Regionalism as Industrial Policy
The Case of MERCOSUR*

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Abstract

This paper empirically explores whether trade preferences can be used as a substitute for industrial policy and help countries achieve their industrialization objectives, at the expense of other regional members. It illustrates the heterogeneity that may exist in terms of reaching industrialization objectives with the help of preferential trade between small and large members of these agreements. Results show that MERCOSUR preferences obtained by Brazilian exporters have led to an increase in exports of relatively sophisticated products in which Brazil does not enjoy a global comparative advantage. On the other hand smaller members of MERCOSUR export to the region products in which they have a strong comparative advantages and with relatively low levels of sophistication. This suggests that MERCOSUR has helped Brazil achieve its industrialization objectives, but has not contributed to the industrialization of its smaller members.
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1 Introduction

Recently, the economic literature on regional integration has devoted great effort towards the understanding of the effects of regionalism on multilateralism, or as put by Jagdish Bhagwati on whether regionalism is a stumbling or building block towards global free trade (Kemp and Wan, 1976, Panagariya and Krishna, 2002). More recently, and pragmatically recognizing that regionalism is here to stay, Richard Baldwin and Patrick Low (2009) have focused on how we can 'multilateralize' regionalism, where the objective is to make existing or future regional integration agreements as WTO friendly as possible.

On the other hand, the early economic literature on regionalism worried less about its impact on the multilateral system (perhaps due to its relative weakness at the time) and focused rather on the conditions under which regional blocks are likely to enhance world and block's welfare (Viner, 1950, Lipsey, 1957, 1960, Kemp and Wan, 1976, Panagariya and Krishna, 2002). A small part of this literature looked at the distribution of gains within regional blocks.[1] An example of this approach is Cooper and Massell (1965) where they argue that regional integration schemes among developing countries could be used to achieve industrialization objectives in the spirit of Prebisch (1959) at a smaller economic or efficiency cost for their members. The idea is simple: facing a larger regional demand through regional preferences, member countries can specialize their industrial production in a fewer range of industrial products in which they are relatively more competitive. Thus, the exogenous or politically determined level of industrial production can be reached at a lower cost thanks to the creation of a larger regional market.

One problem recognized by Cooper and Massell (C&M) is that depending on the cost structure of block members, and the external protection structure chosen by members of the regional block this may lead to the reallocation of industries within a single country, leaving all other members paying for part of the industrialization process of the former. In other words, external protection can be chosen so that the relatively more industrialized country can impose the costs associated with its industrialization on the rest of the block. Note

[1] For a comprehensive survey of the regionalism literature, see Panagariya (2000).

that this may be efficient at the regional level, but it will have redistributive consequences across countries within the regional block. Obviously, the risk of this happening is likely to be stronger if the more industrialized country is also the largest country within a customs union (CU), which is likely to shape the structure of protection at the regional level.

But there is also scope for external protection to be chosen so that all countries can share the cost of each other industrialization's objective. For example, Cadot *et al.* (2001) show how external protection of a free trade area can be designed in order to achieve its industrialization objective (or be "politically viable" in Cadot *et al.* terminology), and be welfare-enhancing for all members. The mechanism is associated with what can be called "an exchange of protection" between member countries: some countries will protect some sectors while others will protect others in order to achieve the industrialization objective while allowing consumers of some goods in some countries to import at world prices. Note that a CU will impose some constraints on this exchange of protection as all countries will have a common external tariff by definition, but it may still be possible to achieve a balanced outcome through the exchange of mutual market access. Moreover, contrary to a free trade area where external protection is in principle not part of the agreement, CU by definition deal with levels of external protection. Monetary compensation mechanisms can also be designed within preferential trade agreements, but as pointed out by C&M, it is possible that there may not be enough income to compensate losers as part of what is value in government's objective function is industrialization which does not necessarily generate revenue.[2]

Whether the industrialization objective makes economic sense is a question that we will not address, and we will take this objective as given. Note however that recently Hausmann, Hwang and Rodrik (2007) have shown that countries that produce certain type of goods tend to grow faster: what you export (or produce) matters. Hwang (2006) suggests that goods produced by fast growing countries tend to be more heterogeneous allowing for a higher

[2]A solution to explore in this setting is one of 'regional' subsidies, where countries can subsidize production within the region to achieve industrialization objectives, while allowing consumers (of final and intermediate goods) to purchase at world prices. This will ensure that large countries do not impose on rest of the block consumers the negative externality of protecting the industrial sector of the large country. While global subsidies are clearly forbidden by GATT and GATS, regional subsides may be WTO consistent.

degree of vertical differentiation. This potential for upgrading is the engine behind faster growth. Countries which are stuck producing more homogeneous goods (e.g., agriculture) will have less scope for faster growth. Krishna and Maloney (2010) show that this may actually not be the full story behind the findings of Hausmann, Hwang and Rodrik (2007) as they observe within products very little convergence in the quality of goods exported by different countries. Nevertheless, this does not rule out that industrialization may actually be a economically desirable objective.

Our objective is more modest. We explore the extent to which MERCOSUR (a CU between Argentina, Brazil, Paraguay and Uruguay) has been used by Brazil to achieve its industrialization objectives at the expense of other members, and the extent to which this was reciprocated by Brazil. Has MERCOSUR helped Brazilian firms diversify their exports towards more sophisticated products where it does not really have a comparative advantage? What about other MERCOSUR members? In order to answer these questions we develop an empirical methodology to explain the impact of MERCOSUR tariff preferences on the characteristics of intra-regional export bundles, based on their relative degree of sophistication and comparative advantage.

The focus on MERCOSUR and Brazil is partly because the latter is the largest economy in Latin America. More importantly, after a long period of import-substitution trade policies, Brazil pursued a mix of unilateral, multilateral and regional trade reforms including the creation of MERCOSUR in the early 1990s, which accounted for 50% of Brazil exports to preferential markets (LAIA) in 2007 which represented almost one quarter of the country total exports. Argentina is the most important preferential destination for Brazil with around 40% of Brazil's preferential exports. It is also important to note that for other MERCOSUR members (Argentina, Paraguay and Uruguay) Brazil is the largest market in terms of preferential exports. Brazil represents between 35 and 50% of their preferential exports. So preferences granted within MERCOSUR are likely to be an important determinant of these countries structure of preferential exports. Another interesting aspect of MERCOSUR is that members have a common external tariff (CET), and therefore the level of preference

is partly determined jointly by the four members.[3]

Results suggest that MERCOSUR preferences obtained by Brazilian exporters have led to an increase in exports of relatively sophisticated products in which Brazil does not enjoy a global comparative advantage. On the other hand, smaller members of MERCOSUR export to the region products in which they have a strong comparative advantages and with relatively low levels of sophistication. This suggests that MERCOSUR has helped Brazil achieve its industrialization objectives, but has not contributed to the industrialization of its smaller members.

The remainder of this paper is organized as follows. Section 2 provides a description of the intra and extra-regional export patterns of MERCOSUR members in terms of the degree of sophistication and comparative advantage of the export bundles. Section 3 provides a theoretical framework to illustrate how trade preferences can be used as a substitute to industrial policy based on C&M's arguments, and other alternative explanations. Section 4 presents the empirical methodology and Section 5 discusses the results. Section 6 concludes.

2 Intra and Extra-Regional Export Patterns

In order to examine whether MERCOSUR has contributed to the industrialization of its members we need to measure the degree of "industrialization" of different export bundles. We proxy "industrialization" using the measure of product sophistication provided by Hausmann, Hwang and Rodrik (2007) (HH&R hereafter). Their idea is that the degree of sophistication of a product ($PRODY$) depends on the average level of per capita income (GDPpc) of countries exporting this good. More formally, it is given by:

$$PRODY_g = \sum_c \text{GDPpc}_c \frac{x_{g,c}/x_c}{\sum_c x_{g,c}/x_c} \tag{1}$$

where g index goods, c countries, x_c are total exports of country c, and $x_{g,c}$ are exports of good

[3]Note that there are limits to this type of argument in the case of MERCOSUR as the CET is not always "common" given the numerous exceptions to the CET.

g by country c. Thus $PRODY$ is just the weighted average of the GDP per capita of countries exporting good g where the weights capture the importance of this good into each country's export bundle. The rationale for using the share in each country exports as a weight rather than the share in total world exports is to ensure that the product sophistication measure is not affected by differences in country sizes. We compute $PRODY$s using data at the six digits of the 1992 Harmonized System (HS).

In order to assess the degree of sophistication of the export bundle of each MERCOSUR member we can construct a synthetic measure of the degree of sophistication of each country's export bundle following HH&R's $EXPY$ measure. It is given by:

$$EXPY_c = \sum_c PRODY_g \frac{x_{g,c}}{x_c} \tag{2}$$

In Table 1 we provide measures of $EXPY$ for MERCOSUR countries export bundles to different destinations. Brazil has the highest $EXPY$ and Paraguay the lowest. Interestingly, all MERCOSUR countries have a higher $EXPY$ in their export bundle to preferential markets. For example, the $EXPY$ of Brazil to Argentina is 1.36 times larger than Brazil's overall $EXPY$. On the other hand, Brazil's $EXPY$ to the ROW is 0.91 of Brazil's $EXPY$ to the World. So, Brazil's exports to Argentina have a degree of sophistication as measured by $EXPY$ that is 53% percent higher than Brazil's exports to the rest of the world (ROW). The general picture that emerges from the evidence above is that Argentina, Brazil and Uruguay exports to the region more sophisticated goods than they do to the ROW.

In order to explore this further we construct an index of trade intensity (ti) at the six digit level of the HS for each MERCOSUR member, which captures the relative importance of a particular good in the export bundle to countries where preferences are granted, relative to non-preferential markets.

Trade intensity (ti) is the share of exports of good g by country c to a preferential partner p at time t in total exports to preferential partner p minus the share of exports of good g by country c to all other non preferential countries, here called "ROW". More formally:

$$ti_{g,c} = \frac{x_{g,c,p,t}}{x_{c,p,t}} - \frac{x_{g,c,\neq p,t}}{x_{c,\neq p,t}} \tag{3}$$

where x are exports, and subscripts g indicates goods, p partners, and t time or year.

Logically, a positive ti indicates that the good is relatively more important in the preferential market, and a negative ti indicates that the good has a stronger weight in the export bundle to the ROW. Table 2 summarizes this information for the four MERCOSUR members by export market. Each cell in Table 2 shows the percentage of exports explained by goods with certain characteristics in terms of revealed comparative advantage (RCA), $PRODY$ and the sign of ti.

Most of Brazilian exports to MERCOSUR countries are explained by goods in which Brazil does not have a RCA and for which ti is positive. Moreover, most of Brazilian exports to Argentina and Uruguay are in goods with a high level of sophistication. For example, 46% of exports of Brazil to Argentina are goods in which Brazil has no comparative advantage ($RCA \leq 1$), are over-represented in the bundle of exports to Argentina ($ti > 0$), and have a relatively high degree of sophistication ($PRODY$ is larger than the median value $PRODY$). On the other hand, only 2.2% of exports to the ROW are in goods with similar characteristics. In the case of exports to Paraguay, the goods explaining most of Brazil's exports are goods for which Brazil does not have a comparative advantage, but contrary to Brazil exports to Argentina and Paraguay, these are goods with a low level of sophistication.

A similar pattern is observed for Argentina, and to a less extent Uruguay. For Argentina, goods with an RCA index equal ot less than one, and a high $PRODY$ value are the most important in the case of exports to Brazil, coming in second place in the case of exports to Uruguay. Goods with an $RCA > 1$ and low $PRODY$ are the most important in the case of exports to Paraguay, and second in the case of exports to Brazil. On the other hand, for Uruguay, the main group of goods are those in which the country does not have a RCA, but with a low $PRODY$ value. In the particular case of exports to Argentina, the pattern is more similar to the ones of the two largest MERCOSUR members, while goods

with an $RCA > 1$ and low $PRODY$ become quite important explaining exports to Brazil and Paraguay, around 30%-41%.

For the three countries, Argentina, Brazil and Uruguay, most of their exports to the ROW are explained by goods the countries have RCA and the goods have a low level of sophistication. This is more evident in the case of Uruguayan exports. On the other hand, goods with a high level of sophistication account for around 13% of Argentina's and Uruguay's exports to the ROW, while they represent near 26% in the case of Brazil.

Finally, Paraguay shows almost the complete opposite picture in its intra-MERCOSUR exports. It exports mostly goods with a high RCA ($RCA > 1$) and low degree of sophistication ($PRODY$ below its median value). The same holds for its export bundle to the ROW. In second place we found goods in which the country does not have a RCA, but these are again goods with low degree of sophistication.

From this preliminary evidence the segmentation of trade orientation is clear. In one extreme is Paraguay which concentrates its exports in goods with high RCA and low $PRODY$, which are similarly oriented to the region and to ROW. Brazil orients its exports in goods without RCA in the regional market, and in particular the ones with high $PRODY$. Argentina is in between these two patterns. Finally Uruguay is in between Argentina and Paraguay. We may preliminary conclude that even when Argentina may, like Brazil, be using the regional market as part of its industrialization strategy; the intensity of this seems less strong. A possible explanation for this finding may be that since the seventies and eighties, with the end of the "industrialization policy" based on "import substitution", this country has not been able to maintain a stable and long-run industrial policy, when not in fact moving from one type of extreme trade policy to another.

3 Theoretical framework

There are at least three different theoretical models that can partially explain the prima facie evidence reviewed in the previous section that suggests that Brazil has been exporting

to its MERCOSUR partners relatively sophisticated products on which it does not really have a comparative advantage, whereas the opposite does not seem to be observed for the other smaller members of MERCOSUR except, perhaps, Argentina in less degree. The first one has to do with industrial organization arguments; the second one is related to factor abundance arguments in a Heckscher-Ohlin-Samuelson (HOS) type of world; and the third one with political economy arguments. They are discussed in turn below and in the empirical section we will provide a horse-race between these alternative explanations to the observed patterns.

Regarding arguments based on industrial organization, in their already mentioned very influential paper, Cooper and Massel (1965) suggest that policy makers may have an embedded preference for industrialization, and therefore may be willing to pay a certain cost in terms of static forgone income in order to achieve this industrialization objective. The rationale behind this industrialization objective is not very clear in Cooper and Massel, but it can be partly rationalize by the recent evidence in HH&R that suggests that what you export and, therefore, produce matters in terms of potential long-run economic development. Regardless of the rationale for the industrialization objective, governments may want to protect part of their industry in order to achieve a certain level of industrial production that is consistent with their industrialization and employment objectives, even though it will clearly create economic inefficiencies.

Interestingly, Cooper and Massel show that in such a setup, a CU can help countries achieve their industrialization objective at a lower cost. Indeed, once the markets are pooled together, the industrialization objective -that can be read in terms of a given level of production- can be achieved with a lower level of tariff protection because the "regional demand" for relatively more efficient industrial producers is larger than the isolated "national demands". In other words, there is more demand in the CU for those producers that are relatively more efficient and therefore there is no need to induce relatively inefficient firms to produce in order to achieve a certain degree of industrial output. Thus trade diversion has a positive counterpart in this world which is associated with the possibility of achieving

industrialization objectives at a lower cost. The problem in this logic arises when the exchange of market access is asymmetric, as part of the cost of the industrialization objective is now on the partners' shoulder. So industrialization can be achieved at a lower cost for one or some of the members, and even for the region as a whole, but the distribution of gains can be asymmetric as the importer will be carrying part of the cost without benefiting from the potential gains if it does not have industrialization objectives or there is no some sort of "regional strategy" to spread the benefits of the industrialization.

A second model, explored by Venables (2003, 2005), extends the C&M's argument to a traditional factor abundance trade model (HOS). In this type of world, the costs of trade diversion could be unevenly distributed across members of a PTA. In particular, in a PTA between developing countries (South), the poorest countries (or rather the least capital abundant) are the ones that bear the costs of trade diversion, which magnifies initial income disparities. MERCOSUR is an example of South-South agreement, and one could then observe an uneven distribution of trade diversion costs among members. In order to illustrate Venables (2003 and 2005) model let us assume three countries (Brazil, Paraguay and ROW) and two goods (A and M). Let us also assume the ROW has a comparative advantage on the capital intensive good M, while Paraguay has a comparative advantage in the natural resource intensive good A, and Brazil factor abundance is somewhere in between Paraguay and the ROW. Then, a trade agreement between Brazil and Paraguay means that part of Paraguay's imports of good M that were previously imported from the ROW are now at least partially replaced with imports of good M from Brazil. Thus, because of the rankings of relative factor abundance with respect to the ROW, the more capital abundant country (Brazil) benefits from this trade diversion, while the natural resource abundant country (Paraguay) suffers.[4]

[4]According to Venables, a welfare enhancing response to this outcome by the least capital abundant country, is trade liberalization with the ROW. An additional reason for observing an increase in the share of Brazil's intra-MERCOSUR exports of more sophisticated goods is based on the predictions of the New Economic Geography models, which show that for positive but not prohibitive trade costs, the larger country has a more than proportional share of the production of goods exhibiting increasing returns to scale (i.e. manufactures), and therefore becomes a net exporter of these goods, and a net importer of goods produced under constant returns to scale (Venables 2003). Then, a CU between countries of different sizes, may induce

Finally, and using a political economy model, Grossman and Helpman (1995) show that a free trade area (FTA) can be made politically viable by excluding certain sectors from liberalization within the FTA. Unfortunately, those products that need to be excluded to make a potential FTA politically viable are precisely those in which trade creation is to be expected, and therefore those which would have provided a larger increase in regional welfare. Thus trade diversion is more likely to be observed in those FTAs that are politically viable. This occurs through the exchange of trade diversion among regional inefficient exporters who benefit to a large extent from preferential access into the partner's markets, while not taking too much of the partner's domestic firms market share (due to the relative inefficiency of regional exporters). On the other hand, very efficient exporters are not likely to benefit much from preferential access as they are selling in world markets and are very likely to hurt to a large extent the partner's domestic firms by taking a significant share of their domestic market (due to the relative efficiency of regional exporters). Thus, in equilibrium trade diverting FTAs are more likely to be observed.

4 Empirical framework

In order to understand how regional preferences affect the composition of MERCOSUR countries' export bundle we propose the estimation of the following equation for each MERCOSUR member:

$$\begin{aligned} ti_{g,c,p,t} &= \beta_1 RCA_{g,c,t} + \beta_2 PRODY_{g,t} + \beta_3 Pref_{g,c,p,t} + \beta_{1,3} RCA_{g,c,t} \times Pref_{g,c,p,t} \\ &\quad + \beta_{2,3} PRODY_{g,t} \times Pref_{g,c,p,t} + \alpha_g + \alpha_p + \alpha_t + \mu_{g,c,p,t} \end{aligned} \tag{4}$$

where as previously defined in Section 2, $ti_{g,c,p,t} = [x_{g,c,p,t}/x_{c,p,t}] - [x_{g,c,\neq p,t}/x_{c,\neq p,t}]$ is given by the share of exports of good g by country c to a preferential partner p at time t in total exports to preferential country p minus the share of exports of good g to all other non-preferential countries, noted $\neq p$. $RCA_{g,c,t}$ is the revealed comparative advantage of country

a further concentration of the production of manufactures in the larger partner.

c in good g at time t. $PRODY_{g,t}$ is the indicator of the degree of "export sophistication" as in HH&R above. $Pref_{g,c,p,t} = t^{MFN}_{g,p,t} - t^{p}_{g,c,p,t}$ is the preference margin granted by country p to country c on exports of good g measured as the difference between two tariffs: partner p's MFN rates and the preferential tariff granted by p to c. Finally, α_g are good specific fixed effects, α_p are partner specific fixed effects and α_t are time specific fixed effects. Because equation (4) is estimated separately for each MERCOSUR member we do not include fixed effects for the exporting countries.

We are interested in disentangling whether tariff preferences lead to higher exports in goods with a strong comparative advantage and/or with a strong degree of export sophistication. Thus we are interested in the sign of the interaction terms between preferences and the indicators of comparative advantage and degree of sophistication.

A positive sign of $\beta_{1,3}$ would indicate that given a preference level for good g, the higher the RCA index the larger the effect in orientating exports toward the preferential market. A positive sign for $\beta_{2,3}$ would indicate that preferences help increase exports within the region in sectors with a certain degree of export sophistication relative to what happens with exports to the ROW.

More generally, in order to know how a change in tariff preferences will affect exports of a particular country towards goods in which it has a comparative advantage or more sophisticated goods, we take the derivative of $ti_{g,c,p,t}$ with respect to $Pref_{g,c,p,t}$, which is given by:

$$\frac{\partial ti_{g,c,p,t}}{\partial Pref_{g,c,p,t}} = \beta_3 + \beta_{1,3} RCA_{g,c,t} + \beta_{2,3} PRODY_{g,t} \tag{5}$$

Then, if the marginal effect of preferences on preferred-trade intensity is set to zero, i.e. if we equate equation (5) to 0, and solve for RCA we obtain:

$$RCA_{g,c,t} = \frac{-\beta_3 - \beta_{2,3} PRODY_{g,t}}{\beta_{1,3}} \tag{6}$$

Equation (6), which we call "zero isoquant", gives the relationship between comparative

advantages (RCA) and product value ($PRODY$) such that the effect of tariff preferences on trade intensity is zero. This "zero isoquant", divides the space (RCA, $PRODY$) into two mutually exclusive areas, one for those goods where the combination of RCA and $PRODY$ is such that the effect of tariff preferences on trade intensity is positive ($\partial ti/\partial Pref > 0$), and another area where RCA and $PRODY$ are such that the effect on ti is negative ($\partial ti/\partial Pref < 0$).

One can establish a link between the theoretical models presented in the previous section on the one hand and the estimated coefficients of equation (4) and the resulting isoquant in (6) on the other hand. As discussed in the theoretical section, there are three main effects to be identified. The first effect is associated with the C&M view of trade agreements as an instrument to achieve industrialization objectives at a lower cost. Thus, we identify a C&M like result if the effect of a given preference on trade intensity increases with the degree of sophistication ($\beta_{2,3} > 0$). In this case the PTA becomes an instrument to achieve a more sophisticated export and production structure than the one that would be suggested by its comparative advantage.

The second effect is related to Venables (2003) argument that member countries with a comparative advantage at the extreme of the distribution are more likely to suffer from trade diversion from preferential partners with a comparative advantage which is closer to the ROW. The partner which is closer to the ROW is therefore more likely to benefit from preferential agreements with partners at the extreme of the distribution, as their preferential imports from the partners are likely to be trade creating. So one would expect preferences granted to partners at the extreme of the distribution to have a larger impact on their intra-regional exports of goods in which they have a strong comparative advantage ($\beta_{1,3} > 0$), but this will occur given their extreme comparative advantage in products with a low degree of sophistication ($\beta_{2,3} < 0$). On the other hand for the country with a comparative advantage closer to the ROW, one will expect their intra-regional exports to occur in sectors where it has a low comparative advantage ($\beta_{1,3} < 0$), and in products with a higher degree of sophistication ($\beta_{2,3} > 0$).

The third effect is associated with the political economy model of trade policy applied to the case of PTAs (G&H 1995). To be politically viable a PTA requires an exception list that excludes from the liberalization those goods where trade creation is greater and therefore where countries have stronger comparative advantages. In our specification this means that the impact of preference on trade intensities falls as RCA increases ($\beta_{1,3} < 0$). It also means that the effect of tariff preferences on trade intensities do not differ depending on the level of sophistication of the goods included in the agreement and therefore the isoquant defined by (6) is horizontal ($\beta_{2,3} = 0$).

Table 3 summarizes the expected signs for each coefficient considering the three theoretical frameworks discussed above.

5 Results

Equation (4) is estimated separately for each of the four MERCOSUR members, considering exports to all other MERCOSUR countries for the period 2000 to 2007. Good g is defined at the six digits of the 1992 version of the Harmonized System.

Table 4 we provides the result obtained from the estimation of equation (4) for each MERCOSUR member by OLS and Instrumental Variables (IV) to control for the potential endogeneity of tariff preferences. Based on Olarreaga *et al.* (1999) finding that MERCOSUR's CET put in place in 1995 mainly reflected Brazil's political economy preferences, we use Brazil's 1989, 1990 and 1991 MFN rates as instruments.

Table 5 summarizes the signs of the coefficients when they are statistically significant and makes the link with the potential theoretical explanations discussed above. The first coefficient (β_1 for RCA) provides an interesting description of the type of products that are exported by each MERCOSUR member within the region controlling for the presence of preferences. For the four countries, but Uruguay when using OLS, the effect of RCA on ti is negative and statistically significant. One possible explanation for this outcome is based on political economy type arguments *à la* G&H. The idea is that RCA is a proxy for

the presence of non-tariff barriers to preferential trade, and that these barriers are likely to be stronger when countries have a strong revealed comparative advantage. So a negative coefficient on RCA simply captures the fact that partner country p imposes higher non-tariff barriers on goods country c has strong comparative advantages.

Going back to the C&M rationale for regional integration agreements, this is consistent as discussed above with $\beta_{2,3} > 0$. This condition is fulfilled for Argentina when using OLS, Paraguay with IV, and Brazil and Uruguay with both estimators, however only the estimates for Brazil are statistically significant. Thus, for Brazil, the higher is the degree of sophistication of a good g the more likely preferences would tend to redirect exports toward preferential markets. In other words, the data would confirm that Brazil is using regionalism as an instrument to change its export pattern.

Regarding Venables' predictions, one would expect $\beta_{1,3} > 0$, $\beta_{2,3} < 0$ for countries at the extreme of the comparative advantage distribution. In the four countries we had $\beta_{1,3} > 0$, but for none of them we had a statistically significant $\beta_{2,3} < 0$. For intermediate countries we would expect $\beta_{1,3} < 0$, $\beta_{2,3} > 0$. Only for Brazil we obtain a statistically significant $\beta_{2,3} > 0$. For the other three countries when $\beta_{2,3} > 0$ the estimates are not statistically different from zero. In summary, event if the results are not fully conclusive, the evidence regarding Venables' predictions partly suggests that Argentina, Paraguay and Uruguay would fit into the class of countries with extreme comparative advantages, and Brazil in the category of countries with comparative advantages closer to the ROW, especially of developed countries.

5.1 A graphic representation of the effect of trade preferences on trade intensity

Using equation (6) and the OLS estimates in Table 4, the green line in Figure 1 (Figure A.1 in the Appendix when we use the IV estimates) plots the isoquants in the (RCA, $PRODY$) space for each of the four MERCOSUR countries. The vertical line provides the median $PRODY$ across all HS 6-digit categories. The horizontal line correspond to goods where $RCA = 1$ (or $\ln(RCA)=0$). Each observation corresponds to the value of the derivative

$\partial ti/\partial Pref$ as given by (5). Red points are those for which $\partial ti/\partial Pref > 0$, while blue points are goods with $\partial ti/\partial Pref < 0$.

Two clear outcomes arise from looking at Figure 1. On the one hand, for the four countries and for the majority of goods the marginal effect of preferences on trade intensities had been positive. Moreover, this occurs also in the set of goods in which countries do not have a comparative advantage ($RCA \leq 1$), and a large share of goods falls into the area of high level of sophistication: with a $PRODY$ to the right of the median value.

However, looking at the share (or number) of goods falling into each area provides only limited information regarding the importance of these goods in terms of export values, as well as the potential heterogeneity across export destinations. In Table 6 we compute the aggregate value over four different categories for which $\partial ti/\partial Pref$ is found positive when using OLS estimates (in Tables A.1 and A.2 in the Appendix we present all the possible combinations of the three variables here considered: $\partial ti/\partial Pref$, RCA and $PRODY$ when using both OLS and IV estimators). Looking at these exports shares provides us with an assessment of the importance of each category of goods in terms of export values, highlighting the heterogeneity that exists among the four MERCOSUR countries.

MERCOSUR preferences had a positive impact on Brazilian exports mainly on goods in which the country does not have a RCA, and with a high degree of sophistication. This category accounts for 44% of Brazil's exports to the region. The second most important group of goods, which accounts for 22% of Brazil's exports to the region, is that in which Brazil does not have RCA and have a low degree of sophistication. The results for Argentina are similar to those for Brazil, but the magnitudes are smaller, and there is also a larger participation of goods in which the country has a comparative advantage. Goods which fall into what we call the "status quo" category ($RCA > 1$ and low $PRODY$) are the largest category accounting for 39% of Argentina's intra-regional exports, followed by goods in which Argentina has no comparative advantage ($RCA \leq 1$) and have a high $PRODY$, which account for 32% of Argentina's exports. The results for Paraguay show a very different pattern with 84% of goods for which MERCOSUR preferences had a positive impact falling

in the the "status quo" category, followed by goods in which Paraguay does not enjoy a comparative advantage but with low $PRODY$. Finally, the results for Uruguay show that most of exports for which the effect of preferences on trade intensity has been positive are mostly concentrated in goods in which the country does not have comparative advantages ($RCA \leq 1$) and are then split equally between goods with low and high $PRODY$.

The results do not change significantly when considering the IV estimates. The main difference is that Uruguay becomes much more like Argentina, but with a lower share of exports for which MERCOSUR preferences has positively oriented them toward the region, and in particular towards Argentina. These findings confirm the idea that preferences under the MERCOSUR allowed the largest members, especially Brazil and to a lesser extent Argentina, to alter their export pattern towards goods with a higher degree of sophistication, and in which these countries do not necessarily enjoy a comparative advantage. This appears also to be the case for Uruguay, but the results vary depending on the estimator we consider. In any case, the magnitude of the effect is much more important in the case of Brazil than for the other two economies. In the case of Paraguay, MERCOSUR preferences have mainly reinforced the pre-existing export pattern.

6 Concluding remarks

In spite of the fact that PTAs has static (and even dynamic) economic inefficiency, governments may have industrialization objectives. C&M showed in an important paper that these industrialization objectives could be achieved at lower costs by integrating national markets into regional blocks, while full integration into global markets would not necessarily help achieve these objectives for countries with a comparative advantage in non-industrial products.

We found prima-facie evidence that products that weight heavily on Brazil's export bundle to its preferential partners within MERCOSUR are products in which Brazil does not have a global comparative advantage, and are products with a higher degree of sophistica-

tion than products exported by Brazil to the ROW. While this is also present in exports of Argentina to other MERCOSUR members, the pattern is not as strong as in the case of Brazil. The opposite outcome is found for Paraguay. In the case of Uruguay, the results are more ambiguous.

A potential explanation for this prima-facie evidence is that, as suggested by C&M, Brazil is achieving its industrialization objectives through its preferential trade. We give evidence that the marginal effect of trade preference in goods where RCA is low and $PRODY$ is high concentrates more than 40% of Brazilian exports to MERCOSUR. But there are also some existing alternative models which could help explain at least one of these stylized facts. The first alternative is the model by Venables (2003, 2005) which suggests that members of a preferential trade agreement with relative factor endowments closer to the world average (Brazil in the case of MERCOSUR) are more likely to export within the region products in which they have low comparative advantages. The opposite is true for the members of the preferential trade agreement with relative factor endowments that are the furthest away from the world average. We only find partial evidence for this type of effects in our results. The other alternative explanation relies on G&H prediction that politically viable trade agreements are more likely to be trade diverting, as they will provide very large benefits to inefficient exporters within the region and relatively low costs to the import-competing producers. Therefore, it is not surprising that we observe a lot of trade in products with a low RCA. This is indeed the case in all four MERCOSUR members, but controlling for this we still have that MERCOSUR preferences have helped Brazil to move towards a more sophisticated export bundle.

To sum up, the results show that MERCOSUR has contributed to achieve Brazil's industrialization objectives through exports within the region of goods in which the country does not have a comparative advantage and which have a high degree of sophistication. This was also observed but to a lesser extent in the cases of Argentina and Uruguay, whereas for Paraguay MERCOSUR preferences have only reinforced the pre-existing export pattern.

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Table 1
Value for the basket of goods exported (EXPY) by country
(USD and ratios)

Destiny	Exporter			
	Argentina	**Brazil**	**Paraguay**	**Uruguay**
World (:000 USD)	7,530	8,347	4,316	7,660
ROW (*)	0.82	0.91	0.95	0.90
Argentina (*)		1.36	1.05	1.31
Brazil (*)	1.34		0.97	1.06
Paraguay (*)	1.09	1.09		1.08
Uruguay (*)	1.33	1.19	0.88	

(*) Relative to World.

Source: own based on WITS.

Table 2
Structure of exports by partner, RCA and PRODY

a) Argentina

Destiny	Trade Intensity (ti)	RCA (*)				millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Brazil	Negative	0.9	0.4	5.3	1.2	511.6
	Positive	18.7	32.0	31.1	10.5	6,115.0
Paraguay	Negative	2.2	0.5	2.2	1.2	32.5
	Positive	30.1	18.7	43.0	2.1	500.4
Uruguay	Negative	0.7	0.5	8.8	0.8	88.3
	Positive	37.4	35.2	13.9	2.6	724.1
Mercosur	Negative	0.9	0.4	5.4	1.2	632.4
	Positive	21.3	31.5	30.2	9.1	7,339.5
ROW (a)	Negative	3.7	3.1	9.4	2.5	3,883.9
	Positive	2.4	1.0	71.7	6.1	16,800.5

b) Brazil

Destiny	Trade Intensity (ti)	RCA (*)				millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Argentina	Negative	0.8	0.8	6.5	2.7	827.4
	Positive	20.8	46.0	10.4	12.0	6,834.9
Paraguay	Negative	0.4	1.7	4.5	1.7	78.3
	Positive	44.7	26.0	12.4	8.5	859.4
Uruguay	Negative	0.3	1.3	6.4	1.4	69.3
	Positive	32.2	32.3	15.5	10.4	663.0
Mercosur	Negative	0.7	0.9	6.3	2.5	975.0
	Positive	24.1	42.9	11.0	11.5	8,357.3
ROW (a)	Negative	3.0	6.4	4.2	4.6	13,319.8
	Positive	4.9	2.2	62.7	11.9	59,466.0

c) Paraguay

Destiny	Trade Intensity (ti)	RCA (*)				millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Argentina	Negative	0.0	0.1	15.8	0.0	23.2
	Positive	31.5	3.6	48.8	0.2	122.8
Brazil	Negative	0.0	0.1	17.9	0.0	64.9
	Positive	24.7	1.8	55.4	0.1	295.6
Uruguay	Negative	0.1	0.0	8.0	0.0	23.6
	Positive	25.8	1.2	64.8	0.0	265.9
Mercosur	Negative	0.0	0.0	13.9	0.0	111.8
	Positive	26.4	1.9	57.6	0.1	684.3
ROW (a)	Negative	0.4	0.2	15.0	0.0	83.0
	Positive	0.3	0.6	82.2	1.2	446.8

d) Uruguay

Destiny	Trade Intensity (ti)	RCA (*)				millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Argentina	Negative	0.8	0.2	6.3	1.1	22.8
	Positive	37.5	42.2	8.3	3.7	250.5
Brazil	Negative	0.3	0.2	6.5	1.5	43.0
	Positive	29.1	19.8	35.3	7.4	468.6
Paraguay	Negative	0.1	0.1	5.4	0.4	3.8
	Positive	36.8	15.4	41.1	0.7	60.0
Mercosur	Negative	0.4	0.2	6.3	1.3	69.6
	Positive	32.4	26.7	27.1	5.7	779.1
ROW (a)	Negative	0.6	1.2	7.7	2.6	209.7
	Positive	1.1	0.7	77.9	8.2	1,528.1

(*) RCA = "NO RCA" if RCA<=1; RCA = "RCA" if RCA>1; (**) PRODY = "LOW" if PRODY <= median(PRODY); PRODY = "HIGH" if PRODY > median (PRODY). (a) Trade Intensity defined as export share to ROW minus export share to ALADI. **Source**: own based on WITS and WDI.

Table 3

Theoretical models and expected signs in empirical equation

	C&M	Venables		G&H
		Extreme	Intermediate	
RCA (β1)				(-)
RCA*Pref (β13)		(+)	(-)	(-)
PRODY*Pref (β23)	(+)	(-)	(+)	

Table 4

Results equation (3)

	OLS				Instrumental Variables (a)			
	Argentina	**Brazil**	**Paraguay**	**Uruguay**	**Argentina**	**Brazil**	**Paraguay**	**Uruguay**
ln(RCA) (b1)	-0.00324***	-0.00436***	-0.05135***	-0.00656	-0.00305***	-0.00349***	-0.08630***	-0.03945***
	[0.001]	[0.001]	[0.015]	[0.006]	[0.00080]	[0.00048]	[0.02690]	[0.00887]
ln(PRODY) (b2)	-0.00551	-0.01082**	0.13528	-0.00494	0.00258	-0.00697**	0.03601	-0.08478
	[0.010]	[0.004]	[0.135]	[0.026]	[0.01361]	[0.00314]	[0.19635]	[0.09661]
Preference (b3)	-0.00105	-0.00433*	0.04783	-0.00201	0.00967	-0.00240	0.02528	-0.04835
	[0.005]	[0.002]	[0.060]	[0.015]	[0.01110]	[0.00277]	[0.10861]	[0.06776]
ln(RCA)*Preference (b13)	0.00017**	0.00022***	0.00200**	-0.00009	0.00015***	0.00016***	0.00432***	0.00218***
	[0.000]	[0.000]	[0.001]	[0.000]	[0.00006]	[0.00003]	[0.00159]	[0.00055]
ln(PRODY)*Preference (b23)	0.00044	0.00076**	-0.00392	0.00024	-0.00021	0.00044**	0.00212	0.00561
	[0.001]	[0.000]	[0.006]	[0.001]	[0.00084]	[0.00019]	[0.01073]	[0.00739]
Observations	73027	94152	12189	28025	72901	93999	12189	28010
Number of Clusters	24	24	24	24	24	24	24	24
Adjusted R2	0.677	0.629	0.197	0.502				
First stage statistics								
F Test (P-value)								
Preference					0.686	0.103	0.031	0.043
RCA_Preference					0.000	0.000	0.000	0.000
PRODY_Preference					0.000	0.000	0.000	0.000
Shea's Adj. Partial R-sq.								
Preference					0.080	0.095	0.160	0.159
RCA_Preference					0.288	0.310	0.351	0.219
PRODY_Preference					0.223	0.251	0.240	0.191
Eigenvalue (+)								
Statistic					8.61	17.09	7.26	19.40
5% Relative bias critical value					16.10	16.10	16.10	16.10
10% Relative bias critical value					9.37	9.37	9.37	9.37
P. Value Tests of endogeneity (++)								
Durbin					0.821	0.646	0.220	0.001
Wu-Hausman					0.821	0.646	0.220	0.001
Robust (Wooldridge's Score test)					0.479	0.658	0.089	0.004
P. Value Test of overidentifying restrictions (+++)								
Sargan					0.641	0.279	0.005	0.356
Basmann					0.641	0.279	0.005	0.356
Wooldridge's Score test					0.014	0.000	0.002	0.005

(a) Brazil's 1989, 1990 and 1991 MFN rates, and their interactions with ln(RCA) and ln(PRODY) as instruments. (+) Ho: Instruments are weak. (++) Ho: endogenous regressors can be treated as exogenous. (+++) Ho: the instruments are valid. Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 5

Significant coefficients in the estimation of equation (3)

a) OLS

	Argentina		Brazil		Paraguay		Uruguay	
RCA (β1)	(-)		(-)		(-)			
RCA*Pref (β13)	(+)		(+)		(+)			
PRODY*Pref (β23)			(+)	(+)				

b) Instrumental Variables

	Argentina		Brazil		Paraguay		Uruguay	
RCA (β1)	(-)		(-)		(-)		(-)	
RCA*Pref (β13)	(+)		(+)		(+)		(+)	
PRODY*Pref (β23)			(+)	(+)				

Source: own using Table 4.

Table 6
Export patterns according to RCA and PRODY
Intraregional export shares for goods the marginal effect of preference on trade intensity is positive: $\frac{\partial ti}{\partial Pref} > 0$**. Using OLS estimates**

RCA = 1

Status quo RCA and Low PRODY	
Argentina	39
Brazil	17
Paraguay	84
Uruguay	12

Ideal Export Pattern RCA and High PRODY	
Argentina	9
Brazil	15
Paraguay	0
Uruguay	6

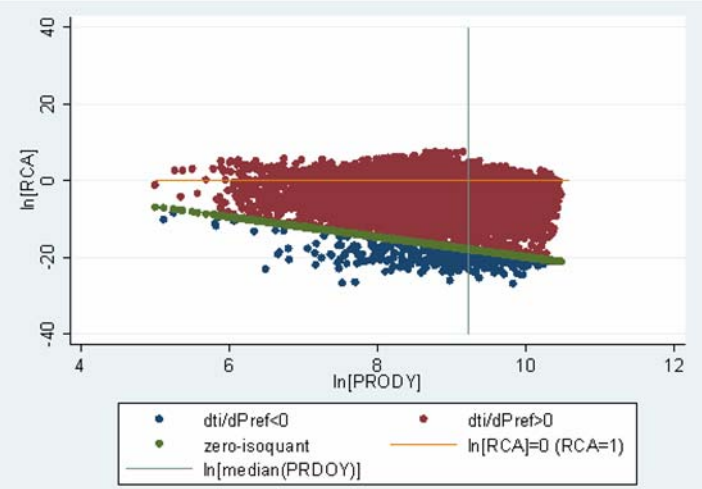
Protection without maturation No RCA and Low PRODY	
Argentina	20
Brazil	24
Paraguay	13
Uruguay	25

Industrial maturation No RCA y High PRODY	
Argentina	32
Brazil	44
Paraguay	1
Uruguay	26

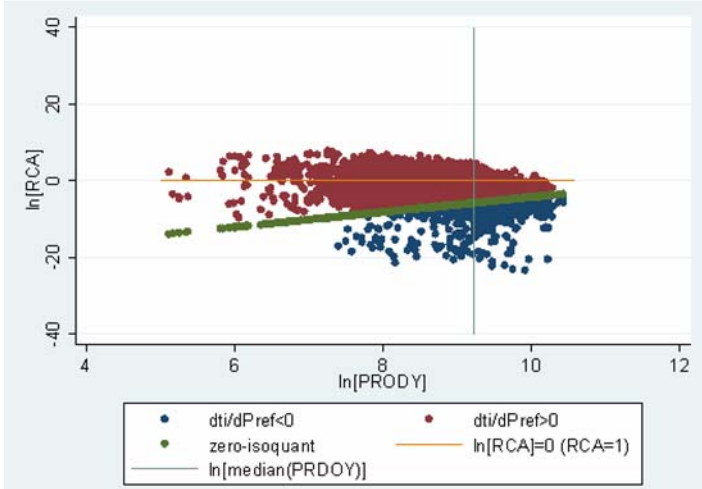
median(PRODY)

Figure 1
RCA, PRODY and the marginal effect of preference on trade intensity. Using OLS estimates

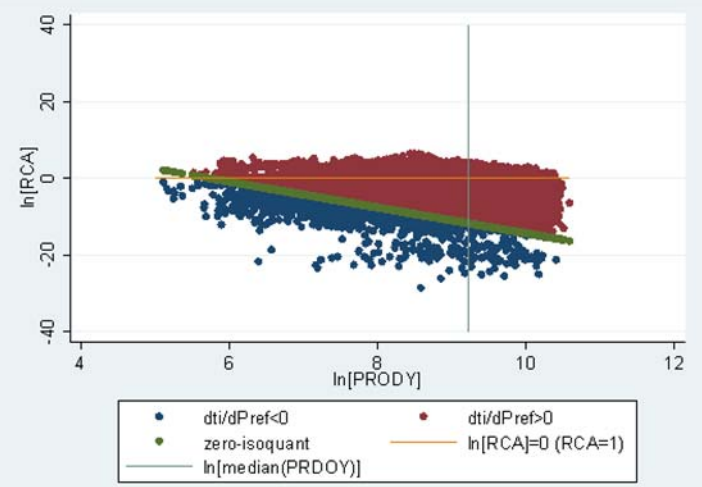
a) Argentina



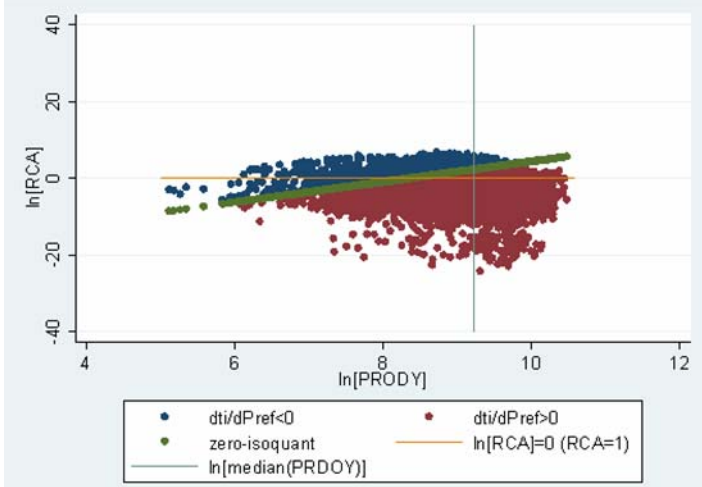
c) Paraguay



b) Brazil



d) Uruguay



Appendix

The data sources are the followings:

- Exports (at the six digit of the Harmonized System (HS) are from UN Comtrade and were obtained through the World Integrated Trade Solution (WITS);
- MFN-Tariffs (at the six digit of the HS) are from UNCTAD's TRAINS obtained through WITS, but also LAIA and MERCOSUR Secretariat;
- Tariff Preferences are from the MERCOSUR Secretariat; GDP per capita for the year 2000 (US dollars) is from the World Development Indicators (WDI);
- *RCA* indices were built based on the export data for the world as well obtained through WITS;
- *PRODY* indices were built based on the export data from WITS and GDP per capita data from WDI.

Table A.1
Effect of preferences on trade intensity according to RCA and PRODY
Distribution of export shares values to each market. Using OLS estimates
(% and millions of US)

a) Argentina

Destiny	$\frac{\partial ti}{\partial Pref}$	RCA (*)				Millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Brazil	Negative	0.0	0.0	0.0	0.0	1.2
	Positive	17.1	32.4	40.0	10.4	6,314.4
Paraguay	Negative	0.1	0.0	0.0	0.0	0.5
	Positive	30.1	19.5	46.3	4.0	513.4
Uruguay	Negative	0.1	0.0	0.0	0.0	0.8
	Positive	33.3	37.6	25.2	3.8	733.0
Mercosur	Negative	0.0	0.0	0.0	0.0	2.5
	Positive	19.6	32.0	39.0	9.3	7,560.8

b) Brazil

Destiny	$\frac{\partial ti}{\partial Pref}$	RCA (*)				Millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Argentina	Negative	0.3	0.0	0.0	0.0	22.7
	Positive	20.6	47.2	16.1	15.8	7,566.3
Paraguay	Negative	0.6	0.0	0.0	0.0	5.5
	Positive	44.0	28.0	16.8	10.6	920.4
Uruguay	Negative	0.3	0.0	0.0	0.0	2.2
	Positive	32.1	33.4	21.6	12.6	722.7
Mercosur	Negative	0.3	0.0	0.0	0.0	30.5
	Positive	23.9	44.2	16.6	15.0	9,209.4

c) Paraguay

Destiny	$\frac{\partial ti}{\partial Pref}$	RCA (*)				Millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Argentina	Negative	3.7	0.8	0.0	0.0	5.5
	Positive	17.0	1.3	76.9	0.3	117.0
Brazil	Negative	1.3	0.1	0.0	0.0	4.3
	Positive	12.7	0.6	85.1	0.2	305.8
Uruguay	Negative	0.3	0.3	0.0	0.0	1.2
	Positive	11.1	0.9	87.4	0.0	240.1
Mercosur	Negative	1.3	0.3	0.0	0.0	11.1
	Positive	12.9	0.8	84.5	0.1	662.9

d) Uruguay

Destiny	$\frac{\partial ti}{\partial Pref}$	RCA (*)				Millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Argentina	Negative	0.3	0.0	13.4	1.8	32.1
	Positive	31.8	42.4	5.9	4.4	174.9
Brazil	Negative	0.2	0.0	36.8	3.3	179.1
	Positive	22.7	18.6	10.9	7.4	264.1
Paraguay	Negative	0.2	0.0	13.5	0.3	6.8
	Positive	20.3	17.1	47.4	1.3	41.9
Mercosur	Negative	0.3	0.0	28.3	2.7	218.0
	Positive	25.2	25.5	11.9	6.1	480.9

(*) RCA = "NO RCA" if RCA<=1; RCA = "RCA" if RCA>1. (**) PRODY = "LOW" if PRODY <= median(PRODY); PRODY = "HIGH" if PRODY > median(PRODY). **Source:** own elaboration.

Table A.2
Effect of preferences on trade intensity according to RCA and PRODY
Distribution of export shares values to each market. Using IV estimates
(% and millions of US)

a) Argentina

Destiny	$\frac{\partial ti}{\partial Pref}$	RCA (*)				Millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Brazil	**Negative**	0.0	0.0	0.0	0.0	0.0
	Positive	13.6	35.0	40.5	10.9	5,868.1
Paraguay	**Negative**	0.0	0.0	0.0	0.0	0.0
	Positive	29.1	20.8	46.7	3.4	487.1
Uruguay	**Negative**	0.0	0.0	0.0	0.0	0.0
	Positive	32.8	38.5	24.9	3.7	722.8
Mercosur	**Negative**	0.0	0.0	0.0	0.0	0.0
	Positive	16.7	34.4	39.3	9.7	7,078.0

b) Brazil

Destiny	$\frac{\partial ti}{\partial Pref}$	RCA (*)				Millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Argentina	**Negative**	0.4	0.1	0.0	0.0	35.9
	Positive	20.2	47.3	15.9	16.1	7,538.6
Paraguay	**Negative**	0.7	1.2	0.0	0.0	17.7
	Positive	43.4	27.3	16.6	10.9	908.2
Uruguay	**Negative**	0.3	0.1	0.0	0.0	3.0
	Positive	31.5	33.7	21.4	12.9	718.1
Mercosur	**Negative**	0.4	0.2	0.0	0.0	56.6
	Positive	23.4	44.3	16.4	15.3	9,164.9

c) Paraguay

Destiny	$\frac{\partial ti}{\partial Pref}$	RCA (*)				Millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Argentina	**Negative**	1.9	0.6	0.0	0.0	3.1
	Positive	18.8	1.5	76.9	0.3	119.5
Brazil	**Negative**	0.9	0.0	0.0	0.0	2.8
	Positive	13.1	0.7	85.1	0.2	307.3
Uruguay	**Negative**	0.1	0.0	0.0	0.0	0.3
	Positive	11.3	1.1	87.4	0.0	241.1
Mercosur	**Negative**	0.8	0.1	0.0	0.0	6.2
	Positive	13.5	1.0	84.5	0.1	667.9

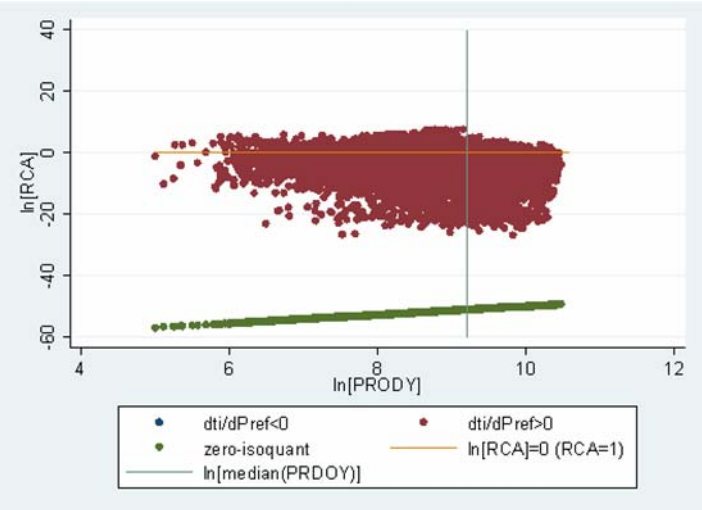
d) Uruguay

Destiny	$\frac{\partial ti}{\partial Pref}$	RCA (*)				Millions USD (annual average)
		NO RCA		RCA		
		PRODY (**)		PRODY (**)		
		LOW	HIGH	LOW	HIGH	
Argentina	**Negative**	29.8	25.3	1.2	0.0	116.6
	Positive	2.2	17.1	18.0	6.3	90.4
Brazil	**Negative**	20.6	7.8	3.5	0.0	141.7
	Positive	2.3	10.8	44.0	10.9	301.5
Paraguay	**Negative**	13.9	5.6	0.1	0.0	9.5
	Positive	6.5	11.5	60.8	1.6	39.2
Mercosur	**Negative**	22.9	12.9	2.6	0.0	267.8
	Positive	2.6	12.7	37.5	8.9	431.1

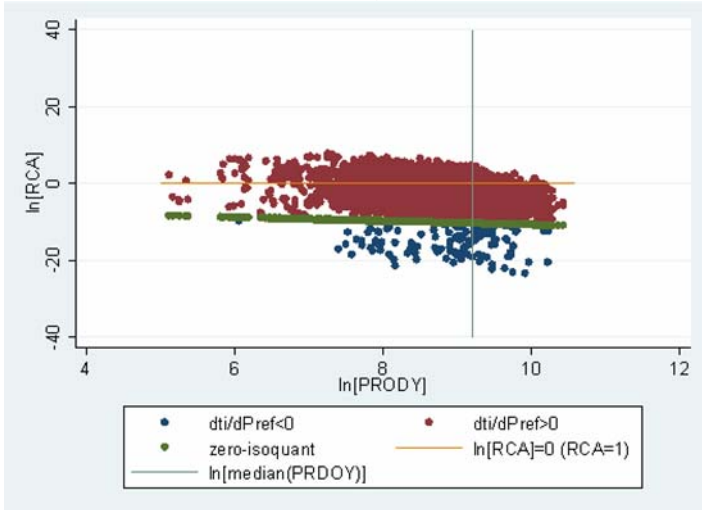
(*) RCA = "NO RCA" if RCA<=1; RCA = "RCA" if RCA>1. (**) PRODY = "LOW" if PRODY <= median(PRODY); PRODY = "HIGH" if PRODY > median(PRODY). **Source:** own elaboration.

Figure A.1
RCA, PRODY and the marginal effect of preference on trade intensity. Using IV estimates

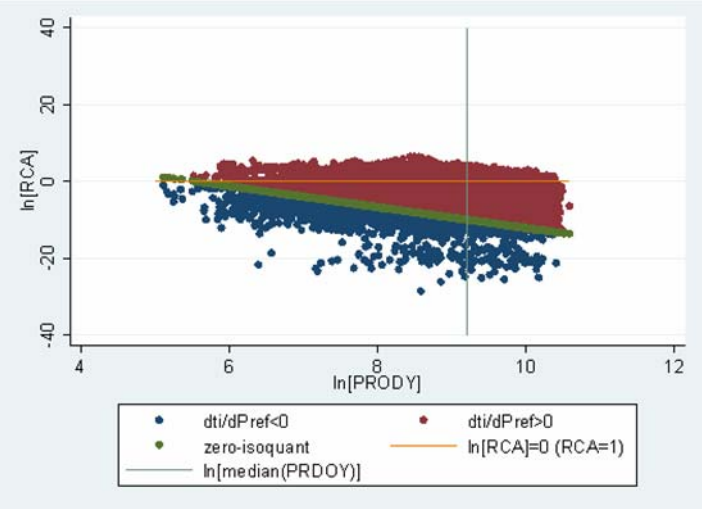
a) Argentina



c) Paraguay



b) Brazil



d) Uruguay