originates from a Northern country. Southern exporters therefore face an equivalent level of access difficulty on Southern and Northern markets, while Southern markets are *relatively* open to Northern exports compared to the reciprocal flow. Expressed in tariff equivalent, the asymmetry between our groups of Northern and Southern countries is $\exp(5.64/6.9) - \exp(4.64/6.9) = 31$ percentage points. It gets up to $\exp(6.63/6.9) - \exp(4.64/6.9) = 65$ percentage points between the North and lower middle income countries (taking to account the bilateral aid and FDI).

Table 2 experiments with a different measure of tariffs (taken from the MacMap database), which improves notably the way preferential trade agreements and other exceptions to the usual GATT/WTO rules are taken into account, but only covers the year 2001. In order to compare this alternative measure of tariffs with our principal one, we match MacMap tariffs with the last year of data (1999 or 2000 depending on the importer) in column (4). Column (3) uses TRAINS-based tariffs on the exact same sample. Column (2) adds NTBs and column (1) simply reports the overall worldwide results with time dimension since 1991, as in Table 1. Comparing columns (3) and (4), MacMap tariffs have a larger effect and are more precisely estimated as expected. The fit of the regression is also enhanced and the border effect reduced with this measure, but those differences seem sufficiently small to have confidence in the estimates using TRAINS data, which offer the important advantage of time coverage.

3.2 The impact of regional trade agreements

Our objective in this section, is to introduce the impact of regional agreements in the regressions. To investigate this issue, we incorporate dummy variables capturing the lower (or higher) impact of borders on trade inside each regional trade agreement (RTA), and thus characterizing the extent of integration of the zone, compared to trade taking place in the rest of the sample. We identify five actual RTAs (EU, NAFTA, MERCOSUR, ASEAN, Andean community). Some of those RTAs include only Northern countries, some only Southern ones, and NAFTA includes two developed countries and a developing country.

[11]The "same country" variable sets to one if the two countries were or are the same state or the same administrative entity for a long period. The "colonial link" dummy refers to countries that have ever had a colonial link. The "common colonizer" dummy equals to one if countries have had a common colonizer after 1945.

Table 2: Global market access: Different measures of protection

	Dependent Variable: Ln Imports Partner/Own			
Model :	Whole sample	1999-2000	wo. NTBs	MacMap
Border	-4.49^a	-2.42^a	-4.17^a	-4.11^a
	(0.08)	(0.16)	(0.13)	(0.12)
Ln Rel. Production	0.79^a	0.84^a	0.76^a	0.76^a
	(0.01)	(0.02)	(0.01)	(0.01)
Ln Rel. Prices	0.02	-0.16^b	-0.23^a	-0.23^a
	(0.03)	(0.08)	(0.05)	(0.04)
Ln Rel. Distance	-0.70^a	-1.38^a	-0.70^a	-0.70^a
	(0.03)	(0.07)	(0.04)	(0.04)
Contiguity	1.44^a	0.59^a	1.28^a	1.23^a
	(0.05)	(0.10)	(0.09)	(0.08)
Common Language	0.37^a	0.21^b	0.63^a	0.59^a
	(0.04)	(0.10)	(0.06)	(0.06)
Same Country	0.22^a	0.21	0.12	0.11
	(0.06)	(0.15)	(0.12)	(0.12)
Colonial Link	0.79^a	0.55^a	0.65^a	0.62^a
	(0.06)	(0.10)	(0.08)	(0.08)
Common Colonizer	1.53^a	1.00^a	1.15^a	1.20^a
	(0.12)	(0.25)	(0.18)	(0.17)
Ln (1+Tariff) - TRAINS	-6.90^a	-8.27^a	-7.27^a	
	(0.35)	(1.32)	(0.79)	
NTBs Frequency Index	-0.37^a	-1.02^a		
	(0.10)	(0.28)		
Ln (1+Tariff) - MM				-8.23^a
				(0.55)
N	164101	11648	31428	31428
R^2	0.482	0.537	0.479	0.489
RMSE	2.639	2.176	2.378	2.356

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.

Table 3: North-South market access, with regional trade arrangements

	Dependent Variable: Ln Imports Partner/Own						
Model :	Whole sample	N→N	S→S	N →S	S→N	N→S	S→N
Border	-5.47^a	-4.70^a	-5.81^a	-4.33^a	-6.33^a	-4.33^a	-6.67^a
	(0.08)	(0.10)	(0.14)	(0.14)	(0.12)	(0.20)	(0.14)
Ln Rel. Production	0.76^a	0.78^a	0.80^a	0.76^a	0.76^a	0.66^a	0.82^a
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Ln Rel. Prices	-0.10^a	-0.13	-0.29^a	-0.51^a	-0.38^a	-0.70^a	-0.56^a
	(0.03)	(0.09)	(0.05)	(0.10)	(0.04)	(0.11)	(0.05)
Ln Rel. Distance	-0.53^a	-0.46^a	-0.78^a	-0.90^a	-0.41^a	-0.80^a	-0.39^a
	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.06)	(0.04)
Contiguity	1.01^a	1.10^a	0.93^a	1.22^a	2.32^a	1.25^a	2.67^a
	(0.04)	(0.05)	(0.07)	(0.10)	(0.13)	(0.16)	(0.25)
Common Language	0.48^a	0.81^a	0.66^a	0.99^a	0.71^a	0.77^a	0.47^a
	(0.04)	(0.05)	(0.06)	(0.07)	(0.08)	(0.08)	(0.08)
Colonial Link	0.98^a	0.70^a		0.36^a	0.36^a	0.42^a	0.53^a
	(0.06)	(0.06)		(0.06)	(0.10)	(0.07)	(0.11)
Common Colonizer	1.44^a		0.92^a				
	(0.12)		(0.14)				
Same Country	0.39^a	0.41^a	0.76^a				
	(0.07)	(0.09)	(0.10)				
Ln (1+Tariff)	-4.90^a	-3.80^a	-2.95^a	-2.37^a	-1.76^a	-1.59^a	1.40^a
	(0.30)	(0.65)	(0.44)	(0.42)	(0.45)	(0.49)	(0.51)
NTBs Frequency Index	-0.10	-0.42^a	-0.28^b	-0.46^a	0.14	-0.48^a	0.17
	(0.10)	(0.15)	(0.14)	(0.13)	(0.15)	(0.17)	(0.16)
RTAs	1.80^a						
	(0.04)						
EU		0.93^a					
		(0.06)					
CUSA		0.62^a					
		(0.09)					
MERCOSUR			1.06^a				
			(0.14)				
ASEAN			1.59^a				
			(0.22)				
Andean Community			0.22				
			(0.13)				
NAFTA				1.14^a	2.14^a	1.28^a	2.44^a
				(0.25)	(0.18)	(0.24)	(0.24)
Ln Aid Received						0.17^a	
						(0.01)	
Ln Aid Given							0.11^a
							(0.01)
N	164101	47060	28319	29869	58853	20357	36966
R^2	0.503	0.516	0.438	0.427	0.372	0.428	0.376
RMSE	2.584	2.131	2.667	2.36	2.802	2.322	2.822

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 impact of those agreements is interesting for our matter in the perspective of several trading arrangements that might take place in the near future, notably between Northern and Southern countries. The FTAA and the potential arrangements between the EU and MERCOSUR are the most prominent examples on which the impact of the existing set of RTAs can shed light.

The impact of the different RTAs is expected to be quite different. 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 usually be here EU15 over the whole period. MERCOSUR is a customs union signed in 1991 between Argentina, Brazil, Paraguay and Uruguay but implemented in 1995, with member countries substantially liberalizing their internal trade during the transition period. The common external tariff concerned 85% of tariff lines in 1995 and a schedule for convergence towards a complete common external tariff 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. An interesting aspect is its North-South nature. ASEAN is 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). Last, the Andean Community, a rather old regional trade agreement, usually seen as having been less effective in true reductions of the level of protection in those countries.

Table 3 takes into account those five RTAs with dummies equal to one since the beginning of each agreement. Column (1) starts with an overall estimate of the impact of regional agreements in the complete sample. The estimate reveal that the average country in a regional agreement trades $\exp(5.47 - 1.80) \simeq 39$ times more with itself than with another country of the same RTA, while this ratio is 237 when no RTA covers the bilateral trade flow ($\exp(5.47)$). The estimates for the border effects of EU countries in the North-North sample from column (2) is $\exp(4.70 - 0.93) \simeq 43$[12]. The free trade agreement between the United States and Canada also has a positive and significant impact on bilateral trade, although lower than the European Union. An interesting result on NAFTA is obtained from comparing columns (4) and (5). Mexico faces a level of fragmentation around 66 ($\exp(6.33 - 2.14)$) on the Northern American markets, while US and Canadian

[12]The estimate is higher than the most recent ones in the literature (taking representative coefficients mostly based on EU12 or even EU9 countries, Nitsch, 2000, finds a border effect around 10 in 1990, Head and Mayer, 2000, find 13 for the 1993-1995 period and Chen (2004) finds a multiplicative factor of 6 for internal trade flows in 1996). This is due to the fact that our sample includes all 15 EU countries and that trade data for Belgium–a very open country–is mostly missing. More generally, as stated above, the absolute level of estimated border effects is crucially dependent on the way bilateral and internal distances are measured. Studies differ a lot on this aspect, which makes it very hard to compare levels across studies. Comparing those across time or samples inside each paper is probably more informative. Head and Mayer (2002) cover this topic in more detail and develop a theory-consistent measure of distance which lowers notably the estimated level of border effects compared to usual distance measures. Using their distance measure in our sample, the "world border" coefficient of column (1) in Table 1 falls from -4.49 to -3.67 and the estimated border effect for EU15, falls from 43 to $\exp(3.38 - 0.62) = 15.8$ in Table 3. While the absolute levels are thus very sensitive to the mesure of distance used, the rankings of revealed market access and the coefficients on other variables are not substantially altered.

exporters' corresponding access is less difficult, with a level around 24 (exp(4.33 − 1.14)). The estimated level of market access in the South-South combinations is extremely low (an estimated border effect of 334 on average), but it is interesting to note that, contrary to the Andean Community, MERCOSUR and ASEAN had a very sizeable impact on market access inside those agreements. Sharing a common colonizer also has a very substantial impact on reciprocal market access, confirming in a different setting the finding of Rose (2000). The two last columns introduce the received and given aid in the North-South combinations. Appendix A shows similar results for the impact of RTAs using MacMap data.

Figure 1: Evolution of the impact of regional agreements

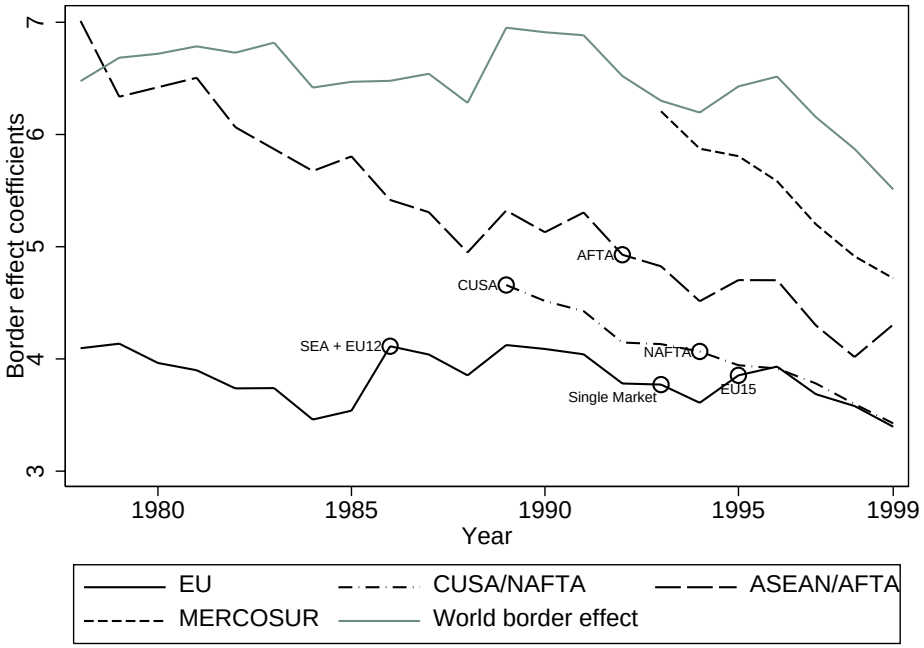


Figure 1 graphs the evolution of border effects coefficients for the world and inside each of the actual RTA. Those estimates are based on simple regressions where, for each year, the relative trade flow is regressed on the explanatory variables of the first column of Table 1 (except tariffs and NTBs in order to cover the 1978-2000 period) and a dummy variable for each RTA. In Appendix B, the first similar graph restrict our sample to the countries for which trade data is available for at least 15 years between 1978 and 1998.[13] Figures are

[13]To graph also the evolution of border effects intra-Mercosur, we add Argentina and Brazil (14 and 9 years available respectively between 1978 and 1998). This restriction keeps 80% of the sample (948,438 observations) and covers the following 47 countries: Argentina, Australia, Austria, Bolivia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Denmark, Ecuador, Egypt, Finland, France, Germany, Greece, Guatemala, Hong Kong, Hungary, India, Indonesia, Ireland, Italy, Japan, Jordan, Kenya, Korea, Malawi, Malaysia, Mexico, Morocco, Netherlands, Norway, Philippines, Portugal, Singapore, South Africa, Spain, Sri Lanka, Sweden, Trinidad and Tobago, Turkey, United Kingdom, United States of America, Uruguay and Venezuela.

very similar.

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 increase in estimated EU fragmentation in 1986 comes from the membership of two relatively closed economies at the time, Spain and specially Portugal. Less pronounced, the increase in 1995 is due to the entry of Austria, Finland and Sweden. The second graph in Appendix B shows the evolution of EU7 instead of EU15. The decline of the border effect is then much smoother. The evolution of MERCOSUR also reveals a downward trend of internal fragmentation.

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, ASEAN and then MERCOSUR, for which border effect coefficients fall markedly in the period 1993-1995, which is interesting as 1995 is the date where most internal trade liberalization should have been completed. Those results point to expected and reasonable estimates of the effect of trading arrangements, somehow more reassuring than what is sometimes found in the literature. Frankel (1997, Table 4.2) for instance, finds mostly insignificant effects of EU membership, once common language and overall openness are taken into account. Soloaga and Winters (2001) find an overall *negative* and significant 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.

Here, as stated in Anderson and van Wincoop (2003, 2004) and Carrère (forthcoming), the rigorous link of the empirical specification with theory proves crucial for a correct assessment of the impact of both national borders and regional integration. The puzzling results in the previous literature where the deepest integration experiences did not seem to yield consistent important surpluses of trade are here qualified. 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).

3.3 Evolution

Results in this section detail the evolution of market access over time, starting from 1976 and going to 1999. We are here focusing on access to Northern markets, and we investigate whether the current high level of revealed restrictions in market access is a persistent phenomenon, and whether there has been some progress recently on this front.

Table 4 gives overall results for the access to the developed countries markets over time. The first three columns provide an overview of how coefficients evolve over three periods of time (1976-1983, 1984-1991 and 1992-1999). The fourth column restricts the sample to those observations for which tariffs are available.[14] The fifth column gives results for the last

[14]We also drop imports of Hong-Kong and Singapore in this table. Those two countries are characterized

Table 4: Difficulties for Developing Countries in Rich Countries' Market Access over Time (w/o. HKG and SGP)

	Dependent Variable: Ln Imports Partner/Own				
Model :	1976-1983	1984-1991	1992-1999	1992-1999	1992-1999
Border	-8.57^a	-7.31^a	-5.92^a	-5.81^a	-5.77^a
	(0.09)	(0.07)	(0.07)	(0.09)	(0.08)
Ln Rel. Production	0.63^a	0.70^a	0.76^a	0.78^a	0.78^a
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Ln Rel. Prices	-0.81^a	-0.82^a	-0.44^a	-0.52^a	-0.53^a
	(0.05)	(0.04)	(0.03)	(0.03)	(0.03)
Ln Rel. Distance	-0.21^a	-0.49^a	-0.61^a	-0.63^a	-0.63^a
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Contiguity	1.46^a	1.98^a	1.40^a	1.42^a	1.42^a
	(0.15)	(0.09)	(0.07)	(0.09)	(0.09)
Common Language	0.57^a	0.40^a	0.18^a	0.19^a	0.20^a
	(0.05)	(0.04)	(0.04)	(0.06)	(0.06)
Colonial Link	0.59^a	0.59^a	0.90^a	0.91^a	0.90^a
	(0.08)	(0.07)	(0.06)	(0.08)	(0.08)
NAFTA			2.43^a	2.35^a	2.32^a
			(0.09)	(0.11)	(0.11)
Ln (1+Tariff)					-1.57^a
					(0.37)
N	67805	99462	141522	84180	84180
R^2	0.268	0.319	0.386	0.391	0.392
RMSE	2.895	2.809	2.756	2.754	2.752

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.

period with tariffs included. Noteworthy is first the substantial improvement of the fit of the regression over time. This remain true in the other evolution tables shown in Appendix C, which distinguish between the European, the North-American and the Japanese market access. Our empirical specification of trade patterns is an increasingly good description of reality over time for the South → North trade, which is not the case in general when this type of regression is applied to North-North trade flows. A possible interpretation is that the underlying theoretical motivations of the regressions are increasingly relevant over time for the South-North trade flows. The first row of Table 4 reveals that, even if the current level of access to Northern markets is very restricted, it is *fourteen* times easier to enter those markets for a Southern country exporter now than what it used to be in the end of the seventies ($\exp(8.57)/\exp(5.92)$). While room for improvement is clearly large, there has been considerable increase in the access of developing countries' products on developed countries' markets.

Whether the remaining level of difficulty in market access is due to residual protection or other factors such as preferences for Northern products or different qualities of goods is hard to identify. One thing that appears clearly in all evolution tables is that tariffs are not the dominant explanation of market access restrictions in this type of South-North trade flows: The border effect falls by less than 5% when tariffs are taken into account ($(\exp(5.77 - 5.81) - 1)$. One dimension of the data we can use to shed more light on this issue is the different importing countries in the North sample. If Southern producers face highly restricted market access because the varieties exported match relatively badly with Northern countries tastes, then the estimated border effects should be broadly similar across importing countries. As Tables 7, 8 and 9 in Appendix C reveal, there is on the contrary wide variance in those South-North border effects. During the 1992-1999 period, EU15 countries trade on average $\exp(5.88) = 358$ times more with themselves than with a developing country of similar size and other characteristics. This figure was $\exp(5.78) = 324$ for the USA and Canada and only $\exp(1.51) = 4.5$ for the Japanese market. The figure for the EU hides wide disparities among European countries, with some EU countries being much more closed than others to imports from the South. Note lastly that coefficients on distance are widely different, Japan, the USA and Canada being far more sensitive to distance than EU countries in their trade patterns with the developing world. An additional aspect relates to colonial links and aid given. Due to the history of European colonial powers and to their current foreign policy instruments, a large number of developing countries do have the colonial link (with coefficient of 0.62 to be subtracted from the border effect of 5.74 in the 1992-1999 period, column (4) of Table 7) set to one combined with a substantial amount of bilateral aid, which also seems to promote trade.[15]

Table 5 shows the changes in the estimated border effects between each period for each developing country of the sample. Unsurprisingly, East Asian exporters, and Chinese in particular, are among those for which changes in access to Northern markets are more

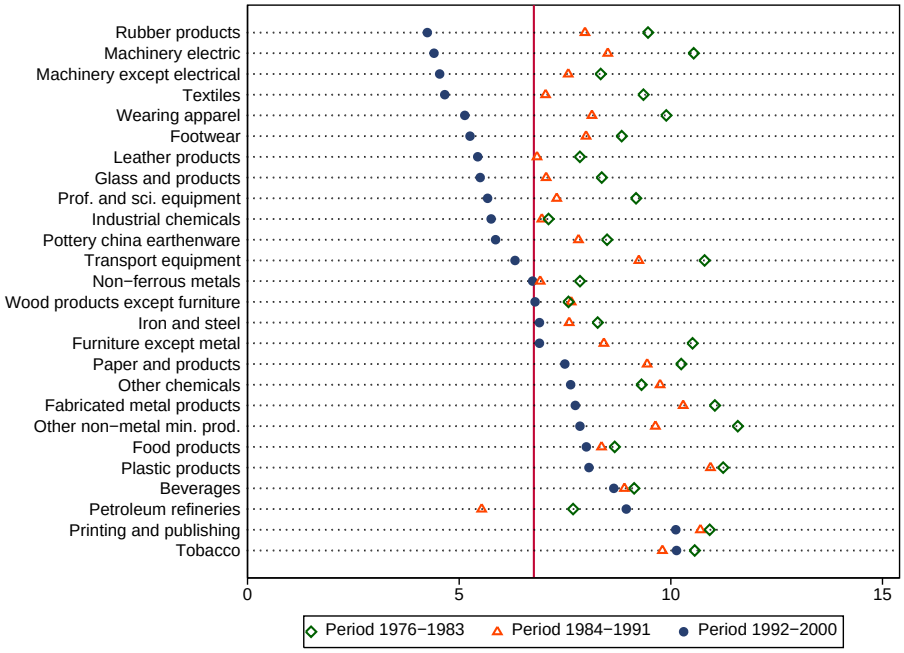
by very large openness to developing countries' exports, together with extremely small internal distance. Those two phenomena tend to bias upwards the estimate on bilateral distance and therefore also the one on borders. The trend of those border effects over time is however unchanged when including those two countries.

[15]The only colonial link of the United States is the Philippines, which explains the very high coefficient on this variable in Table 8.

favorable. EU neighbors also improve largely their access to rich countries between the periods 1984-1991 and 1992-2000. On the contrary, Latin American and African countries are in general under the median levels except for Mexico.

3.4 Industry-level market access

Figure 2: Evolution of Market Access South → North



We finally detail industry-level results concerning imports of high income countries from developing countries. Figure 2 (and figures 5, 6 and 7 in Appendix C) report border effects coefficients in industry by industry regressions.[16] We obtain those coefficients for the three different sub-periods, which enables comparisons across time.

Overall results for the Northern importing countries are given in figure 2. The developed markets that are the most difficult to enter in the last period are Tobacco, Printing and publishing, beverages industries and petroleum refineries notably. On the opposite extreme, different types of machinery, wearing apparel, textiles and chemicals are the relatively easiest markets to export to. All those industries have been characterized by considerable improvement in market access, with transport equipment and electric machinery being among the leading examples of products which switched from one of the most difficult to export to the North, to one of the easiest in twenty years.

As shown in the appendix, Japan is the only of the Northern countries considered individually that actually exhibits reverse border effects, that is a revealed preferential

[16] As in the previous section, the explanatory variables are those of the first column of Table 1 except tariffs and non-tariff barriers in order to have a long period.

Table 5: Changes in access to Northern markets (decrease of border effect coefficients)

	Border effect coefficient			Percent change between periods	
Country	1976-1983	1984-1991	1992-2000	second/first	third/second
China	8.9	8.1	4.1	-9	-49.4
Egypt	10.4	9.9	5.3	-4.8	-46.5
Jordan	14.1	12.1	8.1	-14.2	-33.1
Algeria	10.6	9.1	6.2	-14.2	-31.9
Indonesia	9.6	7.9	5.5	-17.7	-30.4
Benin	8.7	6.4	4.5	-26.4	-29.7
Thailand	10.7	8.3	6.3	-22.4	-24.1
Poland	8.7	7.5	5.7	-13.8	-24
Ghana	9.6	9.7	7.5	1	-22.7
Morocco	9.5	7.6	5.9	-20	-22.4
Romania		6.6	5.2		-21.2
India	10.5	10.3	8.2	-1.9	-20.4
Hungary	8.1	7.6	6.1	-6.2	-19.7
Turkey	9.4	7.3	5.9	-22.3	-19.2
Mexico	9.1	7.9	6.4	-13.2	-19
Malaysia	7.5	6	5	-20	-16.7
Philippines	8.5	9.3	7.8	9.4	-16.1
Panama	12.6	12.5	10.6	-0.8	-15.2
Tunisia	7.6	8.1	6.9	6.6	-14.8
Iran	13.1	11.2	9.6	-14.5	-14.3
Costa Rica	9.6	9.8	8.5	2.1	-13.3
Bulgaria		5.5	4.8		-12.7
Honduras	10.8	11.7	10.3	8.3	-12
Korea	8.5	7.7	6.8	-9.4	-11.7
Trinidad and Tobago	9.3	7.2	6.5	-22.6	-9.7
Ecuador	12.1	12	10.9	-0.8	-9.2
Guatemala	9.7	11	10.1	13.4	-8.2
MEDIAN	9.6	8.9	8.25	-9.4	-8
Pakistan	10	9	8.3	-10	-7.8
Venezuela	12.2	10	9.3	-18	-7
Sri Lanka	9.8	9.5	8.9	-3.1	-6.3
Nigeria	13.4	13.6	13	1.5	-4.4
Colombia	9.6	9.5	9.2	-1	-3.2
El Salvador	9.7	10.8	10.5	11.3	-2.8
Argentina	9.7	9.3	9.1	-4.1	-2.2
Syrian Arab Republic	11.5	10.7	10.5	-7	-1.9
Brazil		6.1	6		-1.6
Mozambique		13	12.8		-1.5
Kenya	11.5	10.7	10.8	-7	0.9
Chile	9.9	9	9.2	-9.1	2.2
Cameroon	10	6.9	7.1	-31	2.9
Bolivia	8.2	9.7	10.1	18.3	4.1
Uruguay	8.2	7.4	7.8	-9.8	5.4
Peru	7.1	9.4	10	32.4	6.4
South Africa	9.8	8.3	9	-15.3	8.4
Malawi	5.4	5.8	6.3	7.4	8.6
Zimbabwe	10.3	8.8	9.6	-14.6	9.1
Barbados	11.6	8.7	9.7	-25	11.5
Mauritius	15.4	9.4	11	-39	17
Côte d'Ivoire	8.5	5.8	6.8	-31.8	17.2
Bangladesh	9	6.8	8.7	-24.4	27.9
Fiji	5.9	3.7	4.8	-37.3	29.7
Tanzania	9.6	9.7	13.7	1	41.2
Nepal		8	11.6		45
Senegal	8.8	7.4	10.8	-15.9	45.9

access of Southern goods over domestic ones. This is true for professional equipment, machinery, apparel, footwear and leather notably for the latest years. Iron, steel and non-ferrous metals have specifically high border effects for this country.

4 Conclusion

This paper develops a new method to measure difficulties in market access over a wide sample of countries (both developing and developed), industries and years. We use a gravity-type model of trade patterns structurally grounded in theory to estimate in particular the impact of national borders on revealed access to Northern markets by Southern producers. Results show that difficulties faced by developing countries' exporters in accessing developed countries consumers are higher than difficulties faced by Northern exporters. Currently, the tariff equivalents of those border effects differ by a figure up to 45 percentage points. Those difficulties in market access have however experienced a noticeable fall since the mid seventies.

Another of our results concerns the impact of tariffs on market access. While tariffs still have in general an influence on trade patterns, they do not seem to be an important part of the border effect faced by Southern exporters on Northern markets. We also show that the proximity of the empirical specification with theory changes the estimates related to the impact of regional agreements and put them more in line with our expectations than some results in the literature. The EU, CUSA/NAFTA, ASEAN/AFTA and MERCOSUR agreements all tend to reduce the estimated degree of market fragmentation within those zones, with an expected ranking between the respective impact of those agreements. Further research should concentrate on the provision of further explanations of estimated restrictions in market access and in particular on disentangling actual protection from differences in preferences among consumers in rich and poor countries. While we do account for relative prices of products in our specification, an additional improvement of our framework would be to deal more fully with the respective specialization patterns of developing and developed countries, incorporating comparative advantage in the model.

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A Robustness check: North-South market access, with regional trade arrangements using MacMap

Table 6: North-South market access, with regional trade arrangements

	Dependent Variable: Ln Imports Partner/Own						
Model :	Whole sample	N→N	S→S	N →S	S→N	N→S	S→N
Border	-4.51^a	-4.54^a	-4.26^a	-2.72^a	-5.02^a	-2.38^a	-5.31^a
	(0.14)	(0.16)	(0.26)	(0.32)	(0.17)	(0.52)	(0.27)
Ln Rel. Production	0.74^a	0.73^a	0.84^a	0.72^a	0.78^a	0.64^a	0.86^a
	(0.01)	(0.02)	(0.03)	(0.02)	(0.02)	(0.04)	(0.04)
Ln Rel. Prices	-0.30^a	-0.45^a	-0.54^a	-0.85^a	-0.55^a	-0.98^a	-0.67^a
	(0.05)	(0.16)	(0.11)	(0.17)	(0.08)	(0.22)	(0.08)
Ln Rel. Distance	-0.62^a	-0.40^a	-0.97^a	-1.10^a	-0.52^a	-1.10^a	-0.45^a
	(0.05)	(0.05)	(0.08)	(0.08)	(0.05)	(0.11)	(0.08)
Contiguity	0.93^a	1.20^a	0.68^a	0.91^a	1.53^a	1.07^a	1.40^a
	(0.08)	(0.08)	(0.16)	(0.19)	(0.21)	(0.27)	(0.53)
Common Language	0.76^a	0.90^a	0.58^a	0.94^a	0.80^a	0.70^a	0.50^a
	(0.06)	(0.09)	(0.11)	(0.09)	(0.14)	(0.12)	(0.17)
Ln (1+Tariff) - MM	-6.83^a	-5.23^a	-5.84^a	-4.78^a	-5.76^a	-4.93^a	-2.80^b
	(0.53)	(1.04)	(0.69)	(0.59)	(0.85)	(0.86)	(1.29)
Same Country	0.41^a	0.16	0.51^a				
	(0.13)	(0.22)	(0.18)				
Common Colonizer	1.18^a		0.95^a				
	(0.19)		(0.22)				
Colonial Link		0.34^a		0.45^a	0.13	0.43^a	0.19
		(0.11)		(0.09)	(0.18)	(0.12)	(0.22)
RTAs	1.13^a						
	(0.08)						
EU		0.72^a					
		(0.10)					
CUSA		0.38^b					
		(0.17)					
MERCOSUR			0.37				
			(0.27)				
ASEAN			2.35^a				
			(0.42)				
Andean Community			0.29				
			(0.32)				
NAFTA				0.21	1.38^a	0.08	1.95^a
				(0.57)	(0.28)	(0.58)	(0.44)
Ln Aid Received						0.13^a	
						(0.03)	
Ln Aid Given							0.10^b
							(0.04)
N	31230	8800	6336	7927	8167	4981	3976
R^2	0.487	0.483	0.507	0.43	0.447	0.423	0.448
RMSE	2.345	1.979	2.534	2.253	2.377	2.29	2.427

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.

B Evolution of the impact of regional agreements

Figure 3: Evolution of the impact of regional agreements - Restricted sample

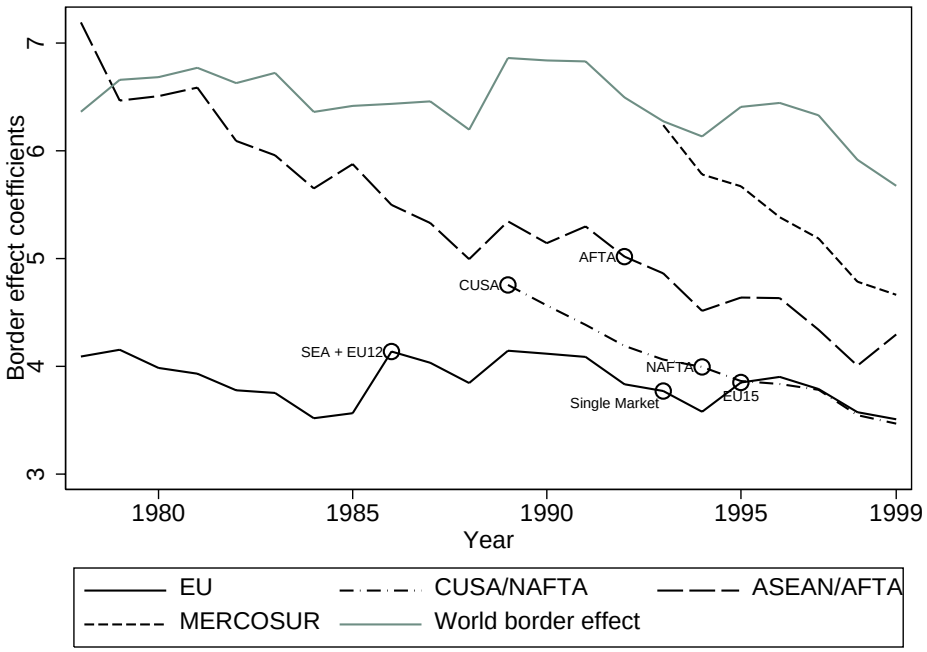
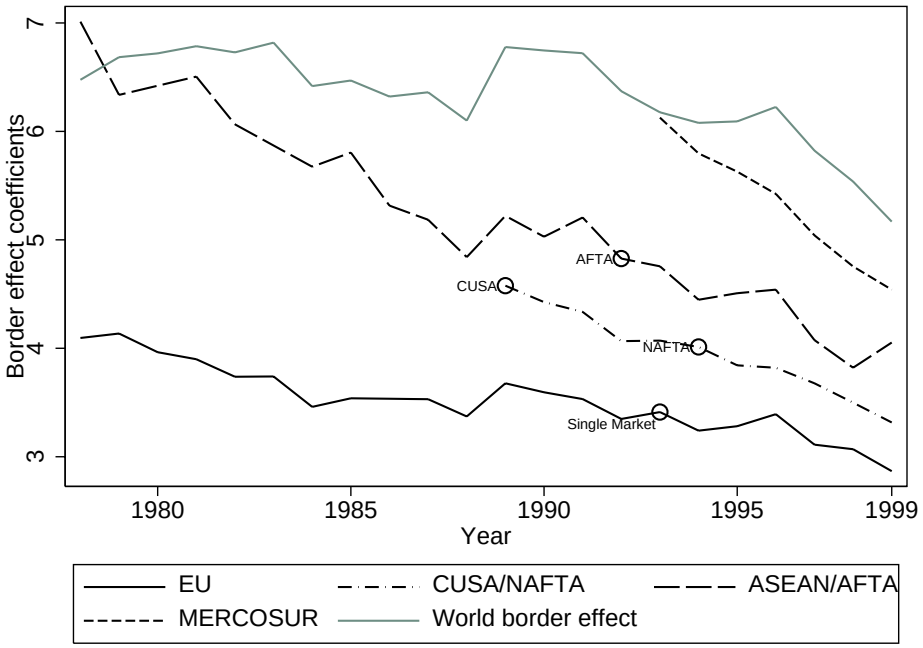


Figure 4: Evolution of the impact of regional agreements - EU7



C Difficulties for developing countries in the Quad countries' market access over time and by industry

Table 7: Difficulties for Developing Countries in European Market Access over Time

	Dependent Variable: Ln Imports Partner/Own						
Model :	76-83	84-91	92-99	92-99	TRAINS	MM	Aid
intcpt	-8.77^a	-7.57^a	-5.88^a	-5.74^a	-5.71^a	-4.98^a	-7.15^a
	(0.12)	(0.09)	(0.08)	(0.10)	(0.10)	(0.22)	(0.15)
Ln Rel. Production	0.62^a	0.71^a	0.76^a	0.77^a	0.77^a	0.77^a	0.84^a
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.01)
Ln Rel. Prices	-1.01^a	-0.96^a	-0.58^a	-0.64^a	-0.65^a	-0.81^a	-0.84^a
	(0.06)	(0.05)	(0.03)	(0.04)	(0.04)	(0.09)	(0.04)
Ln Rel. Distance	-0.15^a	-0.39^a	-0.60^a	-0.63^a	-0.62^a	-0.60^a	-0.25^a
	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.07)	(0.04)
Contiguity	0.50^a	1.34^a	1.62^a	1.51^a	1.52^a	1.06^a	0.00^a
	(0.18)	(0.12)	(0.08)	(0.11)	(0.10)	(0.27)	(0.00)
Common Language	0.41^a	0.24^a	0.19^a	0.18^b	0.18^b	0.17	0.18^b
	(0.08)	(0.07)	(0.07)	(0.09)	(0.09)	(0.25)	(0.09)
Colonial Link	0.41^a	0.47^a	0.60^a	0.62^a	0.63^a	0.39^c	0.64^a
	(0.08)	(0.08)	(0.07)	(0.08)	(0.08)	(0.22)	(0.10)
TRAINS Tariffs					-1.79^a		0.84^c
					(0.42)		(0.47)
MacMap Tariffs						-6.68^a	
						(1.26)	
Ln Aid Given							0.11^a
							(0.01)
N	44755	63076	92343	59334	59334	5448	37288
R^2	0.24	0.3	0.355	0.364	0.364	0.409	0.371
RMSE	2.909	2.837	2.775	2.752	2.75	2.37	2.8

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.

Table 8: Difficulties for Developing Countries in the USA and Canadian Market Access over Time

	Dependent Variable: Ln Imports Partner/Own						
Model :	76-83	84-91	92-99	92-99	TRAINS	MM	Aid
Border	-7.81^a	-6.58^a	-5.78^a	-5.71^a	-5.77^a	-5.72^a	-5.45^a
	(0.15)	(0.13)	(0.13)	(0.15)	(0.15)	(0.46)	(0.17)
Ln Rel. Production	0.72^a	0.74^a	0.78^a	0.80^a	0.80^a	0.79^a	0.76^a
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.02)
Ln Rel. Prices	-0.97^a	-0.95^a	-0.39^a	-0.58^a	-0.57^a	-0.26	-1.37^a
	(0.11)	(0.08)	(0.07)	(0.09)	(0.08)	(0.22)	(0.10)
Ln Rel. Distance	-0.72^a	-0.91^a	-0.85^a	-0.94^a	-0.95^a	-0.29	-1.42^a
	(0.06)	(0.05)	(0.05)	(0.07)	(0.07)	(0.20)	(0.08)
Contiguity	3.19^a	3.08^a	1.96^a	1.68^a	1.68^a	1.35^a	1.69^a
	(0.12)	(0.10)	(0.14)	(0.18)	(0.18)	(0.49)	(0.17)
Common Language	0.99^a	0.55^a	0.65^a	0.73^a	0.73^a	0.79^a	0.60^a
	(0.06)	(0.05)	(0.04)	(0.06)	(0.06)	(0.15)	(0.06)
Colonial Link	2.28^a	2.20^a	2.42^a	2.22^a	2.24^a		2.66^a
	(0.18)	(0.15)	(0.19)	(0.26)	(0.26)		(0.26)
NAFTA			1.97^a	2.08^a	2.12^a	2.15^a	1.67^a
			(0.14)	(0.16)	(0.16)	(0.48)	(0.17)
TRAINS Tariffs					1.31		1.32
					(1.22)		(1.25)
MacMap Tariffs						3.60	
						(3.30)	
Ln Aid Given							-0.20^a
							(0.02)
N	8675	12809	17566	11535	11535	1037	8199
R^2	0.351	0.377	0.421	0.436	0.436	0.556	0.459
RMSE	2.695	2.575	2.684	2.683	2.682	2.219	2.741

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.

Table 9: Difficulties for Developing Countries in Japanese Market Access over Time

	Dependent Variable: Ln Imports Partner/Own						
Model :	76-83	84-91	92-99	92-99	TRAINS	MM	Aid
Border	-4.17^a	-3.23^a	-1.51^a	-1.65^a	-1.70^a	-2.07^a	-3.22^a
	(0.27)	(0.26)	(0.23)	(0.28)	(0.28)	(0.42)	(0.29)
Ln Rel. Production	0.71^a	0.84^a	0.89^a	0.90^a	0.89^a	0.90^a	1.04^a
	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.07)	(0.04)
Ln Rel. Prices	-0.37^c	-0.59^a	0.03	-0.03	-0.01	-0.17	-0.61^a
	(0.22)	(0.14)	(0.08)	(0.10)	(0.10)	(0.23)	(0.11)
Ln Rel. Distance	-1.44^a	-1.57^a	-1.72^a	-1.68^a	-1.68^a	-1.48^a	-1.50^a
	(0.08)	(0.07)	(0.08)	(0.09)	(0.09)	(0.19)	(0.10)
TRAINS Tariffs					1.25		0.19
					(1.19)		(1.37)
MacMap Tariffs						0.50	
						(1.65)	
Ln Aid Given							0.46^a
							(0.04)
N	4068	5154	7018	4509	4509	441	3187
R^2	0.315	0.424	0.523	0.531	0.532	0.589	0.597
RMSE	3.036	2.739	2.493	2.47	2.469	2.296	2.442

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.

Figure 5: Evolution of Market Access South → EU15

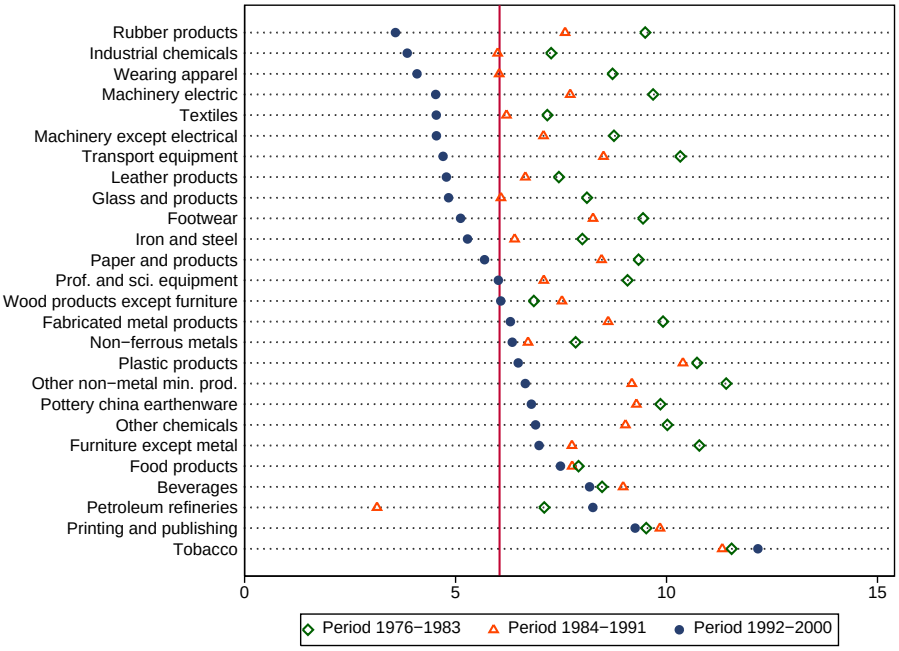


Figure 6: Evolution of Market Access South → USA-Canada

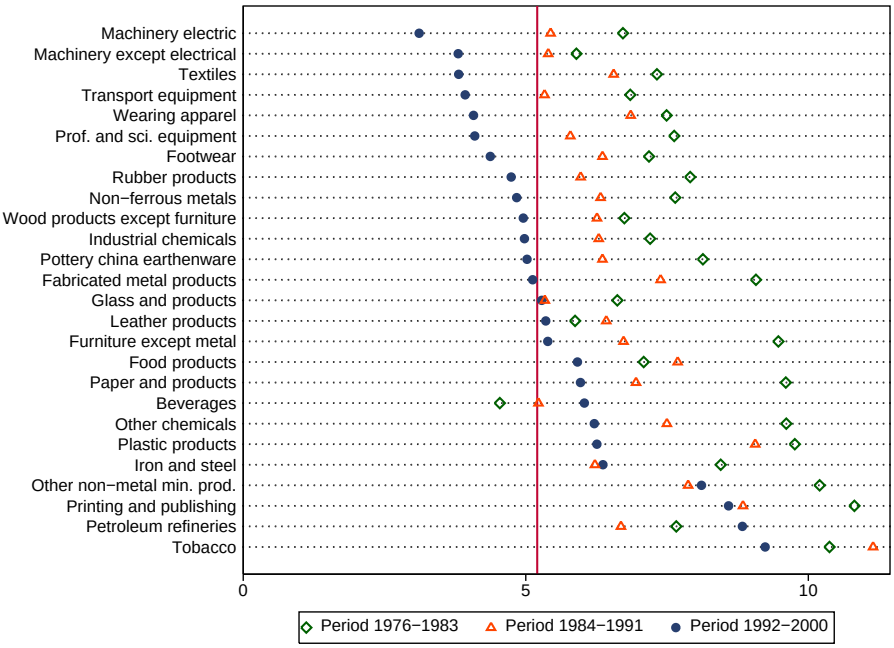


Figure 7: Evolution of Market Access South → Japan