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# MERCOSUR AS AN EXPORT PLATFORM. THE AUTOMOTIVE INDUSTRY[1]

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**MERCOSUR AS AN EXPORT PLATFORM. THE AUTOMOTIVE INDUSTRY**


## Abstract

The global automotive industry is dominated by few MNCs, which design global and regional strategies. If regional strategies were prioritised, MERCOSUR could competitively become an export platform. This paper measures whether this was achieved. We use bilateral trade data from 1991-2005 to evaluate trade creation and market diversification of the industry using gravity models. Results show that MERCOSUR agreements did not yet convert the region into an export platform for extra-bloc markets, although they genuinely created trade within the region.



**Keywords:**

Globalization Market Integrations

International Trade Theory

South America (Latin America)

Automotive

Econometrics

Theory of MNE (Ownership-Location-Internalization)

## I) INTRODUCTION

Automotive production is dominated by very few multinational corporations (MNCs); the largest five (General Motors, DaimlerChrisler, Toyota, Ford y Volkswagen) count for 65% of total production in 2005. Subsidiaries of some MNCs started production in Argentina and in Brazil during the 1950s, principally motivated by the increase of their internal markets, which were largely protected as automobile markets generally were in producing economies.

However, new trends in the industry were unfolded in recent years which rendered internal markets as insufficient incentives for further increase in the production capacity. These new trends aim at gaining international competitiveness by means of internationalising production, which would be the most effective way of reducing costs and simultaneously increasing variety worldwide.

They are known with the names of "*commonolisation*", "*modularisation*" and "*global sourcing*". *Commonolisation* implies to globally use common platforms and other mechanical components and to concentrate most design activities in a few locations. This opens new possibilities for increasing scale (especially in design and development) and scope economies, since with little modifications different models and versions could be produced on the same platforms. *Modularisation* implies architectural changes in car production from assembly of parts to assembly of sub-systems. The production of these sub-systems could be outsourced, and the supplier would then deliver a single module for a complete subsystem (e.g. instrument panels, seats, gear boxes, doors, etc.). When outsourcing is involved, the trend implies large responsibilities for the suppliers of subsystems (sometimes called mega suppliers) with whom the auto makers have increasingly symbiotic relations. For example, it is now common to observe suppliers and automakers involve in simultaneous engineering activities (i.e. they cooperate in the generation of new products and/or processes). The increasing reliance on suppliers for production activities let the automakers specialise in design activities and as a consequence they promoted long-term

relations with fewer provider rather than encouraging competition among a big number of potential suppliers.

The *commonolisation* and *modularisation* trends derive to some extent the third trend "*global sourcing*". Since there is a need to use common components for different models and the fact that suppliers become key players in car production, automakers usually prefer to buy from the same suppliers in all locations where they produce. Thus, suppliers also need to globalise. This is especially the case for mega-suppliers and other suppliers in the first tier, but not so relevant for suppliers in the second and third tiers (i.e. producers of more basic components). Moreover, given *just-in-time* technologies, suppliers sometimes also need to follow the automakers to their production location (this trend is called *follow sourcing*), but this trend will be limited when large scale economies are required for efficient production.

Therefore, in order to create incentives for new investments in this industry, it would not be wise to promote protectionist policies, since there are strong global components in firms' strategies developed in the industry that endure the need for intense international exchanges, both of vehicles and components, within the corporation and with international suppliers.

Simultaneously with the global changes, regional strategies have also been diffused in the industry. As a matter of fact, different studies argue that the regional strategies rather than global strategies predominate in global corporations. This is because producing for regional markets appear to better exploit the trade off that exists between scale production and product differentiation (Rugman and Hodgetts, 2001). Firstly, the efficient scale is usually achieved at regional level (Schlie and Yip, 2000) –especially since regional trade agreements widened and diffused (Humphrey and Memedovic, 2003)-; and secondly, demand is often stratified also at regional level because of common cultural patterns, environmental and safety regulation, use of fuels, etc. Moreover, other reasons unrelated to scale and product differentiation, also induce carmakers to prefer their partners in the value chain to operate in the same region. For example, carmakers have high opportunities for making profits when

the network of distribution, finance and aftermarket services is well established in the region were they produce,

In sum, it seems that regional strategies are preferable due to efficiency and profitability against both, national and also global strategies (see Freyssenet and Lung, 2000; Humphrey and Memedovic, 2003; Rugman and Collinson, 2004). This opens encouraging perspectives to MERCOSUR, since it could potentially become a production and export platform for an internationally competitive industry. In this paper, we attempt to understand to what extent this was the case for Argentina and Brazil since they signed a special trade agreement for the automobile sector at the end of 1994. Our approach is on revealed competitiveness; we will analyze the extent to which these countries increase the intensity of exports, especially to extra-bloc markets, in the years that follow their agreement. We estimate sectoral gravity models with information on worldwide bilateral flows in the automobile industry from 1991 to 2005.

Five sections follow to this one. The next one (Section II) contextualize the study presenting main statistics on production and trade for the automobile sector in Argentina and Brazil; it also describes the main features of the regulatory framework. Section III presents the research questions and hypotheses. Section IV describes the methodology for testing the hypotheses. Section V discusses the empirical results, and finally the conclusions are presented in Section VI.

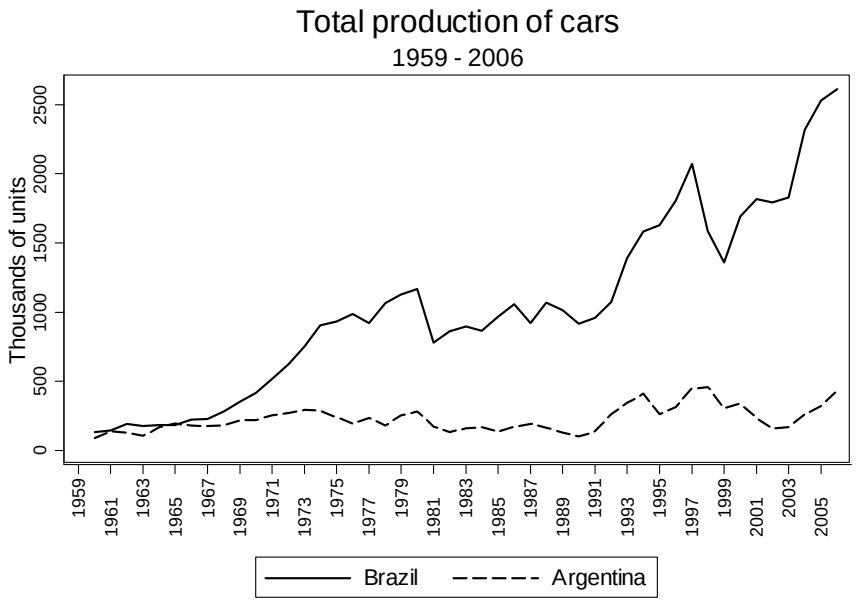
## II) THE AUTOMOBILE INDUSTRY IN ARGENTINA AND BRAZIL

### 2.1) The national perspective

The automobile sector has been frequently considered an importer pillar for the economic and industrial development in Argentina and Brazil. The industry has been systematically supported even by governments with opposite viewpoints on economic policy. To some

extent, this support responds to political economy issues (i.e. vested interests created throughout the long production history –since the late 1950s in the region-). However, it is also true that the economic importance of the sector still remains in the present time. In 2005, the Argentinean automobile and auto-component industries represented 5.3% of the industrial output (industrial gross production value) and 3.5% of industrial employment, while in Brazil those figures were even more outstanding: 10.9% and 6.2% respectively.

**Figure 1:** Historical evolution of car production in Argentina and Brazil, from 1959 to 2006

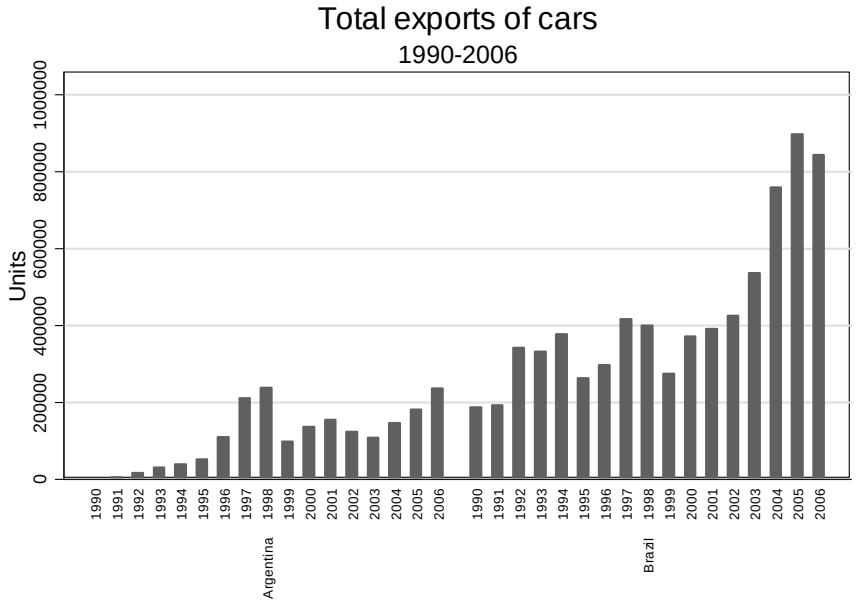



Source: Own production using data from ADEFA (short in Spanish for Automobile Makers Association) and ANFAVEA (short in Portuguese for National Association of Auto Vehicle Makers)

Figure 1 shows the evolution of car production in Argentina and Brazil. The Argentinean series is more erratic; for example in 1990 the production was lower than in 1961, then it increased sharply during the 1990s but in 2002 the same amount of cars were produced as in 1964. Brazil produced quantities that were comparable to those produced by Argentina until the mid 1960s, but by 2006 it produced six times more car than its neighbour after a much less volatile evolution.

Export performance is also markedly asymmetric in Argentina and Brazil. At the beginning of the 1980s, Brazil exported almost as much units per year as Argentina did in 2006. Since then exports continue growing and in 2006 Brazil exported 3.6 times more than Argentina (see Figure 2). Argentinean exports grew during the 1990s, but Brazilian recession first in 1998/9 and Argentinean crisis later (in 2001/2) reversed export performance. Since 2003 exports start growing again.

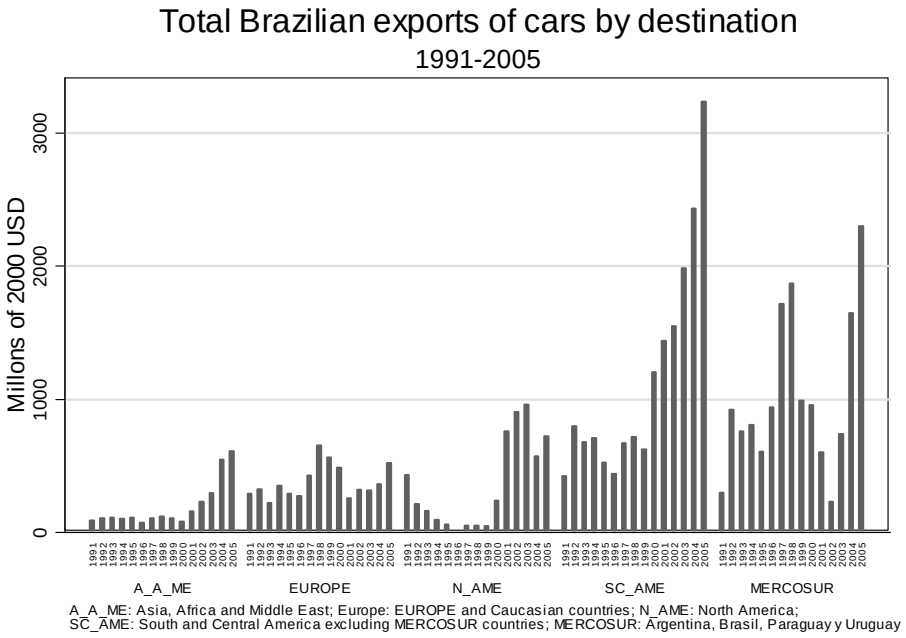
**Figure 2:** Total exports in the automobile sector in Argentina and Brazil, from 1990 to 2006




Source: Own production using data from ADEFA and ANFAVEA

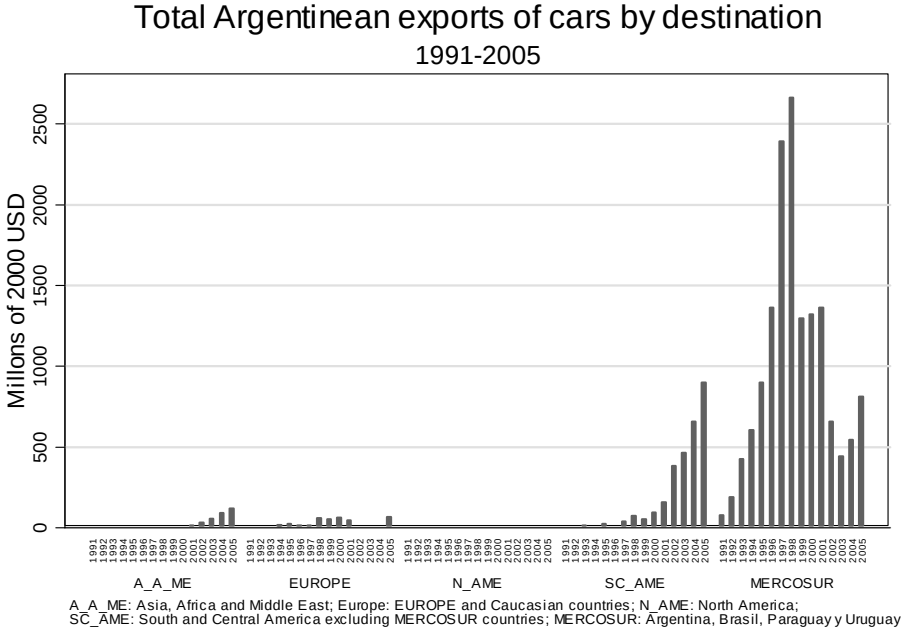
Brazil also outperformed Argentina in its access to extra-bloc markets. As can be seen in the comparison between Figure 3 and 4, Brazil managed to diversify its exports markets more widely than Argentina. The latter country has only recently (since 2002) started exporting beyond MERCOSUR, but mainly within Latin-America. Brazil, instead reached more demanding markets, such as Europe and North-America in the early 1990s. Although these markets still represent a minority share of Brazilian total exports, its economic relevance should not be turned down: in 2005 Brazil exported to Europe and North-America a total amount that was similar to Argentinean total exports (worldwide).

**Figure 3:** Total exports in the automobile sector in Brazil by destination, from 1991 to 2005




Source: Own production using data COMTRADE, United Nations

**Figure 4:** Total exports in the automobile sector in Argentina by destination, from 1991 to 2005




Source: Own production using data COMTRADE, United Nations

There are various factors that explain the different development of the automobile industry in Argentina and in Brazil. Firstly, from a macroeconomic point of view, the business climate was more predictable in Brazil than in Argentina during the period 1989-2005. Secondly, the regulatory system was differently designed and enforced, and it involved an asymmetric degree of economic aid in these two countries. Although the automobile sector was supported by both governments since the origins of the industry, in Brazil, support has been much more direct and systematic, with subsidies and soft credit offered by federal, provincial and even more local institutions. In Argentina, instead, regulations were fairly discretionary and sometimes inconsistent; this added to the macroeconomic lack of previsibility. Moreover, the government hardly enforced the commitments achieved by firms at different stages, in what respect, for example, to export performance. Furthermore, there existed very blur focus on developing the value chain and no explicit interest in motivating firms to carry out local innovative activities (see Arza and López, 2007b for more detail).

Thirdly, automobile industry in Argentina and Brazil has structural differences. The market is at least four times larger in Brazil and the industrial network is more developed. This might explain the strategic difference that each of these locations has for the corporation. In turn, this adds to production efficiency, since, by relying on it is internal market, it was historically easier in Brazil to achieve efficient scales of production. Humphrey and Oeter (2000: 63) argued that for light vehicles assembly a scale larger than the 50,000 units could be considered efficient. In 1999 Argentina produced 27 different models of light vehicles, and none of them at volume larger than the 35,000 units. Brazil, instead, produced 44 models, and only six of them at an efficient scale. In 2006 Argentina produced 17 models and two of them at efficient scale. Brazil produced 43 models and 15 of them at efficient scales. We believe that the better use of scales in Brazil is related to the size or their market since in average, 68% of the production of every model was sold to the domestic market in 2006, in Argentina, instead, the domestic market absorbed in average 44% of the production of every model.

All in all, there is evidence to expect a differential performance in Argentina and Brazil. However, in this paper we want to understand the extent to which regional efforts by corporations and governments could trigger competitiveness in *both* countries. Therefore, we will now change the lens to capture the regional point of view.

**2.3) The regional perspective**

MERCOSUR in an important location for worldwide sales and production in the automobile industry. In 2006 the number of new vehicles registered in MERCOSUR were 2.4 millions, which locate the region in number eighth of the world ranking, beyond United States (17 millions); China (6.6 millions), Japan (5.7 millions), Germany (3.8 millions), United Kingdom (2.7 millions) and Italy and France (2.6 millions each). In 2005 MERCOSUR was also located in the eighth place in the ranking of world production of vehicles (it produced 2.8 millions of vehicles). Moreover, having started production in the late 1950s the region can show a long trajectory in this industry. In many cases, MERCOSUR subsidiaries were pioneers in the internationalization strategies of the corporations.

For the automobile industry, integration among MERCOSUR countries has not yet been fully achieved. Countries could not agree on common external tariffs, rules for intra-bloc trade and the definition of rules of origin. Up to present time, no common regime has yet been signed. Instead, a large series of bilateral agreements coexists. Brazil and Argentina signed the first agreement in December 1994 and the last one in June 2006. Therefore, when in this paper we refer to the "bloc" we mean Argentina and Brazil partnership.

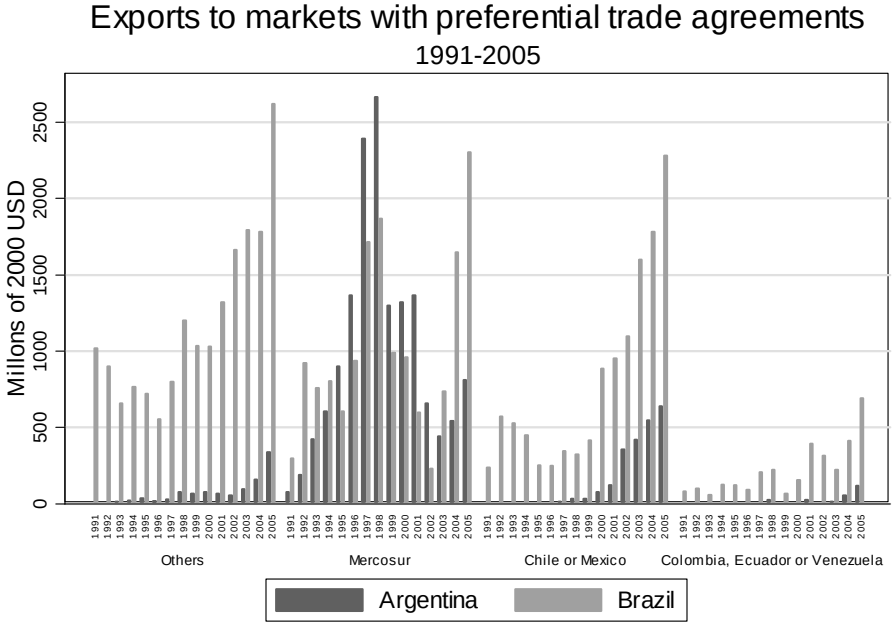
In the integration process between Argentina and Brazil, three periods could be identified. A first period, (until 1994) characterized by a national regulatory system that prioritized protecting their internal markets and increasing competition against each other to capture new international markets. A second period (from 1995 to 2000) with increasing emphasis in MERCOSUR integration but still somehow inward looking (e.g. on the one hand intra-bloc trade was free from tariffs –subject to rules of origin, which were defined regionally- but on

the other hand, imports from the partner had to be compensated with exports worldwide and there was no agreement on common external tariff). A third period started in August 2000, when a new bilateral agreement was signed between Argentina and Brazil, which deepened MERCOSUR integration (e.g. common external tariffs were established and intra-bloc trade restrictions were loosened with the aspiration of reaching free intra-bloc trade by 2006). When intra-bloc free-trade was due to begin, Argentina pushed for an extension of the previous agreement and a new one was signed in 2006, valid until 2008. To some extent, this implied a retrocession in the integration process, since intra-bloc trade was more tightly regulated.

Moreover, in recent years the regional influence of MERCOSUR automobile production was expanding with the support of various preferential trade agreements (PTA) signed with Latin-American countries: Chile (1996 and 2002); Mexico (2003), and with Venezuela, Colombia and Ecuador (2005). Argentina and Brazil have also signed various agreements with Uruguay since the 1980s. However, in the context of MERCOSUR integration, important steps for the automobile sector were done first in 1994 and later in 2002 (with Brazil) and 2003 (with Argentina).

Figure 5 illustrates Argentinean and Brazilian trade for the automobile sector (ISIC 341) to markets with and without PTA (i.e. MERCOSUR, Chile, Mexico, Colombia, Ecuador and Venezuela against other markets). The graph illustrates the following facts: a) MERCOSUR trade increased largely from 1995 onwards and the take-off was more rapid for Argentina. b) The crisis of Brazil (in 1998/9) and Argentina (2001/2) had a negative impact on intra-bloc trade, c) Mexico and Chile become important markets for Argentina but especially for Brazil around the period 2000-2003. d) Colombia, Ecuador and Venezuela are not relevant for Argentina, e) other markets without PTA have always been very relevant for Brazilian exports and timidly started to be so for Argentina in 2004/5.

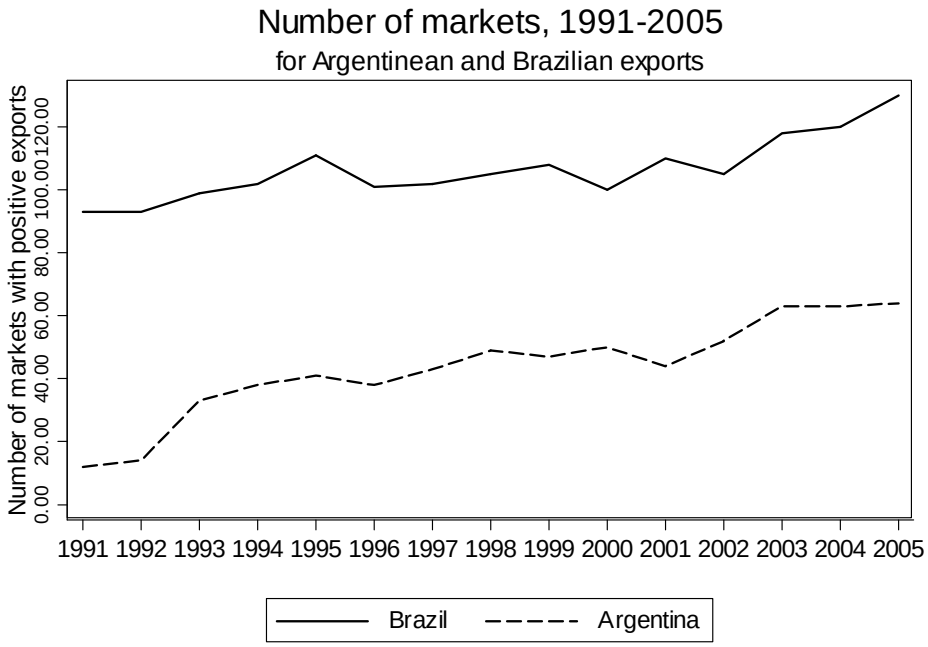
**Figure 5:** Argentinean and Brazilian exports of automobiles to markets with and without preferential trade agreements, 1991-2005




Source: Own production using data COMTRADE, United Nations

In sum, Brazilian exports are more diversified than Argentinean exports, which in turn rely more largely on markets with preferential access. Figure 6 shows the total number of markets to where Argentina and Brazil exported since 1991. As can be seen, Argentina exported cars only to 12 markets in 1991 but in 2005 the industry reached five times more markets (64). Brazil already exported to many more markets in 1991 (93) and in 2005 the Brazilian industry reached 130 destinations. Both countries have recently broken their trend reaching significantly more markets than they historically had (Argentina in 2001 and Brazil in 2002).

**Figure 6:** Export markets. Argentina and Brazil, 1991-2005




Source: Own production using data COMTRADE, United Nations

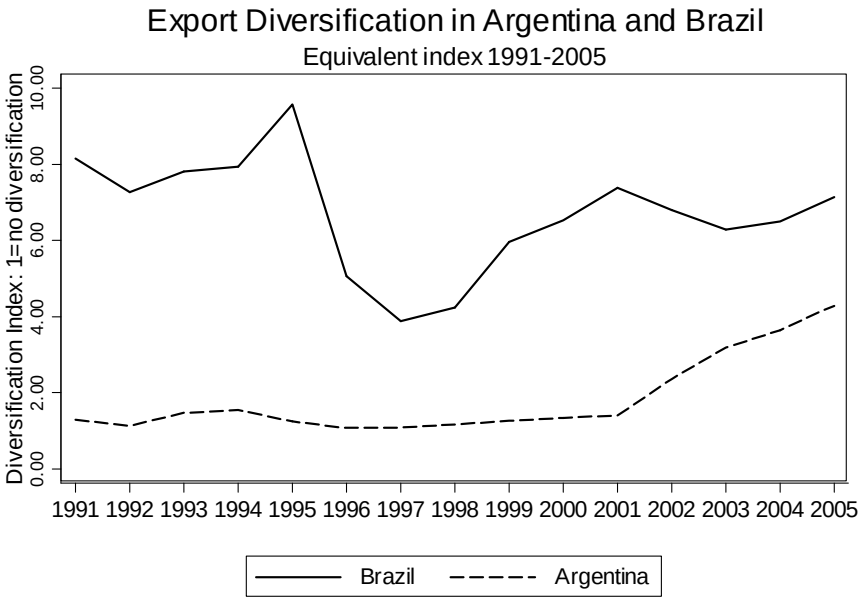
However, market diversification implies not only access to new markets but also a more *balanced* access to all markets. As a matter of fact, Argentina still exported 40% of its total exports of cars to a single country (Brazil) in 2005, while Argentina represented 28% of total Brazilian exports. In other words, the quantity sold to each market was far from being balanced, especially in the Argentinean case. In order to account for this aspect of diversification, we built an equivalent index defined as:

$$F = \frac{1}{\sum_{j}^{n} F_j^2}$$

Where F*i* is the fraction of total exports of Argentina/Brazil that goes to each market *i*. The index has a minimum value of 1 when total Argentinean/Brazilian exports are sold to a single market. Otherwise, the equivalent index evaluates diversification in terms of number of markets with equal export shares. For example, in Figure 7 we see that export

diversification for Argentina in 2005 is equivalent to the diversification of a country that exports equal shares of exports to four markets[i].

**Figure 7:** Diversification measured by an equivalent index. Argentina and Brazil, 1991-2005




Source: Own production using data COMTRADE, United Nations

Figure 7 shows that diversification was more or less stable in Argentina until year 2001. During the period 1991-1994 (before MERCOSUR agreement) the index was around 1.5. It was a bit lower in the period just after the agreement (1.2 between 1995-2000) and it increased to around 3.1 in the period 2001-2005. In other words, Argentinean exports were very largely concentrated in Brazil before and after the agreement, however in recent years the industry reached new markets, noticeable, Chile and México, as we saw in Figure 5.

In Brazil instead, diversification dropped suddenly after the agreement. Argentina started then to be its prioritized market. For example, Brazil exported 12% of its exports to Argentina and also to Chile in 1991. In 1996, exports to Argentina represented almost 41%, while it continued to be more or less 12% to Chile. However, in the following years the participation of Argentina dropped. Simultaneously Brazil reached new markets. Therefore, the diversification index increased. In 2005 Brazil reached an equivalent index of around 7,

which was still lower to what it used to be in 1991 (around 8), even though the country had reached 25% more markets in 2005 than in 1991.

## III) RESEARCH QUESTIONS AND HYPOTHESES

The above discussion suggests that when preferential agreements were established for the automobile industry between Argentina and Brazil in the MERCOSUR context, intra-bloc trade increased. In the case of Brazil this could have happened at the expense of extra-bloc trade. In the Argentinean case, instead, descriptive evidence suggests that trade was genuinely created after the agreement.

Moreover, both countries seem to have diversified trade in recent years. This adds elements of evidence to the hypothesis of MERCOSUR having become an export and production platform. However, while in Argentina the phenomenon of diversification is just a recent one, Brazil shows a historical pattern of increasing diversification. Moreover, trading partners with PTA are mostly responsible for Argentinean diversification while that is not the case for Brazil.

In this paper we aimed at understanding the role of MERCOSUR agreements for trade creation and market diversification.

The research questions are:

***Is there evidence of trade creation after December 1994? Are there patterns of market diversification after that date? Are those patterns similar for Argentina and Brazil? Did diversification appear at the expense of intra-bloc trade?***

We have the following hypotheses:

> *Hypothesis 1*: After MERCOSUR agreements for the car industry (December 1994) there was *trade creation* in Argentina and Brazil

*Hypothesis 2:* Brazil and Argentina diversify their exports to extra-bloc markets since they signed their trade agreement in 2000

*Hypothesis 3:* Diversification came at the expense of intra-bloc exports.

## IV) METHODOLOGY

### 4.1. The gravity model

This paper follows the methodology used in trade integration literature that attempts to measure the degree of trade creation and diversion of different institutional agreements. (e.g Aitken, 1973; Bayoumi and Eichengreen, 1997; Braga and Safadi, 1994; Frankel, 1997; Krueger, 1999; Soloaga and Winter, 2001).

Gravity models are inspirations from physics about objects' attraction, which is dependent of their mass and the distance between them.

(1) $$force\_of\_gravity = G\frac{M_i M_j}{(dist_{ij})^2}$$

In trade theory, physic attraction is replaced by commercial attraction, which is said to be dependent of country size and distance between countries (G is a constant term). Size is defined according to market size of the importer and production capacity of the exporter. Distance, in turn, is defined by barriers (institutional and geographical) and distance (geographical and cultural). Thus, basic gravity models are defined as:

(2)

$$X_{ij} = \alpha + \beta_1 Y_i + \beta_2 N_i + \beta_3 PC_j + \beta_4 N_j + \beta_5 T_i + \beta_6 T_j + \beta_7 AD_i + \beta_8 D_{ij} + \beta_9 A_{ij} + \beta_{10} I_i + \\ + \beta_{11} I_j + \beta_{12} LL_i + \beta_{13} LL_j + \beta_{14-18} CL_{ij} + \varepsilon_{ij}$$

Where, *i* is the importer country and *j* the exporter country.

$X_{ij}$ = Constant (2000 thousands of USD) imports from of country *i* from country *j* (in natural logs)

$Y_i$ = Constant (2000 USD) GDP of importer country (in natural logs)

N = Population of importer/exporter country (in natural logs)

T = Land Area of importer/exporter country (in natural logs)

$PC_j$ = Production capacity of exporter country, defined as the maximum production of the previous five years in 2000 USD (in natural logs).

$AD_i$ = Average distance between country *i* to all its exporter partners, weighted by trade (measure of remoteness) (in natural logs)

$D_{ij}$= Distance between country *i* and country *j*. (in natural logs)

$A_{ij}$= Dummy for neighbor countries *i j*

I= Dummy for countries that are islands

LL= Dummy for countries that are landlocked

$CL_{ij}$= Dummy for common language between countries *i j*. This is sub-divided in 5 dummies for different languages (English, Spanish, Arabic, French and Others).

These models have been enlarged to cover other aspects that affect trade between two countries, which are unrelated to size and distances, for example, dummies for trading blocs, or indicators of revealed comparative advantages or evolution of bilateral exchange rates, etc. (e.g. Filippini and Molini, 2003; Musila, 2005; Soloaga and Winter, 2001).

In order to quantify whether trade creation or trade diversion existed in different circumstances, a set of dummy variables that identifies trade *from*, *to* and/or *between* groups

of partners are used. This methodology was primarily proposed by Aitken (1973). Since then, empirical studies that used and improved the original methodology mushroomed.

This paper used the methodology proposed by Soloaga and Winters (2001). Recall that the objective is to test whether trade was creation after a particular event (i.e. after the sign of 1994 agreement). The method proposes to include three dummy variables: a first dummy identifies the bloc when they import from the extra-bloc; a second one identifies the bloc when they export to extra-bloc, and finally a third one that identifies intra-bloc trade. Then one would compare the coefficients of these dummies after and before the event: there will be trade creation when the increase in the third dummy is larger than the decrease in the first dummy; on the contrary, there will be trade diversion when these two changes are similar.

The enlarged model to be used in this paper is:

(3)

$$X_{ij} = \alpha + \beta_1 Y_i + \beta_2 N_i + \beta_3 PC_j + \beta_4 N_j + \beta_5 T_i + \beta_6 T_j + \beta_7 AD_i + \beta_8 D_{ij} + \beta_9 A_{ij} + \beta_{10} I_i + \\ + \beta_{11} I_j + \beta_{12} LL_i + \beta_{13} LL_j + \beta_{14-18} CL_{ij} + \beta_{19} RCA_{jj} + \beta_{20-34} BLOC_{ij} + \varepsilon_{ij}$$

Where we add the following variables to the base equation (2)

$RCA_{ij}$= Revealed Comparative Advantage, defined as the ratio of the RCA for country *i* over RCA for country *j*. RCAi is defined as the share of country *i* in world exports of cars over the share of country *i* exports over world exports for all traded products. When the indicator is larger than one, country *i* is said to have a comparative advantage in the production of cars.

$BLOC_{ij}$= Dummy variables that bilateral flows *within* fifteen trading blocs (see Appendix A)

As can be seen we added two variables that stimulate trade. The RCA*ij* attempts to measure the relation of competitiveness in car production between importer and exporter and we

expect it to negatively affect the amount traded between importer and exporter. We also added bloc dummy variables since the constitution of blocs can be seen as institutional aids to shorten distances between countries; in other words, it is to be expected that countries within blocs trade more among themselves, and we want to control for this phenomenon.

### 4.2. Data sources and coverage

We use the *Commodity Trade Statistics Database (COMTRADE*) produced by United Nations which covered bilateral trade flows of the automobile industry (ISIC 3: 341) from 1989 to 2006. We consider import flows as first choice and complete missing data with export flows. However data coverage is not equally complete for all years. Therefore, we trimmed the dataset and work only with data from a period when Argentinean and Brazilian data was reasonably complete (1991 – 2005)[ii].

To complete the data requirements of gravity models we use: i) World Bank *Trade, Production and Protection Database*. This database includes all but one[iii] the independent variables for equation 2 for one hundred countries between the period 1970 to 2004; ii) World Bank: *World Development Indicators*, to update time-varying information until 2005; iii) United Nations Industrial Development Organization: *Industrial Statistics* to build the indicator of production capacity; iv) World Trade Organization: *Statistical data sets* to identify regional integration agreements; v) Ministry for the Economy of Argentina and Brazil: legal information datasets to identify PTA with third countries and other regulatory information affecting the automobile industry in Argentina and in Brazil.

Given that data availability was different in each dataset, we ended up with and unbalance panel of 59165 bilateral flows over 1991 and 2005 (between 3393 and 4163 per year).

### 4.3. Testing the hypotheses

In order to test the hypotheses mentioned in III we split the sample in three periods. The first period covers the pre-MERCOSUR years (1991-1994), the second period goes from 1995 to

2000 and finally, the last period was defined to fully consider the time when trade diversification enhanced for both countries (2001-2005).

We then estimate different models to test the hypotheses mentioned above.

**Model 1** is estimated to test Hypothesis 1. We constructed three dummy variables as proposed by Soloaga and Winters (2001) and we added them to equation (3).

$ARGBRA_{ij}$= It is dummy variable that identify flows between Argentina and Brazil

$ARGBRA_{i}$= It is dummy variable that identify other exports of Argentina and Brazil

$ARGBRA_{j}$= It is dummy variable that identify imports of Argentina and Brazil made from other partners.

Hypothesis 1 will be true when there is a significant *increase* in the coefficient for $ARGBRA_{ii}$ between period 1 and 2 which is not compensated by a *decrease* of the coefficient for $ARGBRA_{i}$

**Model 2** included new dummy variables to test hypotheses 2 and 3.

$ARGBRA_{ij}$= It is dummy variable that identifies flows between Argentina and Brazil

$ARGCHL_{ii}$= It is dummy variable that identifies flows between Argentina and Chile

$ARGMEX_{ii}$= It is dummy variable that identifies flows between Argentina and Mexico

$ARGURY_{ii}$= It is dummy variable that identifies flows between Argentina and Uruguay

$BRACHL_{ii}$= It is dummy variable that identifies flows between Brazil and Chile

$BRAMEX_{ii}$= It is dummy variable that identifies flows between Brazil and Mexico

$BRAURY_{ii}$= It is dummy variable that identifies flows between Brazil and Uruguay

$ARGBRA_i$= It is dummy variable that identify other imports of Argentina and Brazil (excluding those to Argentina/Brazil, to Chile, to Mexico and to Uruguay)

$ARG_j$ = It is dummy variable that identify other exports of Argentina (excluding those to Brazil, to Chile, to Mexico and to Uruguay)

$BRA_j$ = It is dummy variable that identify other exports of Brazil (excluding those to Argentina, to Chile, to Mexico and to Uruguay)

Hypothesis 2 will be true when there is a significant *increase* of Argentinean ($ARG_j$) and Brazilian ($BRA_j$) exports to any extra-bloc markets after 2000

Hypothesis 3 will be true when there was a decrease of intra-bloc trade ($ARGBRA_{ij}$) of the same size of the joined increase of exports to all other markets after 2000

**4.4. Estimation methods**

There are different alternative estimation methods that can be used for gravity models using a panel of countries. Our panel includes a maximum of 78 exporter countries and 103 importer countries all over the world and covers the period 1991-2005. Moreover, as trade flows refers to a single sector, there could be many bilateral pairs for which flows did not exist all the time. The censored characteristic of our data directed us to choose a Tobit model for panel data as our first option.

However, missing data in the dataset could be interpreted as both lack of information and lack of trade flows between a pair of countries. To enhance the robustness and to avoid input zero value of flows for all missing data, we kept only those bilateral relations for which a bilateral flow existed at least in three years between 1989 and 2006. For those cases we assumed that a bilateral relation existed and zero was input to missing data. For the others, we interpreted that the trade relation did not exist and left them out of the analysis. Nevertheless, as said above coverage is not equally distributed over time. In particular, during the period before 1994 there were many countries that did not report either imports or

exports. This implies that we might have biased the relation imputing zero flows to those first years when there were actually positive but unreported flows.

As a matter of fact, a basic bootstrapping procedure of resampling the data for periods and bilateral flows showed inconsistent results for panel Tobit estimations. Consistency was achieved only when the pre-MERCOSUR period was excluded (i.e. when considering data from 1995 onwards). Given our research question, focusing the analysis in the period 1995-2005 was not an option.

Therefore, our second-best alternative was to keep only positive flows for the analysis. We then perform Ordinary Least Square (OLS) estimation per year and also per the mean value over three different periods defined for our research questions (see 4.3).

## V) RESULTS

Gravity models 1 and 2 were estimated with the dependent variable always being the natural log of constant import value (in thousands of 2000 USD) and the independent variables those mentioned in equation 3.

As said in section 4.3 the differences across models rely on the inclusion of different dummy variables for Argentinean and Brazilian trade. All models present Adjusted-R-squared around the 40%-50%. Gravity variables are in general significant. Most of them render expected effects on the dependent variable: income of imported countries have a positive effect on imports; the production capacity of the exporter countries also have the expected positive effect; the relative revealed comparative advantage between importer and exporter has the expected negative effect on total imports; distance between pair of countries has a negative effect; neighbor countries trade more; and in general, countries within blocs trade more than expected by the gravity itself[iv].

The estimation of Model 1, used to test our first hypothesis, is presented in Table 1. As can be seen there, we find that Argentina and Brazil traded more between themselves than

expected by the gravity model. More precisely, during the period 1991-1994, Argentina and Brazil traded 34 times[v] more than expected by the gravity and overall bloc trade variables alone. However, in the second period, after these two countries signed their trade agreement in December 1994, trade between them was 147 times more than expected by the gravity model. In other words, the agreement seems to have had a relevant impact on intra-bloc trade[vi].

Figure 8, shows the evolution of the coefficients for Argentina-Brazil intra trade when gravity equations are estimated per year (only for positive trade flows). As can be seen, trade between these two countries has increased its importance since the early 1990s, however, it was after the agreement (at the end of 1994) that Argentina and Brazil trade significantly more than expected by the gravity equation. This effect was the largest during 1996-1998. In 1999, Brazilian recession might have had an effect on diverting Argentinean trade to other destinations, and then again a drop in the intra trade is noticeable at the time of Argentinean recession in 2002.

However, to conclude that there was trade creation after the agreement between Argentina and Brazil, we need to check whether the increase in the intra-bloc coefficient more than compensate the decrease in the extra-bloc coefficient measured by the variable ARGBRA_i. In Table 1 we can see that there was not any decrease in extra-bloc trade after MERCOSUR agreement, and therefore we can reject the hypothesis of trade diversion and we conclude that trade was created after the agreement. In other words, our Hypothesis 1 was right.

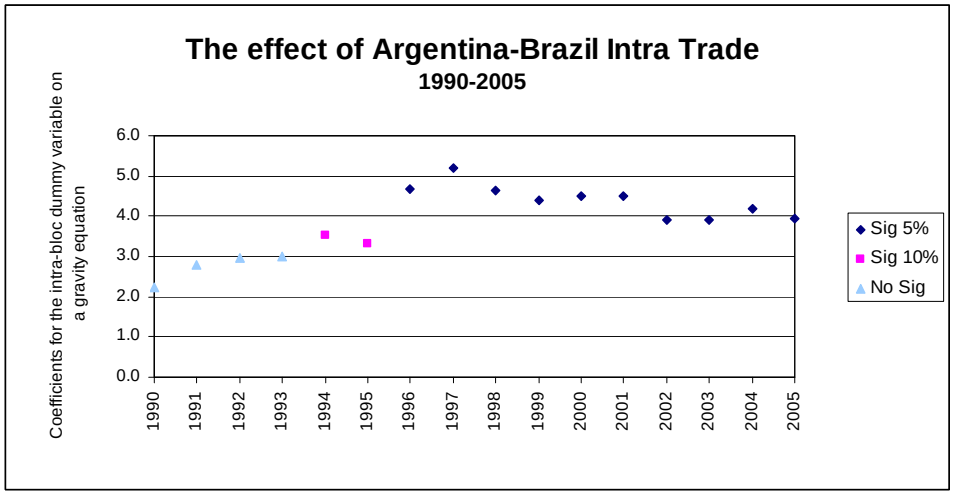
**Table 1:** Intra-bloc trade OLS Regression for gravity Model 1 estimated for different periods.

| | Model 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1991-1994 | | | 1995-2000 | | | 2001-2005 | | |
| Variable | Coef | P-value | Sig | Coef | P-value | Sig | Coef | P-value | Sig |
| lnY_i | 0.36 | 0.00 | *** | 0.40 | 0.00 | *** | 0.50 | 0.00 | *** |
| lnPC_j | 0.58 | 0.00 | *** | 0.63 | 0.00 | *** | 0.89 | 0.00 | *** |
| lnN_i | -0.06 | 0.30 | | -0.09 | 0.04 | ** | -0.11 | 0.01 | * |
| lnN_j | 0.40 | 0.00 | *** | 0.41 | 0.00 | *** | 0.22 | 0.00 | *** |
| lnT_i | 0.00 | 0.94 | | 0.01 | 0.68 | | 0.08 | 0.01 | ** |
| lnT_j | -0.42 | 0.00 | *** | -0.41 | 0.00 | *** | -0.33 | 0.00 | *** |
| lnAD_ij | 0.52 | 0.00 | ** | 0.44 | 0.00 | *** | 0.26 | 0.04 | * |
| lnD_ij | -0.90 | 0.00 | *** | -0.93 | 0.00 | *** | -1.02 | 0.00 | *** |
| A_ij | 1.21 | 0.00 | *** | 0.67 | 0.01 | ** | 0.74 | 0.00 | ** |
| I_i | -0.18 | 0.22 | | 0.07 | 0.53 | | -0.01 | 0.93 | |
| I_j | 0.88 | 0.00 | *** | 0.74 | 0.00 | *** | 0.94 | 0.00 | *** |
| LL_i | -0.08 | 0.59 | | -0.30 | 0.01 | * | -0.35 | 0.00 | ** |
| LL_j | -0.27 | 0.18 | | -0.31 | 0.03 | * | -0.25 | 0.11 | |
| LSp_ij | -0.07 | 0.76 | | 0.23 | 0.24 | | 0.47 | 0.02 | * |
| LEn_ij | 0.24 | 0.24 | | 0.41 | 0.01 | * | 0.42 | 0.02 | * |
| LAr_ij | -1.89 | 0.04 | * | -1.92 | 0.00 | ** | -0.90 | 0.17 | |
| LFr_ij | 0.97 | 0.05 | † | 1.05 | 0.00 | ** | 1.88 | 0.00 | *** |
| LOt_ij | 2.28 | 0.00 | *** | 1.78 | 0.00 | ** | 1.46 | 0.01 | ** |
| bloc_andean_ij | 0.20 | 0.80 | | 1.46 | 0.04 | * | 1.20 | 0.09 | † |
| bloc_asean_ij | -2.09 | 0.00 | ** | -0.89 | 0.05 | † | -0.69 | 0.10 | |
| bloc_cacm_ij | 0.86 | 0.21 | | 1.94 | 0.00 | ** | 1.95 | 0.00 | ** |
| bloc_caricom_ij | -0.73 | 0.21 | | -0.17 | 0.92 | | (dropped) | | |
| bloc_cemac_ij | -0.16 | 0.96 | | -1.37 | 0.33 | | -0.22 | 0.88 | |
| bloc_comesa_ij | -0.38 | 0.53 | | -0.14 | 0.78 | | -0.02 | 0.97 | |
| bloc_eccas_ij | -2.36 | 0.36 | | (dropped) | | | (dropped) | | |
| bloc_ecowas_ij | -2.17 | 0.23 | | -0.75 | 0.09 | † | 0.86 | 0.14 | |
| bloc_efta_ij | 1.73 | 0.24 | | 1.15 | 0.23 | | 1.49 | 0.13 | |
| bloc_eu25_ij | 2.89 | 0.00 | *** | 2.89 | 0.00 | *** | 2.22 | 0.00 | *** |
| bloc_gcc_ij | (dropped) | | | (dropped) | | | (dropped) | | |
| bloc_nafta_ij | 5.12 | 0.00 | *** | 6.13 | 0.00 | *** | 4.93 | 0.00 | *** |
| bloc_sadc_ij | 1.87 | 0.01 | ** | 1.39 | 0.00 | *** | 1.83 | 0.00 | *** |
| bloc_saarc_ij | -2.37 | 0.01 | ** | -1.08 | 0.12 | | -0.74 | 0.33 | |
| bloc_waemu_ij | -2.70 | 0.39 | | -0.06 | 0.94 | | 0.55 | 0.54 | |
| RCA_ij | -3.E-04 | 0.00 | *** | -1.E-03 | 0.00 | *** | -3.E-04 | 0.00 | ** |
| ARGBRA_i | 0.39 | 0.25 | | 0.49 | 0.08 | † | -0.30 | 0.31 | |
| ARGBRA_j | 0.06 | 0.81 | | 0.17 | 0.43 | | 0.55 | 0.01 | ** |
| ARGBRA_ij | 3.56 | 0.05 | † | 5.00 | 0.00 | ** | 4.19 | 0.01 | * |
| constant | -11.21 | 0.00 | *** | -12.72 | 0.00 | *** | -17.51 | 0.00 | *** |
| | | | | | | | | | |
| N | 3013 | | | 4019 | | | 3752 | | |
| Adj R-Squared | 0.39 | | | 0.47 | | | 0.51 | | |

† if $p < 0.10$, * if $p < 0.05$; ** if $p < 0.01$; *** if $p < 0.001$.

Source: Own production based on data from different sources (see 4.2 above)

**Figure 8:** Coefficients for dummy ARGBRA_ij in OLS estimations of gravity equation per year




Source: Own production based on data from different sources (see 4.2 above)

If one compares period 3 with period 2, we could see that exports to other destinations were a 73% (=exp(0.55)-1)*100) more than expected with the gravity. In period 1 and in period 2, the effect of this variable was null. The significant coefficient ARGBRA_j in period 3 shows the importance of exports to other markets in recent years. However, given that there are no significant differences in this coefficient when estimated for period 3 and compared with the estimation for period 1 or 2, it seems to be early for arguing that MERCOSUR has become and export platform. Moreover, we will see later that export strategies are not homogeneous for Argentina and Brazil.

Table 2 presents the 2nd model, which is used to evaluate hypotheses 2 and 3 –both related to export diversification to extra bloc markets. We pay especial attention to those that have been recently supported by trade regulation.

Within markets with PTA, Mexico is the only one that has become an increasingly important partner for both, Argentina and Brazil. However, on the one hand, Argentinean export to Mexico are significantly different to what expected by the gravity only in period 3. On the

other hand, Brazilian exports to Mexico have systematically increased over time but yet we cannot find significant differences in the comparison across periods.

Chile does not seem to trade more with Argentina or Brazil than expected by the gravity model. Uruguay, in turn, did so only with Brazil after they signed their agreement in 1994.

If we now turn the attention to other export markets for Argentina and Brazil we find that in period 1 and 2, Argentina exported to other markets (ARG_j) less than it would have been expected by the gravity when controlling for particular partnerships with PTA (Brazil, Chile, Mexico and Uruguay). In period 3, the coefficient was not negative anymore, but it was not significant. Brazil, instead, shows positive and significant coefficients for BRA_j in all periods, which accounts for its more aggressive diversification strategies beyond markets with PTA. Moreover, an exercise on Model 1 splitting the dummy variable ARGBRA_j into ARG_j and BRA_j shows the same results. This suggests that our speculation for Model 1 on whether the bloc is becoming an export platform, only seem to be accurate for Brazil. In any case, since Brazil *always* exported more than expected by the gravity, and the coefficient for BRA_j does not change significantly over time (neither in the Model 3 controlling for other PTA nor on Model 1 when only trade with Argentina is controlled for), the speculation about MERCOSUR/Brazil becoming and export platform seems unsound.

Thus, hypothesis 2 is only validated in the Argentinean case when we analyse market diversification towards Mexico. Brazil, instead, reached many more markets and exported to them significantly more than expected by the gravity itself. However, we could not find evidence that this has started to happen when the intra-bloc agreement was signed in 1994 or when integration was deepened in 2000.

In any case, the diversification of markets did not come at the expense of intra-bloc trade, as hypothesis 3 suggested. The intensity of exports between Argentina and Brazil did not change significantly between period 2 and 3.

**Table 2:** Market diversification: OLS Regression for gravity Model 2 estimated for different periods.

| | Model 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1991-1994 | | | 1995-2000 | | | 2001-2005 | | |
| Variable | Coef | P-value | Sig | Coef | P-value | Sig | Coef | P-value | Sig |
| lnY_i | 0.36 | 0.00 | *** | 0.40 | 0.00 | *** | 0.50 | 0.00 | *** |
| lnPC_j | 0.58 | 0.00 | *** | 0.63 | 0.00 | *** | 0.89 | 0.00 | *** |
| lnN_i | -0.05 | 0.35 | | -0.09 | 0.04 | ** | -0.11 | 0.01 | ** |
| lnN_j | 0.40 | 0.00 | *** | 0.41 | 0.00 | *** | 0.21 | 0.00 | *** |
| lnT_i | -0.01 | 0.81 | | 0.01 | 0.75 | | 0.08 | 0.01 | *** |
| lnT_j | -0.42 | 0.00 | *** | -0.41 | 0.00 | *** | -0.33 | 0.00 | *** |
| lnAD_ij | 0.47 | 0.00 | *** | 0.41 | 0.00 | *** | 0.24 | 0.06 | * |
| lnD_ij | -0.87 | 0.00 | *** | -0.91 | 0.00 | *** | -1.01 | 0.00 | *** |
| A_ij | 1.08 | 0.00 | *** | 0.56 | 0.02 | ** | 0.70 | 0.01 | *** |
| I_i | -0.17 | 0.23 | | 0.08 | 0.51 | | -0.01 | 0.95 | |
| I_j | 0.87 | 0.00 | *** | 0.74 | 0.00 | *** | 0.93 | 0.00 | *** |
| LL_i | -0.07 | 0.65 | | -0.28 | 0.01 | ** | -0.35 | 0.00 | *** |
| LL_j | -0.27 | 0.19 | | -0.31 | 0.03 | ** | -0.25 | 0.11 | |
| LSp_ij | 0.05 | 0.84 | | 0.29 | 0.15 | | 0.47 | 0.03 | ** |
| LEn_ij | 0.25 | 0.22 | | 0.41 | 0.01 | ** | 0.42 | 0.02 | ** |
| LAr_ij | -1.82 | 0.04 | ** | -1.88 | 0.00 | *** | -0.89 | 0.18 | |
| LFr_ij | 0.98 | 0.05 | ** | 1.06 | 0.00 | *** | 1.88 | 0.00 | *** |
| LOt_ij | 2.28 | 0.00 | *** | 1.76 | 0.00 | *** | 1.47 | 0.01 | *** |
| bloc_andean_ij | 0.21 | 0.79 | | 1.50 | 0.03 | ** | 1.24 | 0.09 | * |
| bloc_asean_ij | -1.99 | 0.00 | *** | -0.83 | 0.07 | * | -0.66 | 0.12 | |
| bloc_cacm_ij | 0.84 | 0.22 | | 1.96 | 0.00 | *** | 1.98 | 0.00 | *** |
| bloc_caricom_ij | -0.73 | 0.68 | | -0.17 | 0.92 | | (dropped) | | |
| bloc_cemac_ij | -0.02 | 0.99 | | -1.22 | 0.39 | | -0.17 | 0.91 | |
| bloc_comesa_ij | -0.33 | 0.58 | | -0.12 | 0.81 | | -0.01 | 0.98 | |
| bloc_eccas_ij | -2.29 | 0.37 | | (dropped) | | | (dropped) | | |
| bloc_ecowas_ij | -2.00 | 0.27 | | -0.68 | 0.12 | | 0.89 | 0.13 | |
| bloc_efta_ij | 1.76 | 0.23 | | 1.15 | 0.23 | | 1.48 | 0.13 | |
| bloc_eu25_ij | 2.92 | 0.00 | *** | 2.91 | 0.00 | *** | 2.22 | 0.00 | *** |
| bloc_gcc_ij | (dropped) | | | (dropped) | | | (dropped) | | |
| bloc_nafta_ij | 5.25 | 0.00 | *** | 6.23 | 0.00 | *** | 4.98 | 0.00 | *** |
| bloc_sadc_ij | 1.97 | 0.01 | *** | 1.47 | 0.00 | *** | 1.86 | 0.00 | *** |
| bloc_saarc_ij | -2.27 | 0.00 | *** | -0.99 | 0.15 | | -0.70 | 0.36 | |
| bloc_waemu_ij | -2.82 | 0.37 | | -0.08 | 0.92 | | 0.54 | 0.54 | |
| RCA_ij | -3.E-04 | 0.00 | *** | -1.E-03 | 0.00 | *** | -3.E-04 | 0.00 | *** |
| ARGBRA_i | 0.31 | 0.38 | | 0.40 | 0.17 | | -0.39 | 0.19 | |
| ARG_j | -1.01 | 0.02 | ** | -0.80 | 0.02 | ** | 0.12 | 0.74 | |
| BRA_j | 0.43 | 0.15 | | 0.59 | 0.03 | ** | 0.60 | 0.03 | ** |
| ARGBRA_ij | 3.92 | 0.03 | ** | 5.43 | 0.00 | *** | 4.91 | 0.00 | *** |
| ARGURY_ij | 2.93 | 0.11 | | 1.76 | 0.29 | | 0.17 | 0.92 | |
| ARGCHL_ij | 1.29 | 0.48 | | 1.73 | 0.30 | | 0.79 | 0.64 | |
| ARGMEX_ij | -2.05 | 0.26 | | 1.18 | 0.48 | | 3.36 | 0.05 | ** |
| BRAURY_ij | 2.46 | 0.17 | | 4.08 | 0.01 | ** | 2.12 | 0.21 | |
| BRACHL_ij | 2.48 | 0.17 | | 1.39 | 0.40 | | 1.64 | 0.33 | |
| BRAMEX_ij | 3.08 | 0.09 | * | 3.92 | 0.02 | ** | 4.27 | 0.01 | ** |
| constant | -11.03 | 0.00 | *** | -12.52 | 0.00 | *** | -17.34 | 0.00 | *** |
| N | 3013 | | | 4019 | | | 3752 | | |
| Adj R-Squared | 0.39 | | | 0.48 | | | 0.51 | | |

† if p < 0.10, * if p < 0.05; ** if p < 0.01; *** if p < 0.001.

Source: Own production based on data from different sources (see 4.2 above)

Looking at the same issue from a different perspective sheds a different light. Argentina and Brazil partnership in period 2 was significantly more important than Mexico and Brazil and México and Argentina partnership. However, this was not the case anymore in period 3. Thus, although we find that the increase in the importance of Mexico did not yet come at the expense of Argentina and Brazil partnership (because this latter one did not decrease its importance significantly), it seems to be that Mexico is increasing its relative importance as an export market for Argentina and also for Brazil. This is neither the case for Uruguay, a partner that is shrinking its relative importance, nor for Chile, whose relative importance has been more or less stable over time.

## VI) CONCLUSIONS

The worldwide automobile industry has recently deepened internationalization strategies, which includes global and regional strategies. Regional strategies have been said to be more efficient because they better balanced the trade off between efficient scale and product differentiation.

MERCOSUR has been a historical location for automobile production. For example, some MNCs started producing in the region before they did in more developed locations. At the present time it is an important region in terms of both, production and export shares.

However, fully integration within the region has not been fully achieved yet. The main reason that explains the lack of agreement in this particular sector, is that MERCOSUR members could not agree on common external tariffs (i.e. Argentina and Brazil prefer high tariffs and Uruguay and Paraguay request lower tariffs).

At the present time this is one of the few sectors for which Argentinean/Brazilian trade is administered by trade agreements (one in 1994 and another one in 2000 and the last one in 2006). These agreements aimed at favoring complementation strategies within MNCs located in both countries. To some extent this was achieved, as showed in Arza and López (2007a) for the Argentinean case.

In this paper we wanted to discuss the extent to which MERCOSUR (defined by Argentina and Brazil, only) have become an export platform for automobile production. More specifically, our goal was to check whether trade has been created after the trade agreement achieved in late 1994 and whether both countries have diversified exports to other markets since they deepened integration further in 2000.

We built a very complete database using information for different sources to estimate an enlarged gravity equation. Once all variables needed for the estimation have been pooled together, we had an unbalanced database of a maximum of 78 exporter countries 103 importer countries worldwide, with trade flows measured over the period 1991-2005. In order to answer our research question, we split the sample in three periods (before and after trade agreements of 1994 and 2000) and we estimated two different versions of gravity model. Each version of the gravity models was defined by adding various dummy variables accounting for different trade partnerships for Argentina and Brazil.

We conclude that trade was created after the agreement of 1994. Argentina and Brazil trade more between each other than it would have been expected by the gravity model alone and intra-bloc trade significantly increased after 1994. Moreover, there was not a decrease in automobile imports from other origins after any of the agreement. Therefore, there does not seem to be evidence for trade diversion. Trade was genuinely created for the region.

However, neither agreement seems to have an effect on market diversification. Only in the last period (2001-2005) the region seems to export to other destination more than it would have been expected by the gravity model alone. However, Brazil is the single partner driving this effect. In the Argentinean case, when exports to destinations with PTA are controlled for, the country does not seem to export more than expected by the gravity alone. Brazil, instead, has followed a more aggressive strategy of export diversification, which goes beyond markets with PTA. Nevertheless, this was not a consequence of agreements in the

context of MERCOSUR since Brazilian propensity to export to other markets (when controlling and not for other PTA) has remained mostly unchanged since 1991.

In sum, there is evidence for trade creation after the sectoral agreement of 1994. However, this was only intra-bloc trade. MERCOSUR as a bloc did not yet become an export platform. Brazil, nevertheless, has successfully reached new markets and its propensity to exports is larger than expected by the gravity model. This however has always been the case and has not significantly increased after Brazil/Argentina trade agreements.

**Appendix A:**

**Selected regional integration agreements**[vii]

*ANDEAN (Andean Community):* Bolivia, Colombia, Ecuador and Peru.

*ASEAN (Association of South-East Asia Nations)*: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam.

*CACM (Central American Common Market)*: Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua.

*CARICOM (Caribbean Community)*: Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname and Trinidad and Tobago.

*CEMAC (Economic and Monetary Community of Central Africa)*: Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea and Gabon.

*COMESA (Common Market for Eastern and Southern Africa)*: Angola, Burundi, Comoros, Congo, Democratic Republic of the Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Namibia, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia and Zimbabwe.

*ECCAS (Economic Community of Central African States)*: Angola, Burundi, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Rwanda and Sao Tome and Principe.

*ECOWAS (Economic Community of West African States)*: Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Malí, Níger, Nigeria, Senegal, Sierra Leone and Togo.

*EFTA (European Free Trade Association)*: Iceland, Liechtenstein, Norway and Switzerland.

*EU15 (European Union 15)*: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom.

*EU25 (European Union 25)*: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovenia, Slovak Republic, Spain, Sweden and the United Kingdom.

*GCC (Gulf Co-operation Council)*: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates.

*MERCOSUR (Southern Common Market)*: Argentina, Brazil, Paraguay and Uruguay.

*NAFTA (North American Free Trade Agreement)*: Canada, Mexico and the United States of America.

*SAARC/SAPTA (South Asian Preferential Trade Agreement)*: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

*SADC (Southern African Development Community)*: Angola, Botswana, Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, United Republic of Tanzania, Zambia and Zimbabwe.

*WAEMU (West African Economic and Monetary Union)*: Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo.

**References**


Aitken, N. D., (1973). 'The Effect of the Eec and Eeta on European Trade: A Temporal Cross-Section Analysis', American Economic Review, Vol. 63, No., pp. 881-92.

Arza, Valeria and López, Andrés, (2007a). 'El Caso Argentino', in A. L. (coordinador) (ed.), Complementación Productiva En La Industria Automotriz En El Mercosur, Montevideo: Red MERCOSUR de Investigaciones Económicas.

Arza, Valeria and López, Andrés, (2007b). 'La Visión Regional', in A. L. (coordinador) (ed.), Complementación Productiva En La Industria Automotriz En El Mercosur, Montevideo: Red MERCOSUR de Investigaciones Económicas.

Bayoumi, T and Eichengreen, B, (1997). 'Is Regionalism Simply a Diversion? Evidence from the Evolution of the Ec and Efta', in T. Ito and A. O. Krueger (ed.), Regionalism Versus Multilateral Trade Arrangements, Chicago: University of Chicago Press.

Braga, C.A. Primo and Safadi, Raed, (1994). 'Regional Integration in the Americas: Deja Vu All over Again?' World Economy, Vol. 17, No. 4, pp. 577.

Filippini, Carlo and Molini, Vasco, (2003). 'The Determinants of East Asian Trade Flows: A Gravity Equation Approach', Journal of Asian Economics, Vol. 14, No. 5, pp. 695-711.

Frankel, J. A., (1997). Regional Trading Blocs in the World Economic System, Washington, DC: Institute for International Economics.

Freyssenet, Michel and Lung, Yannick, (2000). 'Between Globalisation and Regionalisation: What Is the Future of the Motor Industry', in J. Humphrey, Y. Lecler and M. S. Salerno (ed.), Global Strategies and Local Realities : The Auto Industry in Emerging Markets, Houndmills, Basingstoke, Hampshire. New York: Macmillan Press; St. Martin's Press.

Humphrey, John and Memedovic, Olga, (2003). 'The Global Automotive Industry Value Chain: What Prospects for Upgrading by Developing Countries', UNIDO, Sectoral Studies Series, Viena:

Humphrey, John and Oeter, Antje, (2000). 'Motor Industry Policies in Emerging Markets: Globalisation and the Promotion of Domestic Industry', in J. Humphrey, Y. Lecler and M. S. Salerno (ed.), Global Strategies and Local Realities : The Auto Industry in Emerging Markets, Houndmills, Basingstoke, Hampshire, New York: Macmillan Press; St. Martin's Press.

Krueger, A. O., (1999). 'Trade Creation and Trade Diversion under Nafta', NBER Working Paper Series, Vol., No. 7429.

Musila, Jacob Wanjala, (2005). 'The Intensity of Trade Creation and Trade Diversion in Comesa, Eccas and Ecowas: A Comparative Analysis', Journal of African Economies, Vol. 14, No. 1, pp. 117-41.

Rugman, Alan and Hodgetts, Richard, (2001). 'The End of Global Strategy', European Management Journal, Vol. 19, No. 4, pp. 333-43.

Rugman, Alan M. and Collinson, Simon, (2004). 'The Regional Nature of the World's Automotive Sector', European Management Journal, Vol. 22, No. 5, pp. 471-82.

Schlie, Erik and Yip, George, (2000). 'Regional Follows Global: Strategy Mixes in the World Automotive Industry', European Management Journal, Vol. 18, No. 4, pp. 343-54.

Soloaga, Isidro and Winter, Alan L., (2001). 'Regionalism in the Nineties: What Effect on Trade?' The North American Journal of Economics and Finance, Vol. 12, No. 1, pp. 1-29.

[i] The absolute number of the equivalent index F is affected by the total number of markets each country exported to. Thus, as Brazil exports to more markets it is expected to have a larger equivalent index. We could have standardize the index by the number of total market, but we did not do so because we want to account not only to equal shares across markets but also to the number of markets each country reached.

[ii] We use national trade data for Argentina and Brazil to check the completeness of the COMTRADE database

[iii] With the only exception of the PC: Production capacity

[iv] The unexpected results are two. Firstly the positive and significant coefficient for the remoteness variable. This coefficient, however, switches sign if zero values are included in Tobit models. Thus, it seems that remoteness affects negatively the creation of new bilateral relations, but not necessarily the intensification of trade between existent partners. In all cases, the distance variable has always a negative effect. Secondly, Asean countries trade less between each other than the gravity would predict. Given that Asean and MERCOSUR are the only blocs fully constituted by developing countries (some of which are car producers) it would be interesting to investigate further the reasons for this results.

[v] As the model was estimated in logs, the effect of the dummy variable is given by the formula: =(exp(dummy coefficient)-1)*100 (if measured in percentage). In the case above, =(exp(3.56)-1)=34

[vi] The difference in the coefficient for ARGBRA_ij between period 1 and 2 is significant (p-value 0.06).

[vii] This is a selection by WTO, WTO Statistical data sets - Technical notes