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**South-South Trade Agreements, Location of
Production and Inequality in Latin America**

Alessia Lo Turco

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Abstract

This study aims at evaluating the relation between South-South trade agreements, location of production and inequality in Latin American RTAs. Following Sanguinetti et al.(2004) and Midelfart-Knarvik et al.(2000), an empirical model will be estimated to check whether industry localization was affected by the agreement. An ending section will then evaluate the overall impact of trade agreements on σ -convergence, i.e. the standard deviation of income levels of countries belonging to the same agreement.

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1 Introduction and Literature Review

Aim of this paper is to evaluate the relation between South-South trade agreements, industrial location and inequality in Latin America.

Location of production is determined by country specific features, such as factor endowments, policy framework, technological advance and the size of the internal market. Though, having care only to country specific characteristics would not allow to explain why very similar countries often show different production structures: *ceteris paribus*, some countries show higher shares of industrial production than others. This can be referred to the existence of industry specific characteristics which, together with geography, cause agglomeration forces to operate. In this sense, the presence of trade or transport costs, economies of scale and backward and forward linkages, *ceteris paribus*, can cause production to concentrate in a few locations and only by time, when wages become unsustainable, let it spread to lower wage economies. Thus, as Puga and Venables(1998) point out, “growth in world manufacturing relative to other tradable industries does not lead to a steady development of low wage economies, but instead to rapid industrialization of countries in turn”.

While Puga and Venables(1998) focus on the role of developing countries unilateral trade policy for industrial development, Venables(2002) analyzes the effect of the negotiation of a Customs Union(CU) on industrial development both in symmetrical and asymmetrical agreements¹. The idea is that

¹Symmetrical and asymmetrical are referred to the level of development of countries involved, thus a South-South CU would be a symmetrical agreement between developing countries.

the formation of a CU among countries with similar comparative advantage would cause the latter to be altered, benefiting the country with an intermediate comparative advantage with respect to the partners and the rest of the world at the expenses of partners with an extreme comparative advantage: preferential tariffs would affect production location via their effect on the structure of regional comparative advantages. The changing in regional comparative advantage together with the above mentioned country and industry characteristics then determine production patterns. Thus, *ceteris paribus*, countries with a higher share of skilled labor would see their share of skilled labor intensive industries increase after the formation of the CU. Now, from an empirical point of view it is important to highlight how the regional integration process together with a pre-existing different trade specialization among partners can affect the location of production.

Some empirical papers address similar issues, Midelfart-Knarvik et al.(2000) analyze the determinants of location of production across Europe. Their dependent variable is the share of industry k production in country i relative to the size of the industry k across Europe and country i 's total production. They test a series of country and industry determinants together with several interactions between the former and the latter. They find that EU's cross country variation in industrial structure can be explained by comparative advantage combined with transport costs and geography. Factor endowments, skilled labor in particular, are important in attracting high skill intensive industry. Forward and backward linkages matter too. Finally the fall in trade costs and government intervention makes economic forces become important in determining location. More recently, Sanguinetti et al.(2004) focus on

the relocation of industry following the formation of Mercosur. Using data on Argentina, Brazil and Uruguay over the period 1985-1998 they find that preferential trade liberalization has favored a reshaping of manufacturing production according to regional comparative advantage in labor and skilled labor and that declining internal tariffs have weakened agglomeration forces determined by the distribution of the market sizes. Their dependent variable is the country share production of industry k over the whole regional manufacturing product. Apart from interacting country and industry characteristics, the main contribution of this paper is the detection of the agreement effect via the introduction of the preferential margin and its interactions with country and industry specific characteristics in the regression.

Within this frame, the main contribution of the present work is the focus on the relation between regional partners' trade specialization patterns, localization of industry and inequality across Latin American sub-regions, i.e. Mercosur, Andean Community and the Central American Common Market before and after the negotiations of the early 90s.

The first part of the work will deal with the relation between trade agreements formation, trade specialization and location of production on the basis of industry level data: the role of trade integration will be controlled via the introduction of three different variables. Firstly, for each industry the regional output growth is introduced: the idea is that if the preferential tariff structure causes industry to relocate among countries within the same agreement a significant relation needs to exist between regional output growth in industry k and localization of industry k in country i and if localization is enhanced a positive relation is expected. Secondly, the Balassa Revealed

Comparative Advantage (RCA) index of trade specialization with respect to the sub-region is calculated for each industry: if countries with a higher comparative advantage are favored in the relocation of production following the formation of the integrated area, then the higher trade specialization in industry k the more industry k will be localized in country i . Finally, the ratio between the RCA calculated for the whole region with respect to trade with the rest of the world and each country regional RCA is introduced as a regressor in the empirical model to test Venalbes's model prediction: if the formation of the integrated area causes countries with an intermediate comparative advantage to do better then the less country i is specialized with respect to partners in the region the less industry k will be localized in it.

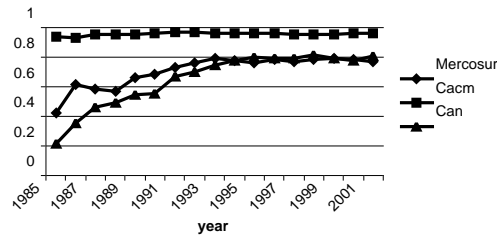
The second part of the work, instead, is based on the detection of the impact of trade agreements on overall inequality and uses aggregated country data on real GDP per capita. Following Slaughter(1998) the σ -convergence of regional groups is tested via a diff-in-diff technique.

The work is organized as follows. The next section deals with the description of changes in trade and production patterns, the following section presents the empirical strategy: the following sub-sections will present the data, the empirical models and results. Summary conclusions will end the work.

2 Trade and Production Patterns in Latin American Sub-Regions

Figure 1 shows the increase in the relative importance of the intra-regional market for South-American countries manufactures² In general, after the 90s

Figure 1: Introversion Indexes for LAC agreements



Source:ECLAC. Calculations by the author.

partners in the agreements become the most favorite destinations for manufacturing exports. Table 1 shows a symmetric version of the re-orientation index proposed by Yeats(1998), i.e. the ratio between the share of manufacturing exports directed to the partners over total exports to the sub-region and the share of manufacturing exports going to the world over total exports to the world. The index ranges between -1 and 1, with 0 indicating geographic neutrality. A strong re-orientation process towards partners in the agreement emerges for Ecuador, Argentina, Uruguay and Costa Rica. Colombia, Venezuela and Brazil do not substantially change the direction of their exports, while Bolivia and the remaining CACM countries seem to re-direct their exports towards destinations outside the region. One might conclude that the formation of the agreement did not bring about a great

²The definition of manufacturing industry adopted here is the UNCTAD-World Bank.

change for the bigger countries which already held a wide share of total regional trade, as is the case for Colombia Venezuela and Brazil. For smaller countries, in the Southern cone instead it represented the chance to exploit a wider destination market, as it could be the case for Argentina, and Ecuador. The remaining countries might have stayed neutral to the formation or renegotiation of the integrated area. This is the case of Central American countries which already enjoyed a higher level of integration and actively trade outside the region too.

For Mercosur and Andean countries many traditional production industries³⁴ are re-directed to the sub-region. Ecuador is the country which re-directs the largest number of industries towards the partners among which electric machinery and transport equipments, while Bolivia is the country with the smallest one.

For CACM countries in general the re-direction process involves more dynamic industries⁵ with El Salvador having the largest number of industries re-oriented towards the sub-region.

Tables 2-4 show the absolute variation in the Herfindal index for the three sub-regions before and after the 90s⁶. Only those industries where localization of production increased were presented.

Table 5 instead shows for each country within each agreement the change in

³Tables on the evolution of the re-orientation index for those ISIC manufacturing industries which experienced a re-direction towards the sub-regional markets can be obtained from the author upon request.

⁴e.g. food, beverages and textiles

⁵i.e. electric machineries, professional and transport equipment

⁶It is calculated as: $HERFINDAL_{rk} = \sum_i s_{ik}^2$ where $HERFINDAL_{rk}$ is the Herfindal index for industry k in region r and s_i is the production share of partner i over the whole of regional production in industry k .

Table 1: Re-orientation of manufacturing exports

country-year	1985	1990	1995	2001
bolivia	0.59	0.27	-0.32	-0.44
colombia	0.63	0.46	0.39	0.43
ecuador	0.70	0.47	0.74	0.62
venezuela	0.65	0.68	0.57	0.62
argentina	0.17	0.14	0.17	0.22
brazil	0.25	0.21	0.23	0.21
uruguay	0.14	0.05	0.06	0.10
costarica	0.17	0.22	0.47	0.50
el salvador	0.51	0.36	0.25	0.04
guatemala	0.50	0.24	0.06	-0.10
honduras	0.61	0.27	0.24	0.04

Table 2: Mercosur-regional Herfindal index

ISIC-year	85-90	90-95
Food	-0.22	0.01
Glass	-0.19	0.04
Industrial chem.	-0.21	0.01
Miscellaneous petr.and coal prod.	-0.07	0.08
Paper and prod.	-0.14	0.01
Petroleum ref.	-0.13	0.03
Pottery	-0.15	0.11
Rubber prod.	-0.21	0.08
Textiles	-0.23	0.05
Transport equipm.	-0.08	0.01

the degree of specialization with respect to the whole region⁷ and the growth of the overall share of regional manufacturing production.

Gathering the evidence from the tables, in the 90s the degree of introversion increases for the Andean Community and Mercosur and to a lesser extent for the Central American Common Market.

In the South American agreements bigger partners, which already held a relevant role in regional trade flows, do not change the direction of their exports while the remaining partners do (apart from Bolivia in the Andean commu-

⁷This is a modified of the Hoover Balassa index which provides a country specialization measure relative to the region, it is calculated through the following formula:

$SI_i = \sqrt{\frac{\sum_k (x_{ik} - x_{rk})^2}{k}}$ where SI_i is the specialization index for country i , x_{ik} is country i 's production share of industry k over country i 's total manufacturing and x_{rk} measures region r 's production share of industry k over the whole regional manufacturing production. k measures the total number of industries

Table 3: CAN-regional Herfindal index

ISIC-year	75-90	90-98
Food	-0.04	0.01
Glass	-0.09	0.06
Iron and Steel	-0.09	0.16
Leather Prod.	0.02	0.04
Machinery, electric	-0.04	0.06
Machinery,exc.electrical	-0.02	0.00
Non-ferrous metals	0.34	0.09
Other chem.	-0.05	0.01
Plastic prod.	-0.09	0.05
Pottery	0.04	0.06
Printing and Publish.	-0.07	0.02
Professional and Scient. eq.	0.00	0.31
Rubber prod.	-0.03	0.33
Tobacco	0.01	0.48
Wearing app.,ex.footwear	-0.10	0.11
Wood prod.	-0.13	0.01

Table 4: CACM-regional Herfindal index

ISIC-year	71-90	90-95
Food	0.04	0.01
Glass	-0.16	0.04
Leather Prod.	0.03	0.07
Machinery, electric	0.15	0.05
Miscellaneous petr.and coal prod.	-0.49	0.91
Other chem.	-0.06	0.07
Petroleum ref.	0.00	0.06
Plastic prod.	0.08	0.02
Pottery	-0.08	0.02
Printing and Publish.	0.06	0.01
Professional and Scient. eq.	-0.02	0.36
Rubber prod.	0.00	0.37
Transport equipm.	-0.14	0.08

Table 5: Specialization Index

	Spec.	Index	share of	reg.prod.
cty-year	85-90	90-95	85-90	90-95
ARG	0.003	-0.008	0.12	0.01
BRA	0.005	-0.001	-0.13	-0.02
URY	-0.011	0.011	0.01	0.00
cty-year	75-90	90-95	75-90	90-98
BOL	-0.010	0.008	0.01	0.00
COL	0.003	-0.001	0.09	-0.04
ECU	-0.012	0.024	0.02	0.04
VEN	0.007	0.006	-0.13	0.00
cty-year	71-91	91-95	71-90	91-95
CRI	-0.001	-0.005	0.06	0.00
GTM	-0.002	-0.001	0.03	0.03
HND	-0.011	0.000	0.04	-0.02
SLV	0.023	-0.007	-0.13	-0.02

nity). In general all the exports re-directed to the region belong to industries where countries gain ground in regional production and this especially is true for Uruguay within Mercosur and for Ecuador which gains several industry shares in the 90s and sells these productions to partners in the region.

For Central American countries instead, manufacturing exports are mainly re-directed outside the region and, differently from South American countries, the region becomes the favorite destination for exports of machineries, transport and professional equipments. There is almost a perfect matching between re-oriented exports and gained industries in regional production. Localization of production increases in several industries and main contributors to this patterns are Costa Rica and Guatemala.

In general, then, despite localization increases in several industries in the all this pattern is due to different countries gaining ground in different industries. In Mercosur regional production seems to be more spread across partners, especially Argentina and Brazil, Uruguay loses some industries and becomes more specialized, though it gains in those industries whose exports are re-directed to the sub-region. In the Andean Community, location of production might seem to be more dispersed after the 90s than in the previous period with Ecuador gaining ground in several industries, though Venezuelan production shares dramatically increase in several of the industries with increased regional Herfindal index. In the Central American Common Market regional production in the 90s is shared especially by Costa Rica, Guatemala and El Salvador, their degree of specialization with respect to the region decreases after the 90s showing a more diversified production structure. The first two countries gain more in regional shares than the latter. Honduras

loses ground in regional production despite its degree of specialization does not increase in the 90s.

3 The Empirical Strategy

The empirical strategy is based on the estimation of two different empirical models. Firstly an empirical model based on industry level data will be estimated in order to test the relation between economic integration and localization of production within each agreement. Secondly, an empirical model based on aggregated data on per capita income levels will be estimated in order to detect via a difference-in-differences technique whether the negotiation of the agreements brought about increased overall inequality.

3.1 The Empirical Model I

Following Midelfart-Knarvik et al.(2000) and Sanguinetti et al.(2004) the empirical model in the basic specification is:

$$s_{ikt} = \alpha_0 s_{ikt-1} + \sum_j \beta_j X_{it} + \sum_j \gamma_j I_{kt} + \sum_j \delta_j X_{it} I_{kt} + \theta_i + \eta_k + \tau_t + \epsilon_{ikt} \quad (1)$$

here $s_{ikt} = \frac{q_{ikt}/Q_{kt}}{q_{it}/Q_t}$ measures the share of country i 's industry k in the total regional industry k production (q_{ikt}/Q_{kt} with q_{ikt} measuring country i 's industry k production and Q_{kt} measuring the regional production of k) normalized by the country weight in total manufacturing in the region (q_{it}/Q_t with q_{it} measuring total country i 's manufacturing production and Q_t measuring total regional manufacturing production), X_{it} and I_{kt} are respectively

country i and industry k 's characteristics affecting the location of k production in i , the following term is the interaction between the previous ones, θ_i , η_k and τ_t represent country and industry specific fixed effects and finally ϵ_{ikt} is a time-varying shock.⁸

Model 1 is what in the empirical literature is known as a dynamic panel data model: the lag of the dependent variable appears among the regressors creating a source of correlation between the lag of income and the error term. In this frame the Arellano and Bond (1991) First Difference GMM estimator (Blundell et al. (2000) and Bond et al. (2001)) estimator has been extensively used for the estimation of growth regressions despite it performs very poorly with a high persistence in the series⁹.

To overcome this problem the System-GMM might be of help (see Blundell et al. (2002)), though, can be considered as oversized with respect to the available data set especially in the time span.

Nerlove(1992) highlights that the inconsistency of Within Group estimator in dynamic panel data models fades away as far as the time dimension of the data set gets longer. In the present case, though, Within Group estimator might be severely biased since the time span is quite short, thus Kiviet correction (Kiviet(1995)) for Least Square Dummy Variables Estimator is used. Finally, endogeneity of regressors is broken via the use of lagged values of right hand side variables.

⁸It is worth to notice that the dependent variable can be interpreted both as a specialization and a localization measure.

As a matter of fact $s_{ikt} = \frac{q_{ikt}/Q_{kt}}{q_{it}/Q_t} = \frac{q_{ikt}/q_{it}}{Q_{kt}/Q_t}$ so that it represents an index of country i 's production specialization in industry k and the localization of industry k in country i relative to the localization of activity a whole in i

⁹If this is the case, lagged values of the variables are very unlikely to serve as good instruments for first differences

3.2 The Data

The data on manufacturing output is from UNIDO and ranges from 1970 to 2000, though observations not always are available for all countries, industries and periods¹⁰.

Data on country specific characteristics is from ECLAC and ranges from 1970 to 2000 and data on trade are from TradeCAN (ECLAC).

Finally, data on real GDP per capita from 1960 to 2000 is from PWT version 6.1.

For the estimation of model 1 variables affecting the location of production are all taken in logs and in their lagged values and can be divided into four main groups:

- country specific factors: the share of agriculture over GDP, the population education level(measured as the secondary school enrolment rate), the size of the economy measured through GDP in order to detect a country market potential and the total labor force are introduced
- industry specific factors:labor intensity is detected by the number of employees, skill intensity by the productivity level of employees, backward and forward linkages are detected by total production in the rest of manufacture. The idea is that if backward and forward linkages are

¹⁰For Mercosur data for Paraguay is never available and for CACM data on Nicaragua only arrives to 1985 so these two countries were dropped from the analysis. For the remaining countries data was available from 1970 to 1998, and to 2000 in some cases. Though only those years were all, or almost all of the countries within an agreement were present were used. For this for Mercosur data for years 1985, 1990 and 1993-1995 was used. For the Andean Community data on output values is available for all of the countries from 1970 to 1998. Finally, for CACM data is available for all of the countries (i.e.four or three over four countries)for the periods 1971-75, 1981-85 and 1991-95

at work, the more the industrial structure widens and grows the more industry k will enlarge within country i , thus a positive sign is expected. Finally, scale economies are measured by means of a dummy variable taking value 1 for those industries which are classified as scale economy industries according to Pavitt classification.

- interactions: country specific factors are interacted with industry specific ones. Countries' labor force is interacted with labor intensity. Countries' population education level is interacted with skill intensity and market potential is interacted with the scale economy dummy.
- integration detectors: the increasing level of economic integration among partners is detected by means of three variables.

Firstly, for each industry k in each country the growth rate of industry k in the whole sub-region is introduced in order to check what relation exists between the development of the industry in the whole region and the same industry localization in country i .

Secondly, since the evolution of comparative advantages is believed to affect production patterns among partner countries the Balassa Revealed Comparative Advantage, RCA_{ik} , index for trade with the sub-region is used:

$$RCA_{ik} = \frac{\frac{x_{ik}}{x_i}}{\frac{x_{rk}}{x_r}} \quad (2)$$

here $\frac{x_{ik}}{x_i}$ measures country i industry k exports directed to the sub-region over total country i exports to the partners and $\frac{x_{rk}}{x_r}$ measures the sub-regional industry k exports over the total sub regional exports. If trade integration causes comparative advantages to change then in-

dustry k localization of production is believed to increase in locations enjoying a higher specialization compared to partners.

Finally, always making use of the Balassa RCA index, a ratio was calculated to check whether localization of production is more likely to occur in countries with a comparative advantage which is intermediate between the partners and the rest of the world. In order to achieve this the RCA index for the whole region was calculated according to the following formula¹¹

$$RCA_{rk} = \frac{\frac{x_{rk}}{x_r}}{\frac{x_{wk}}{x_w}} \quad (3)$$

and noting that for countries which are relatively more specialized than partners $RCA_{rk} < RCA_{ik}$ and that the opposite holds for countries with an extreme comparative advantage (disadvantage) then the ratio $r = RCA_{rk}/RCA_{ik}$ was calculated noting that for $0 < r < 1$ countries enjoy an intermediate comparative advantage and that for $r > 1$ instead country show an extreme comparative disadvantage. Thus if the formation of South-South RTAs brings about localization of production in countries with an intermediate comparative advantage then the ratio r is expected to show a negative sign thus predicting delocalization in countries with high values of the ratio.

¹¹Here $\frac{x_{rk}}{x_r}$ again measures the sub-regional industry k exports over the total sub regional exports and $\frac{x_{wk}}{x_w}$ the world industry k exports over total world exports.

3.3 Results

Tables 10-14 in the appendix show results for the Andean Community and the Central American Common Market¹² Each table respectively shows coefficients and P-values.

Table 10 shows results respectively when the regional industrial growth, *reg.sect.gr.*, the regional RCA, *reg.RCA*, and the ratio between countries and regional specialization indexes in industry k , r , are introduced in the regression. From the cross effects in the first table, labor abundant locations seem to attract labor intensive industries the same does not occur for skilled labor abundant locations and skill intensive industries and for large market potential countries and scale economy industries. The regional industrial growth rate seem to positively affect the localization of production of industry k in country i . The RCA index with respect to the sub-region shows a positive sign suggesting that the higher country i trade specialization in industry k the more industry k will become localized in country i . Finally the coefficient on the ratio r is significant and negatively related to localization of production thus confirming that the more extreme is country i 's disadvantage with respect to partners in the agreement the less k production will be localized in it.

Table 11 presents the estimation of model 1 when the sample is broken into pre and post-agreement period. The cross effect of labor intensity and labor force abundance is not significant anymore, while regional industrial growth is always significant and higher in the post-agreement period. These findings

¹²For Mercosur the time span data was not enough to attempt an estimation of model 1.

are confirmed in table 12, though in the post agreement period the regional RCA does not turn out to be significant and the significance of the ratio r is lower than in the first period and in table 10.

Table 13 shows results for CACM: again labor abundant locations attract labor intensive industries, but the same does not occur for skilled labor abundant locations and skill intensive industries and for large market potential countries and scale economy industries. The coefficient for the regional industrial growth is positive and significant, though when the regional RCA and the ratio r are introduced it is not significant anymore, moreover these two variables turn out to be non-significant too.

Table 14 shows regression results for the pre and post agreement period when the only regional industrial growth is introduced, for the remaining two variables in fact there are no sufficient pre-agreement observations. The significance of the cross effect of labor intensity and labor force abundance is confirmed in the second period while the regional industrial growth is not significantly related to localization of production in both periods.

To sum up there is some evidence of increased localization of production in the Andean Community after the 90s, it seems moreover that productions tends to localize in countries with a higher specialization with respect to partners in the region. The effect though is only slightly significant after the 90s. For CACM, the relation between the regional industrial growth and localization of production is not robust, the regional RCA and the ratio r are never significant

3.4 Patterns of Inequality

This section is devoted to a brief analysis of patterns in convergence/divergence in real GDP per capita. From the previous sections no clear evidence of diverging production patterns after the agreement emerges: after 1991 industrial location does not seem to be prevented to spread across countries within the same agreement. Now, aggregate data on per capita GDP is going to be used for an overall analysis of inequality in Latin American agreements . A diverging pattern in per capita income might be driven not only by localization of production but by localization of services as well.

Within the branch of the empirical growth literature focusing on the relation between openness and convergence in income levels, a pioneer work was the one by Ben-David (1993) who specifically focused on the experience of the European Community. With a non parametrical approach, Ben-David analyzes the pattern of the standard deviation of the log of income per capita levels in the region, comparing this to the timing of the evolution of the EEC. From the comparison before/after of the dispersion in income levels for the European Countries, he concludes that the dispersion has decreased after the EEC was formed and this pattern is not only a long term trend. But, more recently Slaughter (1998) examines the same issue using the difference-in-differences approach, thus reading in the experience of 10.000 randomly chosen control groups what the pattern of convergence in the European Countries would have been in the absence of the agreement. Apart from the EEC, he focuses on the formation of the European Free Trade Area (EFTA), the agreement between EFTA and EEC, and the Kennedy Round tariff cuts

under the GATT. His conclusions are that “trade liberalizations does not trigger convergence in any of the four cases, if anything it seems to have caused income divergence. In all the four cases, the large majority of the 10.000 difference-in-differences estimates are not significantly different from zero and the average among the significant estimates indicates that trade liberalization tends to diverge incomes.” (Slaughter (1998))

3.5 The empirical model II

Following Slaughter (1998), the empirical strategy is based on the reconstruction of a natural experiment setting via the use of the difference-in-differences approach (Blundell et al. (2000)(2002)). The formal model is the following

$$\sigma_{jt} = \alpha_0 + \alpha_1 D_t + \gamma_0 D_t * G_i + \beta_0 t + \beta_1 t * D_t + \beta_2 t * D_t * G_i + u_i + \epsilon_{it} \quad (4)$$

σ_{jt} measures the per capita income dispersion within each group of countries (Andean group, Central American Common Market, Mercosur Group, Control Group). This is calculated as the standard deviation of the log of the real income per capita of the countries in the agreement. On the right hand side we have the time dummy D_t , taking value 1 from the date of the agreement onwards, and its interaction with the group dummy, $G_i = 1$ for the agreement group, and $G_i = 0$ for the control group. The other components of the right hand side are a time trend, t , its interaction with the time dummy D_t , and its interaction with the agreement indicator $D_t * G_i$. This last term is introduced in order to investigate whether the three South-South

Table 6: Groups and Regimes

COUNTRY GROUP/REGIME Model (1)	INTERCEPT	RATE OF CONVERGENCE
Treatment group before the agreement	α_0	β_0
Treatment group after the agreement	$\alpha_0 + \alpha_1 + \gamma_0$	$\beta_0 + \beta_1 + \beta_2$
Control group before the agreement	α_0	β_0
Control group after the agreement	$\alpha_0 + \alpha_1$	$\beta_0 + \beta_1$

Regional Trade agreements have contributed to convergence or divergence in income levels among the countries involved. The parameter of interest here is β_2 , when it is negative then the rate of dispersion has decreased during the period under observation. Table 6 shows the different intercepts and convergence rates for the agreement and the comparison groups.

The interaction of the time trend with the treatment indicator will reveal whether the agreement has contributed to increase or decrease the rate of convergence, whereas the coefficient on the interaction between the time dummy and the trend will reveal what the pattern of the rate of convergence would have been in the same period, in the absence of the agreement. The unobserved heterogeneity and endogenous selection are caught in the country specific time invariant effect u_i that is wiped out through the use of Within Group estimator. For the choice of the control group, the dispersion for 204 random groups of countries that did not undergo any of the three agreements was calculated and estimations were repeated 204 times in order to check robustness of results.

3.6 Basic Results.

Figures 2-4 show the pattern of income dispersion among the countries in the three agreements. On the y axis the standard deviation from the regional mean of the log of the real GDP per per capita is measured. For Mercosur,

figure 2 shows a sharp decrease of dispersion until the end of the 80s, but after 1991 there is a clear and strong tendency to the increase of the deviation of member countries income per capita levels from the mean. For the Andean Community dispersion in per capita GDP tends to decrease after 1969, is quite stable during the eighties and after a positive peak in the beginning of the nineties goes down again. Finally, for CACM the pattern of the standard deviation is quite stable until the first half of the seventies, then it decreases and in the nineties increases dramatically.

Figure 2: Mercosur: σ -convergence

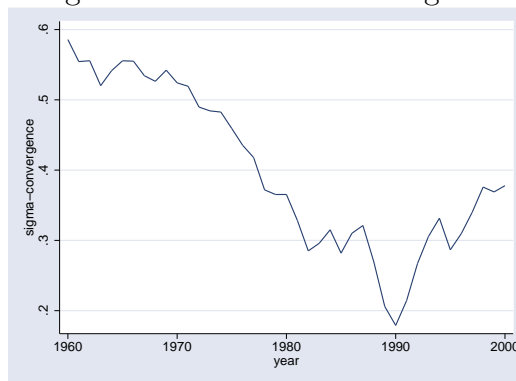


Figure 3: CAN: σ -convergence

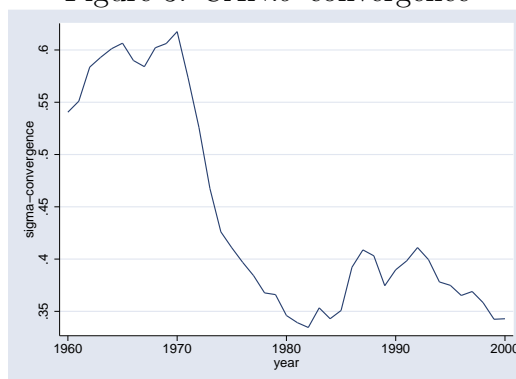


Figure 4: CACM: σ -convergence

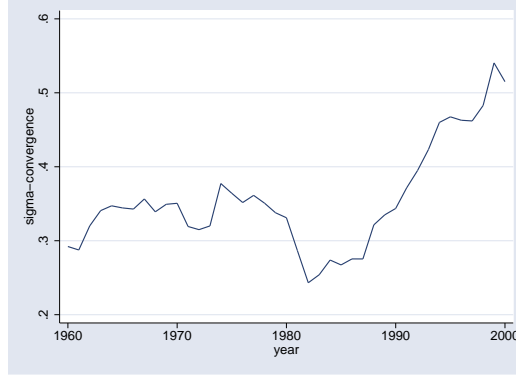


Table 7-9 show results from the estimation of 4 for three different measures of real GDP per capita¹³. The average¹⁴ from the significant estimates of the additional rate of convergence is shown in the second column, while the final column shows the number of trials where the additional rate of convergence is not significant. Negotiation of CACM and Mercosur seem to have fostered divergence while the re-negotiation of the Andean Pact seems to have enhanced convergence. Though, from the third column the number of trials with non significant coefficients is much wider than the number of trials with significant estimates and this is valid for each different measure of GDP per capita adopted. Then no final evidence on enhanced inequality in income levels by means of South-South trade agreements exists, thus confirming results from the previous sections.

¹³In tables 7 and 8 respectively the Laspeyres and the current price real GDP per capita are used. In table 9 instead the real GDP per worker is used.

¹⁴The model estimation was repeated 204 times with 204 different random control groups of the same size of the agreement groups.

Table 7: Results I: dependent variable real GDP per capita I

agreement	average additional rate of convergence	n.of non sign. estimates
mercosur	0.04	144
can	-0.01	120
cacm	0.04	144

Table 8: Results II: dependent variable real GDP per capita II

agreement	average additional rate of convergence	n.of non sign. estimates
mercosur	0.05	128
can	0.00	121
cacm	0.05	156

4 Conclusion

This paper addresses the issue of South-South integration, trade specialization, location of production and inequality in Latin America. The empirical evidence on trade and production data shows that the degree of introversion increased in Latin American sub-regions after the negotiation of trade agreements in the 90s. Countries re-directed some exports, mainly from traditional industries in South America and from more dynamic ones in Central America, towards the sub-regions and, according to data on production, localization increased in a number of sectors especially in the Central American Common Market and the Andean Community. In the 90s some countries became more specialized than before. Some of these were already highly specialized be-

Table 9: Results III: dependent variable real GDP per worker

agreement	average additional rate of convergence	n.of non sign. estimates
mercosur	0.04	104
can	-0.01	101
cacm	0.05	141

fore the 90s,(e.g. Colombia, El Salvador, Costa Rica) but some others gained ground after the negotiation of the agreement(e.g. Ecuador and Guatemala). Two different empirical models were estimated.

On one hand a data set made up of disaggregated data on trade and production was used in order to check whether industrial localization was affected by increasing economic integration and trade specialization patterns. Three different variables were used to check for the role of regional integration: the regional industrial output growth, the RCA with respect to the region and the inverse of the ratio between this and the whole region RCA with respect to the rest of the world. Only for the Andean Community there is some evidence of localization of production increasing with the enlargement of the market, moreover countries with intermediate comparative advantages seem to do better then the rest of the region, the effect, though, is not strongly significant after the 90s.

On the other hand, an empirical model based on aggregated data was estimated to detect by means of a diff-in-diffs technique whether the negotiation of the agreements enhanced divergence in income per capita among partners. The evidence which emerges by the use of 204 different random control groups suggests that for the majority of the estimations the effect of the agreements on the rate of convergence is not significantly different from 0 and from the average of significant estimates Mercosur and CACM seem to have fostered divergence while CAN seems to have triggered convergence. Thus putting all the evidence together, the evidence on South-South RTAs leading to increased concentration of production and divergence is not really strong.

5 References

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Table 10: Results CAN I

N.Obs.	2546		1345		1345	
Groups	108		107		107	
	Coef.	$P > z $	Coef.	$P > z $	Coef.	$P > z $
s_{ikt-1}	0.84	0.00	0.58	0.00	0.57	0.00
agr.gdp	-0.28	0.00	-0.11	0.29	-0.13	0.20
edu.	1.38	0.01	1.13	0.28	1.01	0.33
mkt pot.	-0.50	0.00	-0.68	0.05	-0.60	0.08
lab.force	-4.17	0.01	-15.50	0.00	-15.61	0.00
link.	0.05	0.43	0.23	0.09	0.21	0.13
lab.int.	-1.77	0.00	-5.63	0.00	-5.82	0.00
skill int.	0.21	0.15	0.08	0.78	0.05	0.85
lab.force*lab.int.	0.46	0.00	1.48	0.00	1.53	0.00
edu*skill int.	-0.11	0.02	-0.06	0.52	-0.05	0.60
sc.econ.*mkt pot.	0.19	0.01	0.14	0.33	0.12	0.39
reg. ind.gr.	0.44	0.00	0.34	0.00	0.33	0.00
reg. RCA			0.02	0.03		
r					-0.02	0.00

Table 11: Results CAN II

N.Obs.	1687		859	
Groups	108		108	
	Coef.	$P > z $	Coef.	$P > z $
	<1991		>1990	
s_{ikt-1}	0.81	0.00	0.38	0.00
agr.gdp	-0.35	0.00	0.41	0.07
edu.	1.26	0.15	8.89	0.00
mkt pot.	-0.45	0.06	-1.59	0.01
lab.force	-0.90	0.80	-31.25	0.00
link.	-0.01	0.87	0.51	0.02
lab.int.	-0.18	0.88	-3.06	0.26
skill int.	0.13	0.61	1.39	0.00
lab.force*lab.int.	0.04	0.88	0.87	0.20
edu*skill int.	-0.09	0.28	-0.46	0.00
sc.econ.*mkt pot.	0.18	0.19	0.05	0.76
reg. ind.gr.	0.20	0.01	0.49	0.00

Table 12: Results CAN III

N.Obs.	845		845	
Groups	107		107	
	Coef.	$P > z $	Coef.	$P > z $
	>1990		>1990	
s_{ikt-1}	0.34	0.00	0.34	0.00
agr.gdp	0.43	0.07	0.41	0.07
edu.	7.28	0.00	7.29	0.00
mkt pot.	-1.46	0.01	-1.39	0.01
lab.force	-33.16	0.00	-33.54	0.00
link.	0.45	0.03	0.44	0.04
lab.int.	-4.11	0.18	-4.17	0.17
skill int.	1.03	0.00	1.02	0.00
lab.force*lab.int.	1.14	0.13	1.16	0.12
edu*skill int.	-0.34	0.00	-0.34	0.00
sc.econ.*mkt pot.	-0.02	0.97	-0.03	1.00
reg.sect. gr.	0.41	0.00	0.41	0.00
reg. RCA	0.04	0.18		
r			-0.03	0.07

Table 13: Results CACM I

N.Obs.	757		299		299	
Groups	110		102		102	
	Coef.	$P > z $	Coef.	$P > z $	Coef.	$P > z $
s_{ikt-1}	0.69	0.00	0.81	0.00	0.79	0.01
agr.gdp	-0.53	0.01	2.50	0.64	2.47	0.64
edu.	1.87	0.00	-6.96	0.91	-6.44	0.92
mkt pot.	-0.40	0.48	4.89	0.79	4.90	0.79
lab.force	-12.35	0.00	-72.00	0.39	-71.36	0.40
link.	-0.49	0.01	1.31	0.37	1.30	0.37
lab.int.	-3.40	0.01	-10.29	0.00	-10.21	0.00
skill int.	0.07	0.46	-1.19	0.04	-1.18	0.05
lab.force*lab.int.	0.84	0.01	2.46	0.00	2.45	0.00
edu*skill int.	-0.09	0.00	0.28	0.21	0.28	0.20
sc.econ.*mkt pot.	-0.10	0.46	-1.28	0.31	-1.19	0.34
reg. ind.gr.	0.34	0.00	0.27	0.37	0.26	0.38
reg. RCA			0.03	0.66		
r					-0.04	0.48

Table 14: Results CACM II

	N.Obs.				
	458		299		
Groups	105		102		
	Coef.	$P > z $	Coef.	$P > z $	
	<1991		>1990		
s_{ikt-1}	0.56	0.00	0.83	0.00	
agr.gdp	0.03	0.98	2.45	0.65	
edu.	1.84	0.11	-6.23	0.91	
mkt pot.	0.12	0.93	4.92	0.80	
lab.force	-11.59	0.43	-71.79	0.39	
link.	-0.28	0.42	1.35	0.36	
lab.int.	-7.79	0.18	-10.24	0.00	
skill int.	0.21	0.09	-1.21	0.04	
lab.force*lab.int.	1.96	0.18	2.44	0.00	
edu*skill int.	-0.14	0.00	0.28	0.21	
sc.econ.*mkt pot.	0.14	0.60	-1.37	0.27	
reg. ind.gr.	0.32	0.01	0.30	0.34	