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ECONOMIC INTEGRATION AND LOCATION OF PRODUCTION ACTIVITIES: THE CASE OF MERCOSUR

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***Economic Integration and Location of Production Activities:
The Case of Mercosur¹***

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Abstract

This research aims at answering the following questions: How do specialization patterns look like in member countries of Mercosur and how have they evolved over time? How do concentration patterns look like and how have they evolved over time? What are the main determinants of locational patterns? Did Mercosur have an impact on location of economic activities? What are the consequences for the smaller countries? Do we see production clusters? We analyse specialization, concentration, and locational patterns in Mercosur using production value data for the period 1971-1998. We identify the determinants of those patterns during the period 1985-1998 using econometric techniques. In addition, we calculate intra-industry trade statistics within Mercosur and with the Rest of the World for the period 1986-2001 in order to investigate the formation of clusters and uncover their determinants. We complement this analysis with a brief description of production developments in border regions with the purpose of determining whether this phenomenon has a specific spatial dimension. Finally, we draw some conclusions about the implications for smaller countries within the bloc and some lessons for upcoming trade initiatives such as a deepening of integration within the region, the establishment of FTAA, and a free trade agreement with the European Union.

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CONTENTS

EXECUTIVE SUMMARY	IV
1. INTRODUCTION	1
2. THEORETICAL BACKGROUND	3
2.1. THE TRADITIONAL TRADE THEORY	4
2.2. THE NEW TRADE THEORY	5
2.3. THE NEW ECONOMIC GEOGRAPHY	6
3. TRADE POLICY BACKGROUND	9
3.1. UNILATERAL TRADE LIBERALIZATION	9
3.2. MERCOSUR: PREFERENTIAL TARIFF LIBERALIZATION	11
3.2.1. FTA: INTERNAL TRADE LIBERALIZATION	12
3.2.2. THE EXTERNAL TRADE LIBERALIZATION: THE ESTABLISHMENT OF THE CET	14
4. PATTERNS OF MANUFACTURING LOCATION IN MERCOSUR	16
4.1. DATA SET	16
4.2. SPECIALIZATION PATTERNS	20
4.2.1. MEASURING ABSOLUTE AND RELATIVE SPECIALIZATION	20
4.2.2. THE SPECIALIZATION OF COUNTRIES	22
4.2.3. SPECIALIZATION PATTERNS	24
4.2.4. DETERMINANTS OF SPECIALIZATION	27
4.3. CONCENTRATION PATTERNS	29
4.3.1. MEASURING ABSOLUTE AND RELATIVE CONCENTRATION	29
4.3.2. THE SPATIAL CONCENTRATION OF INDUSTRIES	30
4.3.3. CONCENTRATION PATTERNS AND INDUSTRY CHARACTERISTICS	33
4.3.4. DETERMINANTS OF CONCENTRATION PATTERNS	34
4.4. DETERMINANTS OF MANUFACTURING LOCATION	38
4.4.1. MAIN HYPOTHESES	39
4.4.2. SPECIFICATION	40
4.4.3. RESULTS	42
4.5. IMPLICATIONS FOR SMALLER COUNTRIES	44
4.6. SUMMARY	46
5. CROSS-COUNTRY PRODUCTION CLUSTERS	50
5.1. INTRA-INDUSTRY TRADE PATTERNS: DESCRIPTIVE AND ECONOMETRIC EVIDENCE	50
5.1.1. ESTIMATION OF IIT INDICATORS	50
5.1.2. DESCRIPTIVE EVIDENCE	51
5.1.3. DETERMINANTS OF INTRA-INDUSTRY TRADE PATTERNS	59
5.2. <i>DESCRIPTIVE EVIDENCE ON ECONOMIC ACTIVITIES IN BORDER REGIONS</i>	62
5.2.1. PARAGUAY-BRAZIL	62
5.2.2. PARAGUAY-BRAZIL-ARGENTINA	63
5.2.3. PARAGUAY-ARGENTINA	65

5.2.4. URUGUAY-ARGENTINA	66
5.2.5. URUGUAY-BRAZIL-ARGENTINA	67
5.2.6. URUGUAY-BRAZIL	67
5.3. IMPLICATIONS FOR SMALLER COUNTRIES	68
5.4. SUMMARY	68
 <u>6. LESSONS AND IMPLICATIONS FOR FURTHER INTEGRATION</u>	 <u>70</u>
 6.1. IMPACT OF INTEGRATION ON LOCATION OF ECONOMIC ACTIVITY WITHIN THE EXPANDED MARKET AND ITS EFFECT ON THE SMALL COUNTRIES	 70
6.2 DEEPENING OF INTEGRATION WITHIN MERCOSUR	71
6.2.1. REMAINING INTRA-MERCOSUR TRADE BARRIERS	71
6.2.2. STRENGTHENING PHYSICAL INTEGRATION	72
6.3. PURSUING TRADE AGREEMENTS WITH NAFTA, EUROPEAN UNION AND WITH THE ANDEAN COMMUNITY: THE IMPLICATION FOR IIT TRADE	 73
 <u>REFERENCES</u>	 <u>78</u>
 <u>APPENDIX</u>	 <u>82</u>
 A0. INDUSTRY CLASSIFICATIONS	 83
A1. SPECIALIZATION PATTERNS	85
A2. CONCENTRATION PATTERNS	101
A3. LOCATIONAL PATTERNS	126
A4. INTRA-INDUSTRY TRADE PATTERNS	133
A5. DESCRIPTIVE EVIDENCE ON BORDER REGIONS	149

Executive Summary

1. Argentina, Brazil, Paraguay and Uruguay have experienced an increased economic integration via trade liberalization since the 1980s. Following the reallocation of resources across sectors and space associated with this increased openness changes in the production structures within and across these countries are expected. This study investigates changes in the distribution of production activities in these four Latin American countries over the period 1971-1998. In particular, we identify and explain determinants of specialization and concentration patterns as well as the location of manufacturing activities in these countries. Furthermore, we analyse intra-industry patterns and formation of production clusters in border regions. We discuss in particular developments and implications for small countries. Finally we discuss lessons and implications for further integration.
2. The importance of this analysis is threefold. First, changes in sectoral and spatial production structures have implications for the overall welfare level and its distribution across space. Second, the producer and consumer gains from trade liberalization are not evenly distributed across sectors and space. There may be relative winners and losers which might affect the extent of further economic integration. Third, increased specialization of countries and concentration of activities might increase the risk of asymmetric shocks and make synchronization of business cycles less likely. These developments might stimulate demands for returning to protectionism.
3. The analytical framework for investigating the spatial implications of increased integration is based on existing international trade theories. The traditional trade theory assumes perfect competition, product homogeneity and constant return to scale and explains specialization of countries according to comparative advantages resulting from differences in technology or factor endowments. In this framework, trade liberalization fosters relative concentration and specialization in activities matching comparative advantage patterns. Although relevant, comparative advantages do not entirely explain the specialization and concentration patterns observed in reality, in particular the intra-industry trade between countries with similar economic structures, technology and endowments.
4. The new trade theory assumes imperfect competition, differentiated products and increasing returns to scale and underlines the geographical advantage of large markets as location of economic activities. Other things equal, the more concentrated the demand for the produced goods, the higher the concentration of industries and specialization of countries. Falling trade costs imply that activities with increasing returns to scale will concentrate in the largest country due to the better market access. The relationship between trade costs and the degree of concentration of industries is however not monotonic, it has an inverted U-shape when factor market consideration are taken into account. The concentration of industries drives up factor prices, which de-stimulate agglomeration. Therefore, concentration is highest at intermediate trade costs.
5. More recent models from the new economic geography assume that the geographical advantage of large markets is endogenous and point to cumulative causation and agglomeration of activities as determinants of specialization and concentration patterns. Interregional labour mobility and forward and backward linkages are the main mechanisms driving the agglomeration of economic activities. At early stages of integration, concentration forces dominate leading to industrial clusters in large (core)

markets. Further integration beyond a certain threshold fosters however a dispersion of activities towards the periphery to take advantage of low production factors costs.

6. Since 1980s, Argentina, Brazil, Paraguay and Uruguay have undertaken an increased trade liberalization, first introducing unilateral measures and then in the framework of the Mercosur. Trade within Mercosur was to large extent free of tariffs by 1996. External tariffs were initially high, in particular in Argentina and Brazil. The Common External Tariff that entered into force in 1995 was higher than the average external tariff in place in Paraguay and Uruguay and lower than the average tariffs in Argentina and Brazil.
7. Absolute manufacturing specialization is the highest in Paraguay and Uruguay while Argentina and Brazil are more diversified. Over the period 1971-1998, absolute specialization has increased, in particular after 1985. However, in Argentina, during the 1990s absolute specialization has decreased. The three largest industries in each country uncover specialization patterns in line with resource endowments. Food products is one of the three largest industries in each country. Petroleum refineries has a large share in the manufacturing production in Argentina and Uruguay and the same is true for wood products in the case of Paraguay. On the other hand, Uruguay and Paraguay are also specialized in textiles. Scale intensive industries such as transport equipment are important in Argentina and Brazil, while non-electrical machinery is among the three largest industries in Brazil.
8. Increased integration has resulted in production structures changes within the four countries. In Argentina and Brazil the expanding industries include capital and scale intensive industries such as transport equipment, iron and steel (Argentina and Brazil), industrial chemicals, electrical machinery (Brazil), while labour intensive industries such as textiles; footwear, wearing apparel (Brazil) declined. In Paraguay and Uruguay the expanding sectors included industries closely related to natural resources based advantage of the countries (wood products, beverages, food products, and leather products in Paraguay; petroleum refineries, food products, tobacco, in Uruguay) In these two small countries capital and scale intensive industries such as transport equipment, industrial chemicals (Uruguay), non-electrical machinery (Paraguay) declined.
9. On the basis of the industry characteristic biases of countries and the correlations between the relative size of industries within countries and industry characteristics we find that Argentina has specialized in industries with increasing returns to scale, high skills intensive, and high total and industrial intermediate inputs intensity. Brazil has specialized in industries with high scale economies, high skills intensity, and high labour intensity. Paraguay has specialized in industries intensive in agricultural inputs and since early 1990s in industries with a high final demand basis. Uruguay has specialized also in industries which use intensively agricultural inputs and have a high a final demand bias and are intensive in total intermediate inputs. During the 1980s, this country had specialized in sectors with increasing returns to scale.
10. Our econometric analysis confirms that on average, other things equal, the smaller and more open the economy the higher the absolute and relative specialization is. Further, we find that the preferential trade liberalization within Mercosur had no significant impact on absolute manufacturing specialization. Lower trade tariffs within Mercosur had led however to lower relative manufacturing specialization. This latter result is driven by Argentina and Brazil suggesting that regional integration was associated with converging patterns of manufacturing specialization in the large Mercosur countries.
11. Over the period 1971-1998, the share of Argentina in total manufacturing production in Mercosur had a U-shaped evolution, while Brazil had an inverted U-shaped evolution. The manufacturing sector declined relatively in Paraguay and Uruguay after 1991. Overall absolute concentration increased significantly over the period 1971-1998. In particular,

the increase was stronger in the period 1971-1984. After 1989 there is evidence of a partial reversion, i.e., absolute concentration decreased over the 1990s. Initially industries with high absolute concentration experienced both large and small increases in absolute concentration. The industries with the highest increases in absolute concentration include professional and scientific instruments, other manufacturing industries, and footwear. The highest decreases in absolute manufacturing concentration were registered in petroleum refineries, other non-metallic minerals, furniture, and printing and publishing. Average relative concentration increased since the beginning of 1980s. This increasing trend becomes more pronounced since the end of this decade. Industries initially dispersed in relative terms experienced the largest increases in their relative concentration. In particular, industries with the highest increases include tobacco, leather products, professional and scientific instruments. The highest decreases in relative manufacturing concentration were registered in the cases of furniture, wearing apparel, petroleum refineries. We find low correlations between absolute and relative concentration.

12. The correlation between concentration levels and industry characteristics suggest a positive and significant association between the degree of absolute (relative) concentration and the degree of absolute (relative) expenditure concentration. Industries facing low transport costs tend to be more absolutely concentrated. The univariate analysis of the relationship between concentration patterns and industry characteristics suggest the following patterns: a) industries intensive in agricultural inputs have a low absolute concentration while industries with high relative agricultural inputs intensity have high relative concentration; b) industries with high absolute (relative) expenditure concentration tend to be more absolutely concentrated; c) industries with high relative labour intensity and large relative technological differences across countries have higher relative concentration; d) industries with high final demand bias are absolutely dispersed but relatively concentrated; e) industries with high transport intensity have lower absolute concentration; f) there is no clear cut pattern for scale economies and intermediate inputs intensity.
13. Our econometric analysis suggests that, on the one hand, relative factor intensity (labour and skilled labour) and relative technological differences across countries as well as relative concentration of expenditure, on another hand, are the main driving forces of manufacturing concentration patterns. These results are in line with the predictions of neoclassical trade theory and the new trade theory, respectively. The importance of relative labour intensity has increased over the analysed period, while it decreased in the case of relative skilled labour intensity and relative technological differences. Relative convergence across industries in qualification requirements and technological convergence induced by trade liberalization might explain the latter developments. We find that, over the period 1995-1998, manufacturing concentration is positively (in accordance with the new economic geography) and significant related to the intensity in intermediate inputs and negatively and significant associated to transport intensity. This latter result is in line with the international trade theory predicting that less footloose industries tend to be relatively more disperse across space. Finally, we find that lower internal trade tariffs within Mercosur were associated with higher relative manufacturing concentration.
14. Our econometric analysis of determinants of manufacturing location defined by the distribution of country shares in each industry indicates that interactions between factor endowments and factor intensity as well as market potential and scale economies and intermediate inputs consumption are the main driving factors for manufacturing location patterns. More exactly, we find that: a) industries intensive in agricultural inputs are located in countries abundant in agriculture output measured as a share of agriculture to national GDP (this result is stronger when Paraguay is included in the analysis); b) skills

intensive industries tend to be located in countries abundant in skilled labour; c) industries with increasing returns to scale tend to locate in countries with larger market potentials; d) industries whose output is mainly demanded by the manufacturing sector tend to locate in countries with large industrial market potential; e) industries facing high transport costs tend to locate in countries providing a better physical infrastructure (this result holds when Paraguay is not included in analysis).

15. We find that increased economic integration is associated with a stronger effect of the interaction between agricultural intensity and agricultural abundance. When Paraguay is not included in the analysis, over the period 1995-1998, this effect declines however. Increased integration appears associated with a stronger effect of the interaction between increasing returns of scale and market potential, and, when Paraguay is not included in the analysis, with a stronger effect of the interaction between the intensity in industrial intermediate inputs and large industrial market potential, as well as in the case of the interaction between transport intensity and infrastructure. Furthermore, we find a declining effect of the interaction between skill intensity and skill abundance associated with increased integration. We argue that this result might be explained by the relative convergence of qualification requirements across industries supported by our data.
16. From our econometric analysis covering Argentina, Brazil, and Uruguay (whose time length is the largest, 1985-1998), we conclude that factors suggested by the new trade theory and the new economic geography, in particular the interaction between market potential and economies of scale, have gained importance as locational determinants *relative* to comparative advantage considerations (we do not include the measure of labour intensity in these regressions). In order to strengthen the formal support for this conclusion, we include in our model of manufacturing location determinants an additional control variable reflecting preferential trade liberalization and we interact it with the original set of explanatory variables. Our estimation results are in line with the previous findings and suggest that low intra-bloc tariffs increase the intensity of the interactions postulated by the new trade theories. In particular, they ameliorate in a significant way the tendency of increasing returns industries to locate in countries with larger market potentials as well as that of industries selling a substantial part of their output to the manufacturing sector itself to settle in countries with broad industrial bases. The same is true for the propensity of transport intensive industries to locate in countries with better physical infrastructure. Interactions suggested by comparative advantages, in particular, those involving skill and agricultural intensity, appear to weaken with increased economic integration.
17. The results of this study show that the two small countries, Paraguay and Uruguay, are the most open and specialized within Mercosur. The shares of these two countries in the total manufacturing in Mercosur declined after 1991. However, this average behaviour does not replicate in each industry, i.e., there were significant differences across sectors. In fact, the smaller countries increased their shares in sectors such as: leather products; wood products; and footwear (Paraguay); and printing and publishing; professional and scientific instruments; and wearing apparel (Uruguay). To the extent shocks are industry-specific, a high manufacturing specialization may increase the vulnerability of these countries to asymmetric shocks.
18. The analysis of the importance of intra-industry trade in the bilateral trade flows of the four Mercosur countries compared to extra-regional flows enable us to uncover the extent of production clusters across these four countries. We find that, over the period 1986-1999, the average intra-industry trade measure increased in most countries. Argentina and Brazil had a relatively higher average intra-industry trade index, both with respect to their bilateral trade flows and trade with the Rest of the World. Uruguay and Paraguay had lower average intra-industry trade, as expected given their less diversified

economic structure. Our results suggest that trade has become more diversified both within and across industries. The degree of intra-industry trade was significantly higher at the end of the 1990s in comparison to mid 1980s. The increase in the intra-industry trade was higher in the case of the bilateral trade flows among the Mercosur countries compared to their trade with the Rest of the World suggesting the formation of regional production clusters.

19. Matching high intra-industry trade indices within Mercosur was registered by 1998 in the following sectors: a) in the cases of Argentina and Brazil chemicals; motor vehicles; rubber and plastics; leather and luggage; b) in the case of Brazil wearing apparel; leather and luggage ; c) in the case of Paraguay: textiles; food and beverages; leather and luggage; wearing apparel; and furniture; d) in the case of Uruguay printing and publishing; textiles; rubber and plastics; and paper products. High and increasing sectoral intra-industry trade within Mercosur relative to intra-industry trade with the Rest of the World might suggest the formation of production clusters within the bloc. From the point of view of small countries, this is the case, for example, of paper products; furniture; printing and publishing; and textiles in Paraguay; and motor vehicles; medical and optical instruments and also textiles in Uruguay.
20. Using econometric techniques, we **uncovered the estimated effect of the Mercosur trade policy on intra-industry trade**. We find that, overall, as expected, larger tariff preferences within Mercosur have a positive effect on intra-industry trade. This result is supported by the positive and significant sign obtained for the MFN tariff, while at the same time we obtain a negative sign for the internal (preferential) Mercosur duty. Furthermore, except Uruguay, we find a positive and significant relationship between the preferential tariff margin and intra-industry trade. In the case of Uruguay, our estimation results uncover a negative relationship between preferential tariffs and intra-industry trade or no effect.
21. Our analysis of production structures in regions situated along borders between the Mercosur countries suggests that clustering may have a specific regional dimension. In particular, this study shows the existence of production complementarities in border regions, mainly in agricultural products and food processing industries. A few examples illustrate this finding: a) leather products, cotton, and meat products in the case of the regions along the border between Paraguay and Brazil; b) wood products, paper, tobacco; and food processing in the case of the regions situated along the border between Paraguay, Brazil, and Argentina; c) tobacco, textiles, and food processing in the cases of regions situated along the border between Paraguay and Argentina; d) agricultural products and food processing in the case of regions situated along the border between Uruguay and Argentina; e) tobacco, agricultural products, and food processing, in the cases of regions situated along the border between Uruguay, Brazil and Argentina; f) agricultural products, food processing, and leather in the cases of regions situated along the border between Uruguay and Brazil.
22. Our overall analysis in this paper finds evidence supporting the view that economic integration has fostered the formation of production clusters across countries, as suggested by the positive association between intra-industry trade and tariff preferences. Cross-country production clusters have been identified in activities such as motor vehicles; other transportation equipment; TV and communication equipment; electrical machinery; leather and luggage; wood; furniture; paper products; textiles; and food and beverages. Some of these clusters are quite relevant for the small economies (such as: leather; textiles; wood; and furniture in the case of Paraguay; and textiles, food and beverage, paper; and motor vehicles in the case of Uruguay). Moreover, we showed that a number of these clusters have a regional dimension as they are localized in frontier regions. This could potentially constitute a positive factor helping to develop frontier

economies, usually located far away from the political and economic centres of the countries.

23. Production complementarities and cluster formation across economies can be further encouraged within Mercosur. The key issue is to facilitate the flows of merchandises and factors of production across borders so as to make joint production more efficient. To this purpose, and also to take advantage of the larger domestic market, Mercosur should focus on two priority tasks: a) eliminating remaining internal trade barriers, such as antidumping measures and regulations associated with technical and fito-sanitary standards ; in addition, further liberalization is still to be achieved in the motor vehicles (autos) and sugar industries. b) fostering the physical integration between the countries through upgrading of infrastructures. The existing underdeveloped infrastructures connecting bordering regions are a stumbling block to efficiency. Investing in infrastructure in border regions is important in allowing advantages of the potential backward and forward linkages that can be encouraged given the already existing production facilities in these areas.
24. Further trade liberalization through free trade agreements with other areas beyond Mercosur would be beneficial. In particular, Brazil and, although to a lesser extent, Argentina, would benefit from a free trade agreement with NAFTA and the EU. Given their intra-industry performance, Uruguay and Paraguay, would rather benefit from a free trade agreement with the Andean Community. Our analysis highlighted that in the four countries these potential benefits from further trade liberalization appear important in particular in industries such as: textiles; wearing apparel; food and beverages, tobacco; and iron and steel.

1. Introduction

Economic integration is likely to result in production structure changes in the participating countries via reallocation of resources across sectors and space. Argentina, Brazil, Paraguay, and Uruguay opened their economies both unilaterally and preferentially. Hence, one can expect noticeable changes in the distribution of economic activities within and across these countries. The question arises then whether and to what extent has trade liberalization affected the location of economic activities in these countries.

This question is important and policy relevant for at least three reasons.

First, the spatial distribution of economic activities has significant welfare implications. From an efficiency point of view, the way activities are organized across space affects the overall welfare an area can generate. From an equity point of view, the spatial distribution of activities also affects the geographical distribution of overall welfare (Ottaviano, 2002). Hence, by altering the locational pattern of economic activities, trade liberalization may promote changes in both the overall level of welfare and its distribution over space.

Second, as a logical consequence of the previous point, the spatial distribution of economic activities has important political economy implications. Economic integration may trigger a relocation of economic resources at the aggregate and sectoral levels. In the first case, the whole activity might become concentrated in a few regions. Under such a scenario, immobile agents in the region experiencing delocation suffer both as consumers and as workers. As consumers because the nearby available diversity of goods and services decreases and, given the existence of trade costs, they must pay higher effective prices for those goods whose production is relocated to other regions. As workers due to the fact that the matching process between workers and firms tends to worsen, so that unemployment length rises (Martin, 2000). It is then clear that such a level of interregional disparities may become politically unacceptable and hence it may hurt the viability of the ongoing economic integration process (Martin and Rogers, 1994; Begg, Judgin, and Morris, 1996). In the second case, activity levels in some industries increase in certain countries due to their locational advantages and decrease in others. Even though both groups of countries may still have net gains in terms of combined producer and consumer surpluses, the industry-specific welfare gains are larger for the country specializing into a particular growing sector (Brühlhart, 1998). Hence, if spatial and intersectoral mobility of affected workers is low, then depending on their respective relative weight in the government's objective function, this might pose an obstacle for the integration process.

Third, the spatial distribution of economic activities has significant macroeconomic implications. Increased geographical concentration and hence inter-industry specialization implies diverging production structures across the countries and consequently higher probability of experiencing asymmetric shocks and lower synchronization of business cycles (Kenen, 1969). Under such conditions, a higher bilateral exchange rate variability might be expected. This, in its turn, might act as a channel of agglomeration of economic activities in the larger country within the bloc (Ricci, 1998) and might promote reversions in the integration process in the form of reinsertion of protectionist measures (Eichengreen, 1993; Fernández-Arias, Panizza, and Stein, 2002).

Surprisingly, to date, very little empirical work on patterns of location in Mercosur has been undertaken. In particular, there is no empirical evidence about the distribution of economic activities within the area constituted by Mercosur countries and how this distribution has evolved over time, in particular since the creation of the trade bloc.

This study aims at explaining locational patterns in member countries of Mercosur and analysing their evolution over time with an especial emphasis on the implications for the smaller countries.

We address the following questions: How specialized/diversified are production structures? How concentrated/dispersed are industries? What are the main determinants of locational patterns? Does Mercosur have an impact on spatial developments? What are the implications of locational changes for Paraguay and Uruguay?

The remainder of this study is structured as follows. Section 2 reviews the relevant theoretical literature with the purpose of deriving hypotheses to be tested with our empirical analysis. Section 3 reviews the trade policy developments in the region. Section 4 examines specialization, concentration, and locational patterns and identifies their determinants. Section 5 looks at intra-industry trade patterns and productive developments in border regions with the aim of assessing the existence (or the likelihood of formation) of production cluster across the borders. Finally, section 6 draws some lessons and implications for further integration.

2. Theoretical Background²

Economic activities have different spatial patterns at particular time points. They also differ in the way such patterns evolve over time. Several factors can help to explain the cross-sectional locational diversity and its dynamics. Those factors can be classified into two broad groups: *first nature elements*, that is, the physical geography and endowment of natural resources; and *second nature elements*, that is, the geography of distance between economic agents (Krugman, 1993; Overman, Redding, and Venables, 2001). Relevant theoretical approaches can be then differentiated through the weight they assign to the aforementioned factors. The *neoclassical theory* emphasizes the role of the first group of factors. The *new trade theory* builds up on a combination of both sort of forces. Finally, the *new economic geography* concentrates on the second group of factors.

Locational patterns are frequently characterized in terms of the degree of concentration activities display. In this respect, one can distinguish between *absolute concentration* and *relative concentration*. One industry is *absolutely concentrated* if a few countries, independently of their sizes, account for very large shares of its overall activity (Midelfart-Knarvik, Overman, Redding, and Venables, 2000). In turn, one industry is *relatively concentrated* if the spatial pattern of its activity differs from the average spread of the total manufacturing activity across countries. Theoretical approaches can also be grouped depending on the predictions they yield. The *neoclassical theory* allows us essentially to derive clear-cut predictions about relative concentration but not for absolute concentration. The opposite is true for the *new economic geography*. Finally, the *new trade theory* makes possible to draw inferences about *relative* as well as *absolute* concentration (Haaland, Kind, Midelfart-Knarvik, and Torstensson, 1999).

Locational behaviour can be also characterized in terms of the degree of specialization that countries have. As well as for concentration, we can distinguish between *absolute* and *relative specialization*. A country is *absolutely specialized* if a few sectors account for very large shares of its overall activity. On the other hand, a country is *relatively specialized* if its production structure differs from that of remaining countries with a common economic space.

Intuitively, one might expect that there is a close relationship between *concentration* and *specialization*. Suppose that each country becomes more specialized, so that there is an increase (decrease) in the share of the activities taking place in its territory in which it is relatively larger (smaller). Under perfect symmetry of countries and industries, increased specialization must imply increased concentration of industries, simply because of the fact that larger units become even larger (WIFO, 1999). In other words, within this context, *concentration* and *specialization* are two perspectives on a matrix with, say, rows referring to countries and columns to industries. *Concentration* is seen by reading down each column, while *specialization* is observed by reading along each row. Then, it might be thought that increased inequality along the rows should correspond with increased inequalities down the columns. However, it can be demonstrated that this is not necessarily the case when regions or industries are asymmetric (Aiginger and Davies, 2000). Thus, it might well occur, as in the case of the European Union (WIFO, 1999), that one observes at the same time increasing specialization of countries and decreasing concentration of industries. Intuitively, the higher industrial specialization is offset by faster growth in smaller countries, with the net effect that industries may become somewhat less geographically concentrated.

The present section reviews those theoretical approaches, by examining their assumptions and main results. The objective is to provide a basis for the empirical study that we carry out in the

² This section is based on Volpe Martincus (2002) and Traistaru and Volpe Martincus (2003).

following sections. In particular, this theoretical framework serves us to formulate the testable hypotheses that we test afterwards.

2.1. The Traditional Trade Theory

The *traditional trade theory* assumes perfect competition, product homogeneity, and constant returns to scale. This theory shows that location is exogenously determined by *first nature factors*, namely, the spatial distribution of technologies, natural resources, and production factors.

Let us consider first the *Ricardian model*. Within this framework, locational patterns are basically driven by relative differences in technology, which can be described in terms of the relative labour productivity. In particular, *relative technology differences across countries may give rise to comparative advantages and the larger they are, the higher the degree of relative concentration of industries*.

Consider now the *Heckscher-Ohlin model*. In this case, the locational pattern is essentially determined by the interaction between country and industry characteristics (Venables, 2000). Activities settle in locations abundant in the factors those activities are using most intensively.

Then, in the absence of underlying differences between countries in the world, economic activities locate uniformly across the space. Firms producing in places in which they coexist with many partners face a more intense competition both in product and in factor markets and therefore their profitability is lower than the one achieved by firms coexisting with less firms and thus facing a less intense competition. However, *if countries display pronounced differences in their inherent characteristics, so that there prevails a lumpy distribution of factor endowments, then a more uneven spatial distribution of production emerges. Activities relatively concentrate in those countries which are relatively abundant in the factors they use intensively* (Ottaviano and Puga, 1997; Brühlhart, 1998).

In this context, the spatial distribution of demand is essentially relevant for trade patterns, but not for locational patterns, unless trade costs are positive. In particular, if such costs are prohibitive, then the geographical configuration of industries mirrors the one of the demand (Brühlhart, 2000).

What is the expected impact of trade liberalization on the location of economic activities? The *traditional trade theory* predicts that a general opening induces activities to relatively concentrate in countries with the matching true comparative advantage. This implies increased relative concentration and increased specialization when demand is more evenly distributed over space than endowments (Jones, 1965; Brühlhart, 1998). In the case of a regional integration process, the influence of comparative advantage considerations on the spatial dynamics has singular aspects. In particular, *the launching of a trade agreement among developing countries with different comparative disadvantages relative to the rest of the world that consists of a preferential reduction in tariffs holding invariant protection rate with respect to non- members would induce a relocation of manufacturing to the country that, even with a comparative disadvantage relative to the world, has a comparative advantage within the newly created regional economic space, so that consumers in both countries would be increasingly supplied with manufactures stemming from such a country* (Venables, 1999, 2000).

Although relevant, comparative advantage is not sufficient to explain the high concentration of economic activity observed in reality (Ottaviano and Puga, 1997). Particularly, there are many regions without obvious natural advantages which develop into economic centres (Krugman, 1998; Schmutzler, 1999). Which other factors can then explain the existing locational patterns? The *new trade theory* makes an important contribution in this direction.

2.2. The New Trade Theory

The *new trade theory* combines one *first nature element*, the market dimension, determined by the size of the working force living in a particular country under the assumption of international labour immobility, and second nature elements, namely, the geographic distance between economic agents. In general, models within this theoretical approach assume that the world consists of two regions: a big central country and a small peripheral country. The absolute endowment with factors is larger in the central country in comparison with the peripheral country but both countries have the same relative endowment.³ In addition, these models assume that the production structure consists of two sectors. On the one hand, there is a perfectly competitive sector, which operates under constant returns to scale and whose output is costless traded. On the other hand, there is a monopolistically competitive sector with firms producing differentiated products under conditions of increasing returns to scale which are traded at a positive cost.⁴

The typical result of such models is that increasing return sectors concentrate in locations with better access to the markets of their respective products. This result derives from the interaction between scale economies and trade costs as follows. Under economies of scale, average costs fall as the level of production rises. This implies that producers have an incentive to spatially concentrate their activities, because in such a way they can operate at a more efficient level. However, the geographical concentration of production increases the costs of selling output to disperse customers. Thus, the presence of trade costs induces firms to concentrate in the country which has the larger market for their respective goods, since in this way they are able to avoid such costs in a larger fraction of their sales.

In summary, other things being equal, *industries tend to be more absolutely (relatively) concentrated, the more absolutely (relatively) concentrated the demand for the goods they produce.* Furthermore, *a higher degree of scale economies is associated with higher absolute levels of spatial concentration.* However, *the theoretical prediction concerning the influence of increasing returns on relative concentration is ambiguous.* The following numerical example illustrates the previous point. Let us consider three countries, (A), (B), and (U) and two industries (1) and (2). First, let us assume that industry (1) has significant scale economies and that consequently is highly absolutely concentrated, so that the shares of each country are: 0.15; 0.80; and 0.05, respectively. Second, suppose that industry (2) has low increasing returns and hence is absolutely dispersed with country shares equal to 0.45; 0.30; 0.25, respectively. Finally, assume that the overall geographical distribution of manufacturing activity is as follows: 0.70; 0.20; 0.10, respectively. By comparing those shares, it appears that the industry with weak increasing returns exhibits a more relatively concentrated pattern, because it shows the biggest share differences with respect to the whole industry. Thus, in this case, scale economies would be negatively correlated with high relative concentration. Nevertheless, analogously, one could construct a hypothetical example showing a positive correlation.⁵

The locational consequences of falling trade costs hinge upon the interplay between market size and factor market considerations.

Krugman (1980) and Krugman and Helpman (1985) find that, other things equal, *as trade costs fall towards zero, all increasing returns activities tend to concentrate in the larger country measured in terms of demand size.* As a consequence, specialization increases. Therefore, demand differences amplify

³ Thus, there are no comparative advantages.

⁴ Most traditional works in location theory rely implicitly or explicitly on the assumption that there exist significant economies of scale driving the concentration of economic activities, like in von Thünen (1826), Weber (1909), Christaller (1933), Lösch (1940) (Krugman, 1998). The essentiality of increasing returns for explaining the geographical distribution of economic activities constitutes the “Folk Theorem of Spatial Economics” (Scotchmer and Thisse, 1992).

⁵ For example, consider again industry (1) and assume a new industry (3) whose distribution across countries is the following: 0.65; 0.25; and 0.10, respectively.

differences in production structures. This basic analysis can be extended by including in the model a third country with the purpose of examining the consequences of a regional integration process, like in Torstensson (1995) and Brühlhart and Torstensson (1996). Specifically, they assume two asymmetric countries with respect to size forming a custom union and a remaining one as the rest of the world. They show that there is a U-shaped relationship between the share of industrial production located in the large country of the custom union and the deepness of the integration.

However, when factor market considerations are conveniently introduced, as in Krugman and Venables (1990), *the tendency to locate in the larger market is stronger for values of trade costs that are neither too high nor too low, so that there exists an inverted-U shaped relationship between the degree of relative and absolute spatial concentration of industry in the central country and trade costs*. In other words, at intermediate levels of trade costs the number of manufacturing firms located in the large country due to its better market access is disproportionately large with respect to its share in world endowments (Amiti, 1998). The reason is that when trade costs are sufficiently high, location is mainly determined by product market competition, while when trade costs are sufficiently low the spatial result is fundamentally dictated by factor market competition (Ottaviano and Puga, 1997).

The new trade theory cannot be seen as a complete theory of economic geography. Indeed, it assumes rather than explains international differences in manufacturing shares and income (Neary, 2001). Concretely, two main questions are left unanswered by this theory: Why *a priori* similar countries can develop very different production structures? Why do appear clear patterns of regional specialization, so that certain sectors have a tendency to locate in the same place? The *new economic geography* helps understanding such real world developments.

2.3. The New Economic Geography

The *new economic geography* extends the line of research initiated by the *new trade theory* assuming that interregional demand differences are themselves endogenous (Amiti, 1998). Thus, even the market size is explained within the model by starting from a featureless locus with uniformly distributed labour and output in a single industry (Brühlhart, 2000).

In the presence of increasing returns and trade costs, firms and workers tend to locate close to large markets. But, large markets are in turn those where more firms and workers locate (Baldwin, 1994; Ottaviano and Puga, 1997). Thus, there exists a sort of cumulative causation mechanism, which can lead to an endogenous differentiation process of initially similar regions, so that, in this case, *second nature factors* determine the locational pattern of economic activities (Brühlhart, 1998; Venables, 1998).

The *new economic geography* focuses on two main agglomeration mechanisms for modelling the cumulative causation process: interregional labour mobility (Krugman, 1991) and mobility of firms demanding intermediate inputs (Venables, 1996).⁶

The basic idea postulated by Krugman (1991) is that if factors, namely, industrial workers, are mobile across regions, the countervailing pressure against agglomeration exercised by the behaviour of factor markets would be eased, so that firms could exploit the demand linkages to each other workers and a persistent concentration would take place.⁷

⁶ There are also inter-temporal mechanisms related to factor accumulation (Baldwin, 1997) and to input-output linkages with an innovative sector (Martin and Ottaviano, 1996).

⁷ The crucial point is that for industry agglomeration to occur it must be possible for firms to draw resources from elsewhere, particularly from other regions or from other sectors, so that the factors supply becomes sufficiently elastic and consequently large increases in factor prices are avoided (Puga, 1998).

Venables (1996) shows that the agglomeration could be induced by the presence of input-output linkages among firms.⁸ When imperfect competitive industries are linked through an input-output structure and trade costs are positive, the downstream industry forms the market for upstream firms and the latter are drawn to locations where there are relatively many firms of the former industry (demand linkage). Moreover, the fact of having a larger number of upstream firms in a location benefits downstream firms, which obtain their intermediate goods at lower costs, by saving transport costs and also benefiting from a larger variety of differentiated inputs (cost linkage). Hence, the joint action of such linkages might result in an agglomeration of vertically linked industries (Amiti, 1998) and could give such an equilibrium location a certain inherent stability (Venables, 1996). In this sense, the above reasoning provides a rationale for the notion of industrial base. If locational decisions of firms depend on those of other firms, some industries may be particularly important in maintaining firms in other upstream or downstream industries.

The above result implies that the degree of absolute concentration is positively related to the intensity of own production use as intermediate inputs.⁹ However, the new economic geography does not allow to predict unambiguously the impact of intra-industry linkages on relative concentration. The following hypothetical situation described by Haaland, Kind, Midelfart-Knarvik, and Torstensson (1999), can be useful for illustrating this indeterminacy. Assume that there are two asymmetric countries and consider two industries with different factor intensities. Under these conditions, the industry in which the small country has a comparative advantage will display the higher relative concentration degree. Now, suppose additionally that the industry in question has the weaker input-output linkages. In this case, it might be expected that the prevailing pattern in the absence of such linkages does not significantly change and thus that the industry with less intense intra-relationships exhibits the higher relative concentration level. Nevertheless, if firms in such an industry use intensively their own goods as intermediates and sell a considerable proportion of its products to firms belonging to the same industry, then agglomeration forces related to those linkages will tend to bias the location of the industry towards the larger economy. Depending on the relative strength of the interactions between comparative advantage and factor intensities, on the one hand, and size and input-output linkages, on the other hand, the industry may end up with a still higher or a lower degree of relative concentration than the other one.¹⁰

New economic geography models show that, under scale economies, labour migration and input-output linkages between firms lead to industry concentration in one region when trade costs between two initially identical regions are reduced and therefore to a higher specialization. However, this might be only the beginning of the process. When relevant centrifugal forces related to the induced dynamics in factor markets are taken into account, the already mentioned inverted U-shaped pattern emerges again (Venables, 1996; Ludema and Wooton, 1997; Puga 1998). Thus, *at early stages of integration, concentration forces dominate and industries tend to cluster, but further integration, beyond a certain threshold, promotes a re-dispersion of industries towards the periphery, which offers lower factor costs.*

How does economic integration affect the internal geography of a country? Krugman and Livas Elizondo (1996) show that trade liberalization tends to foster dispersion of manufacturing activities. A reduction in trade costs increases the influence of external markets, as significant part of output becomes to be sold abroad and a significant part of consumed output becomes to be imported, and thereby weakens backward and forward linkages. Thus, centrifugal forces

⁸ The potential importance of intermediate inputs in models of monopolistic competition of international trade was highlighted by Either (1982).

⁹ It should be remarked that the effect of intra-industry linkages on concentration is stronger the higher the degree of scale economies characterising the production in an industry (Krugman and Venables, 1996). Under similarity of intra-industry linkages intensities, it should be expected that the industry with higher increasing returns will be the most absolutely concentrated.

¹⁰ Amiti (2001) presents a model combining relative factor endowments considerations and input-output linkages.

originated in high land rents/commuting costs associated with existing agglomerations become dominant. As a consequence, the configuration of manufacturing activities moves towards a more dispersed one. This conclusion assumes a featureless space. If specific locational advantages are introduced, then it is possible to assess the direction in which manufacturing activities move. The typical example is provided by Hanson (1998). The argument that he puts forward is that *the opening of the economy might induce a relocation of those activities towards places with good access to relevant foreign markets*. This would suggest that if traditional centres are located in well-situated regions regarding foreign trade, then industry may not disperse. Baldwin, Forslid, Martin, Ottaviano, and Robert-Nicaud (2003), in turn, highlight that *if a region has a central location, that is, it is at the crossroads of two economically important regions, it may become an industrial base, if the local market is large enough*.

In a similar way, the new economic geography allows us also to address the locational effect of infrastructure. The quality of infrastructure determines interregional and internal trade costs. Under this hypothesis, a bad infrastructure implies that a large proportion of produced and traded goods are not effectively consumed, but that they “disappear” in the transportation process. In this context, and in the presence of scale economies, *economic integration tends to generate a geographical concentration of firms in the region with better infrastructure*. The reason is that in such territories the effective price is lower and, therefore, the relative demand for goods produced there is higher.¹¹

¹¹ The result would be ambiguous if the country with poorer infrastructure has a lower capital/labour ratio, since in this case it would supply a higher capital return.

3. Trade Policy Background

As highlighted in the previous section, economic theory shows that changes in trade policy tend to be associated with changes in the locational patterns of economic activities across involved countries.

Member countries of Mercosur implemented broad trade reforms over the last two decades. Given the relevance of these reforms for understanding the locational dynamics, in this section we will describe the extent and magnitude of the trade liberalization process undertaken by these nations .

A distinguishing feature of the reduction and elimination of trade barriers in these economies is that the process of preferential trade liberalization overlapped with the latter stages of unilateral trade reform initiated earlier in each country. There are some critical issues regarding trade policy developments that we want to investigate. First, how significant were the tariff preferences within Mercosur? Did they appear in a significant way only after 1991, when the Mercosur initiative was launched, or they were already presented before? Does the establishment of the CET after 1995 raised the level of tariff preferences? Which was the level of regional preference for items that were exempted from the CET?

3.1. Unilateral Trade Liberalization

Prior to the establishment of Mercosur, efforts were made in these countries to unilaterally reduce the barriers to trade (both tariffs and non-tariffs restrictions). The process started in isolated cases in mid-80s but was generalized in the early 1990s. Table 1 describes the evolution of average tariffs and the standard deviation for each country since 1985 until 1994. This table shows that external tariffs were significant at the beginning of the period, with Brazil and Argentina having the highest average rates, 55% and 40%, respectively. For the large countries the process of MNF tariff reduction was very important between 1998 and 1991 where we observe the deepest cuts. On the other hand, in the case of Uruguay tariff reduction took also a strong impulse between 1985 and 1988. In Argentina the process of unilateral reduction of MNF tariffs was basically completed by 1991, while in the cases of the other Mercosur countries this tendency continued up to 1994. In what follows we present a more detailed account of unilateral trade reform measures taken in each country.

Table 1

Mercosur - MNF Tariffs by countries (1985-1994)				
Country/year	1985	1988	1991	1994
Argentina				
<i>Average</i>	39.20	30.83	14.22	15.42
<i>SD</i>	9.48	10.31	6.00	8.86
Brazil				
<i>Average</i>	55.09	41.54	20.37	9.70
<i>SD</i>	28.03	19.57	16.80	6.93
Paraguay				
<i>Average</i>	18.68	18.62	13.55	7.26
<i>SD</i>	13.82	13.73	11.83	6.80
Uruguay				
<i>Average</i>	35.87	26.94	21.35	13.63
<i>SD</i>	14.91	11.34	6.50	5.90

Source: Estevadeordal et al (2000)

In Argentina the process of trade liberalization started in 1988 with the so called “Canitrot Reform” (Berlinski, 1998). On the tariff side there was a reduction in nominal protection so that the average import tax fell from 45% in 1987 to 30% at the end of 1988. Regarding non-tariff measures, there was a significant reduction of tariff positions that were subject to quantitative restrictions. In particular, import licenses (authorizations) for approximately 3000 tariff items were eliminated.

The new administration that took office in 1989 pushed trade liberalization even further. Between August 1989 and January 1991, nominal tariffs were lowered again reaching a level of 18% at the latter date, and the remaining import licenses were eliminated. With Cavallo as head of the Economic Ministry, at the beginning of 1991, a new tariff structure with three levels (0, 11, and 22 percent) was put into place. As consequence of this initiative the average tariff fell to an unprecedented level of about 13% in mid 1991. This impulse towards liberalization was partially reverse when, in October 1992, the government established an extraordinary and temporary non tariff duty of 10% to almost all tariff items (the so called “tasa de estadística”). At the end of 1994 this extraordinary levy was reduced to 3% (for extra Mercosur origins). Overall then, and as a consequence of this unilateral process of liberalization, the average tariff in Argentina was reduced from a level of 45% in 1987 (40% in 1985) to around 14% in 1994 (Berlinski, 1998).

In the case of Brazil, the process of unilateral tariff liberalization started in 1988 and has been implemented in three stages: 1988-1989, 1991-1993 and 1994 (Kume et al, 2000). During the first period, nominal tariffs were reduced with the aim of pushing nominal protection closed to the differential between internal and external prices. Thus the average tariff was reduced from 58% in 1987 to about 30% at the end of 1989. On the other hand, non-tariff barriers were not modified. The new government that took power in 1990 implemented a much more ambitious program. First in 1990 various non-tariff barriers, like import prohibitions, import licenses and special import regimes were eliminated. Then in 1991 it was announced a four-year program to reduce tariffs. As a consequence of the proposed change in tariff structure, rates went from 0-105% in 1990 to 0-40% in 1994. Most of the products have tariffs equal or below 20%, with rates above 30% applied to computers, some chemicals, cars and some appliances (Kume et al, 2000). The tariff schedule was moved forward in 1992 so the program was completed by July 1993. With

the introduction of the Real Plan in 1994, the drive toward trade liberalization was further enhanced. In particular, the existing additional tax on imports was eliminated (from 2% to 0%) and also in September of 1994 the government established, ahead of time, the Mercosur Common External Tariff (CET), maintaining the lower tariff in case of tariff positions where the Brazilian duty was lower than the CET. After all these changes, at the end of 1994, Brazil had an average tariff of around 10%.

In Uruguay, as well as in Argentina and Brazil, trade liberalization was strongly fostered since the beginning of the 1990s. However, in the case of Uruguay, trade liberalization has been pursued without major interruptions since the end of the 1970s. More precisely, the unilateral opening launched in 1978 and scheduled to last until 1985 was not significantly reverted when, at that year, the democratic institutions were reestablished (Vaillant, 2000).¹² The simple average tariff was about 35% in 1985 (it was 65% in 1978), and went down in the following years. In 1988-90 the average tariff was already around 25%-30%. The tariff reform not only implied a decline in average protection, but also a fall in level of dispersion. The number of tariff tiers was reduced from 28 in 1979 to 5 in 1985. The lowest level was for raw materials used by the domestic industry (10%). The 20%, 35% and 45% levels were applied to intermediate inputs and final consumption goods of low value added. The highest value (55%) was applied to final consumption goods, industrial products and, exceptionally, to intermediate inputs with a high value added content. This structure lasted with minor changes up to the beginning of the 1990s.

The new authorities that took office in 1990 were committed to push forward the process of trade liberalization.¹³ Thus, since April 1990 the process of tariff reduction was accelerated. The average nominal protection declined from 30% in 1990 to 17% in 1993 and reached 13% at the end of 1994. The dispersion of the structure of protection was also further reduced; the number of tariff levels went down from 5 to 3 in 1991 and the standard deviation corresponding to the average level of protection fell from 12.2 in 1988 to 5.82 in 1994 (Vaillant, 2000). Non-tariff barriers were also abated since the beginning of the 1990s. Thus, reference prices were reduced in 1993, and other non-tariff barriers were transformed into tariffs, of which maximum values were set at 30%.

In 1985 tariffs in Paraguay were lower compared to the rest of Mercosur countries (see Table 1). Still, imports were subject to various quantitative restrictions including the extensive use of import bans. In May 1989, import prohibitions were abolished for several goods, and tariff for certain imports were reduced (Estevadeordal et al, 2000). Mayor tariff reform was again introduced in June 1992. The new tariff structure has three basic rates: 0 percent for inputs, 5% for capital goods, and 10 percent for consumer goods, with the exceptions of automobiles with rates between 15 and 20%. Also by July 1993 the number of products for which imports were prohibited was just 69. All these reforms implied that Paraguay have at the end of 1994 a trade regime mainly determined by tariff barriers with a simple average rate of about 7.5%, the lowest of the four Mercosur countries at that time.

3.2. Mercosur: Preferential Tariff Liberalization

From 1995 onwards trade policies in the region were set within the context of the Mercosur agreement. This integration initiative was established among Argentina, Brazil, Paraguay and Uruguay in 1991 with the signing of the Asuncion Treaty. This treaty states, in its first article that

¹² On the contrary, in the case of Argentina, the trade liberalization attempt launched in 1978-79 was reverted by 1982-83. This was in part due to the balance of payment crisis occurred in those years, but also as a consequence of the surge of protectionist pressures faced by the newly democratically elected authorities. See Berlinsky (2000).

¹³ As indicated in Vaillant (2000) the new authorities belonged to the White Party, which traditionally has had a liberal position regarding trade policy.

the agreement aims at achieving “the free circulation of goods, services and productive factors among the member countries, through the elimination of the tariff and non tariff restrictions to the circulation of merchandises and of any other equivalent measure”. It also established the adoption of a Common External Tariff (CET) and a common commercial policy with third countries or groupings of countries.¹⁴ The full implementation of free trade within the region and the establishment of the CET were scheduled for 1995. As we will see below, these objectives were partially achieved as planned with the help of exceptions.

3.2.1. FTA: Internal Trade Liberalization

Some level of preferential trade existed among Mercosur countries before the Mercosur initiative was launched. Within the LAIA framework, Argentina, Brazil, Paraguay and Uruguay had signed a number of bilateral agreements basically structured as positive list of products that obtained tariff preference (with variable degree of preference margins) and also excepted from non-tariff barriers (Estervadeordal et al., 2000). Nevertheless, up to 1985 the level of tariff preference was rather limited (see Table 2).

Table 2

Mercosur - Preferential tariffs by countries (1984-1994)				
Country/year	1985	1988	1991	1994
Argentina MFN	39.20	30.83	14.22	15.42
Brazil	36.60	24.40	7.20	5.10
Paraguay	35.20	22.20	7.80	7.60
Uruguay	36.00	20.80	8.10	10.70
Brazil MFN	55.09	41.50	20.37	9.70
Argentina	51.90	30.90	10.00	3.20
Paraguay	49.90	28.30	10.80	4.40
Uruguay	51.10	25.10	10.70	4.90
Paraguay MFN	18.68	18.62	13.55	7.26
Argentina	19.90	19.20	13.30	7.00
Brazil	19.90	19.20	13.80	7.00
Uruguay	19.70	19.00	13.40	6.90
Uruguay MFN	35.87	26.94	21.35	13.63
Argentina	34.60	21.10	15.50	12.00
Brazil	34.60	22.00	15.80	10.00
Paraguay	33.30	22.50	14.80	9.10

Source: Estevadeordal et al (2000)

From 1986 onwards tariff preferences within the region was also determined by initial steps taken by Argentina and Brazil to create a regional trade agreement. In that year the two nations signed

¹⁴ The Treaty also stipulates far-reaching objectives in terms of coordination of policies in other areas. In particular, policies applied in the following sectors: agriculture, industry, public taxes and expenditures, monetary rules, exchange rates, capital market, services, transports and communications. The coordination of policies in those areas should aim at assuring appropriate conditions of competition in the broadened economic space created by the integration process.

the “Argentina-Brazil Integration Act” which established an Integration and Economic Cooperation Program that was going to be implemented through sectoral protocols. These protocols established the scope of liberalization and other integration objectives to be achieved sector by the sector. The number of protocols approved increased as new treaties were signed. For example, the Treaty of Integration, Cooperation and Development approved in November of 1988, which, for the first time, explicitly set the objective of reaching a Common Market. As of the beginning of 1990, 24 protocols were established. In August of 1989 Uruguay was invited to participate in the treaties already signed between Argentina and Brazil. Finally in July 1990 the Presidents of Argentina and Brazil, signed the Buenos Aires Act, in which the decision was taken that the Free Trade area should be completed by December 31, 1994. This last compromise was the basic treaty upon which the Mercosur agreement was signed in March of 1991, which include also Uruguay and Paraguay.

All these previous agreements have been important in shaping the integration agenda, but, as we see in Table 2, no major regional tariff liberalization was obtained up to the end of 1990.¹⁵ With the signing of the treaty of Asuncion in March of 1991 it started a profound and continuous process of internal trade liberalization. This process was intended, through progressive, linear and automatic reductions in import taxes, to reach a zero-tariff state by the end of 1994. After an initial drop of 47% taken soon after the signing of the treaty in 1991, which in part explains the raise in the level of tariff preference observed in that year (see Table 2), successive reductions took place every six months so as to arrive at a zero tariff at the beginning of 1995.

Exceptions to internal free trade were nevertheless granted on a temporary basis. Thus, there was an agreement allowing each state to maintain, transitorily and for a limited number of products, tariffs on imports from other Mercosur partners. In particular, Brazil, being the largest country, had only 29 such items, including wool products, peaches in can, rubber factories and wines. Argentina had 223 tariff line items on this list. 57% of the items were steel products, 19% were textiles, 11% paper, and 6% footwear. Paraguay had 272 such tariff items, with the majority in textiles, some agricultural products, wood and steel. Finally, Uruguay had an extensive list with 953 items, including textiles (22%), chemical products and pharmaceuticals (16%), and steel and electric machinery (8%) (Bouzas, 1996; Terra, 2000).

Towards the end of 1994 these products were included in what was called the "Adaptation Regime", which implied a progressive and automatic reduction of tariffs such that import taxes would be completely eliminated by January 1, 1999 in the case of Argentina and Brazil, and by January 1, 2000 for Paraguay and Uruguay. Some of the products included in the Adaptation Regime (i.e. steel) were also subject to quotas. This means that tariff preferences applied to a certain volume of trade. The surplus of that amount is charged with the normal tax on imports effective in each moment.¹⁶

¹⁵ As indicated by Porta (1990), the more ambitious of the protocols was that corresponding to capital goods. Still even in this sector out of 600 items included in the universe of products, little more than one third (236) received free trade treatment. In the rest of the sectors, the negotiated preferences were not very significant.

¹⁶ For some of the initially excepted sectors the elimination of internal barriers to trade was not fulfilled after the 1999/2000 dead line. For example, in the case of steel products, though the internal tariff was eliminated, as scheduled, at the end of 1999, domestic producers in Argentina were able to file an antidumping investigation against Brazilian importers. The case ended up with a private price agreement, which in practice seriously limited Brazilian imports into the Argentine market. Beyond the use of antidumping (see Sanguinetti and Salustro (2000) for a detailed account of the use of these NTBs instruments in Mercosur) there were other attempts to use NTBs to limit internal trade liberalization. For example, in the case of certain types of textiles, as the internal tariff disappear, Argentinean producers tried to file a safeguard action against all imports (including those of Brazil) using the GATT agreement for the liberalization of textiles and apparel products. Brazilian exporters bitterly complain that this safeguard action was against Mercosur principles, which prohibits safeguards within the region. Finally, the Argentine producers lost their case after a Mercosur panel supported the Brazilian position. A similar situation developed when Brazilian importers pressure the government for the establishment of a non-automatic import license for certain food manufactures. At the request of Argentinean exporters a Mercosur panel determined that the Brazilian government

In addition to the general exceptions already indicated, the sugar and automotive sectors were not included in the intra-Mercosur trade liberalization scheme due to significant divergence across member countries, especially Argentina and Brazil, in their national policies toward these sectors. An ad-hoc group for sugar and a technical committee for autos were created to ensure convergence in national policies. In the interim, the exchange of these products was subjected to a very complicated set of rules and restrictions. Argentina, for example, maintained quotas and prohibitions on sugar imports from its Mercosur partners. The Argentine position was that this was necessary due to the generous subsidies enjoyed by Brazilian producers from their government. For autos, a managed trade arrangement is in place, which favors local contents, concessional importation of parts, and export balancing requirements.

3.2.2. The External Trade Liberalization: The Establishment of the Common External Tariff (CET)

The establishment of a Common External Tariff (CET) complemented the internal trade liberalization. The CET, negotiated in 1993 and 1994, entered into force at the beginning of 1995. While the average level of the CET was fixed approximately at 11%, tariff levels were allowed to vary between 0 and 20% across industries. In general terms it can be said that the lowest tariffs were allocated to input and materials, intermediate tariffs were charged on semi-finished industrial goods, and the highest tariffs were assigned to final manufactures.

Just as with intra-Mercosur tariffs, exceptions were granted so that certain imports enjoyed tariff rates different from the CET. It was agreed that the import taxes for these exempt products would progressively converge toward the CET by the year 2001 (and for Paraguay by 2006). Of the approximately 9000 8-digit tariff lines, initially Argentina, Brazil and Uruguay selected 300 each, and Paraguay 399. Additionally, exceptions to the CET were granted for capital goods imports (e.g. machines and equipment), computers, and telecommunication equipment. Though a CET was also established for Textiles, countries agreed not to put it into practice immediately.¹⁷ Thus, for example, Argentina maintained specific tariff on a great quantities of textiles products as well as on footwear. A similar policy was followed in Uruguay for almost 100 textile items. More recently and as a consequence that some of these policies have been denounced at the WTO (i.e specific tariffs levied by Argentina), external protection for these sectors has been granted using safeguards clauses (Sanguinetti and Salustro, 2000).

An overall assessment of the result of the Mercosur internal and external liberalization process up to 1996 can be seen in Table 3, taken from Olarreaga and Soloaga (1998). The table contains data on average 8-digit HS tariff lines, external and internal, for the four Mercosur countries. One can see that, in spite of the above mentioned exceptions, in 1996 on average countries were pretty close to the liberalization objectives. One interesting finding is that while the external tariff in Argentina and Brazil converge from above to the CET, those of Paraguay and Uruguay converge from below, reflecting the relative lower level of protection that those countries had compared to the bigger countries in Mercosur.

Regarding the tariff levels observed for the exempted items, Table 3 indicated that the small countries set very high level of tariffs on the excluded items in internal liberalization. On the other hand, the big countries, in particular, Brazil, have large tariffs on its external excluded items

has to eliminate that NTB. We should indicate that the surge of various NTBs affecting trade within Mercosur, as the ones just mentioned, not only were motivated by the complete elimination, by 1999, of tariff within the region for the excepted items, but also because of the macroeconomic condition in both economies in that year. In particular both countries have been subject to sharp recessions.

¹⁷ Though the deviation from the CET for these excepted products were in some cases to be eliminated by a predetermined scheduled, in practice countries managed the tariff for these products in a quite discretionary way. For example Argentina, changed the tariff affecting certain capital goods several times after 1995. Brazil, on its part, raised the external tariff for toys through a safeguard action against third countries.

(21.39%). This fact could potentially play an important role in encouraging exports from Argentina, Uruguay and Paraguay into de Brazilian market, thus benefiting from the high external protection.

Table 3

Mercosur - External and internal tariffs (1996)						
Country	External Tariff (simple average)	Internal Tariff (simple average)	Import weighted - External tariff	Import weighted - Internal tariff	Tariff level CET exemptions	Tariff level Internal exemptions
Argentina	11.78	0.36	13.37	0.86	14.33	11.69
Brazil	13.14	0.02	15.44	0.02	21.39	10.20
Paraguay	8.79	0.80	5.18	0.37	6.83	24.91
Uruguay	10.78	0.88	11.01	1.77	5.92	19.73
Mercosur CET	11.75	0.00	11.09	0.00		

Source: Olarreaga and Soloaga (1998).

4. Patterns of Manufacturing Location in Mercosur

4.1. Data Set

In this study, we use production value data for each manufacturing industry at *ISIC, Rev. 2, 3 digit-level*. These data is part of the *PADI* database (Software for Industrial Dynamics Analysis) produced by the Industry and Technological Development Unit at the United Nations' Economic Commission for Latin America and Caribbean (ECLAC). It includes homogeneous statistical information for those variables for the period 1971-1998 on an annual basis.¹⁸

The data set covers the period from 1971 to 1998 in the case of Argentina, Brazil, and Uruguay, and from 1971 to 1994 in the case of Paraguay. For this reason, we undertake our analysis in two steps: first, we consider the four countries over the period 1971-1994 and second, we examine only the first three countries over the period 1971-1998.

Formally, the production value of industry k in country i at time t is denoted by $x_{ik}(t)$. This value may be expressed as a share of overall manufacturing production value in the country, in which case we have:

$$(1-a) \quad z_{ik}(t) \equiv \frac{x_{ik}(t)}{\sum_k x_{ik}(t)}$$

and thus for Mercosur as a whole,

$$(1-b) \quad z_k(t) \equiv \frac{\sum_i x_{ik}(t)}{\sum_i \sum_k x_{ik}(t)}$$

Measures of the distribution of the first ratio (absolute or normalized, for example, by the second one, the share of the industry in Mercosur manufacturing production value) across industries for a given state refer to *specialization*. They are the main focus of the subsection 4.2.

Alternatively, the production value may be expressed as a share of the total production value in the industry, in which case we have:

$$(2-a) \quad s_{ik}(t) \equiv \frac{x_{ik}(t)}{\sum_i x_{ik}(t)}$$

and for the whole manufacturing industry,

$$(2-b) \quad s_i(t) \equiv \frac{\sum_k x_{ik}(t)}{\sum_i \sum_k x_{ik}(t)}$$

Measures of the distribution of the first ratio (absolute or normalized, for instance, by the second one, the share of the country in Mercosur manufacturing production value) across countries for a given industry relate to *concentration*. They are the basis for the analysis carried out in subsection 4.3.

¹⁸ It should be stressed that, in the case of Uruguay, available data correspond to the period 1971-1996. Data for 1997 and 1998 were obtained by applying sectoral variation rates calculated from a productive database for Uruguay kindly provided by Marcel Vaillant.

We have also data that allow for a suitable characterization of countries and sectors (see Table 4). These country and industry characteristics will be used to explain specialization, concentration, and locational patterns.

Table 4

<i>Data availability</i>				
Variable	Aggregation	Country coverage	Period	Source
Production value	ISIC. Rev. 2, 3digits	Argentina, Brazil, Uruguay, Paraguay	1971-1998	PADI/ECLAC
	IBGE Subsector Classification	Brazil	1985, 1990-1998	IBGE
Employment	ISIC. Rev. 2, 3digits	Argentina, Brazil, Uruguay, Paraguay	1971-1998	PADI/ECLAC
	IBGE Subsector Classification	Brazil	1985-1998	RAIS/Ministry of Works
Value added	ISIC. Rev. 2, 3digits	Argentina, Brazil, Uruguay, Paraguay	1971-1998	PADI/ECLAC
	IBGE Subsector Classification	Brazil	1985, 1990-1998	IBGE
Exports	ISIC. Rev. 2, 3digits	Argentina, Brazil, Uruguay, Paraguay	1971-1998	PADI/ECLAC
Imports	ISIC. Rev. 2, 3digits	Argentina, Brazil, Uruguay, Paraguay	1971-1998	PADI/ECLAC
Number of establishments	IBGE Subsector Classification	Brazil	1985-1998	RAIS/Ministry of Works
Workers qualification	IBGE Subsector Classification	Brazil	1985-1998	RAIS/Ministry of Works
Intermediate inputs	IBGE Subsector Classification	Brazil	1985, 1990-1998	IBGE
Sales to industry	IBGE Subsector Classification	Brazil	1985, 1990-1998	IBGE
Labour compensation	IBGE Subsector Classification	Brazil	1985, 1990-1998	IBGE
Agricultural inputs	IBGE Subsector Classification	Brazil	1985, 1990-1998	IBGE
Final demand/Total demand	IBGE Subsector Classification	Brazil	1985, 1990-1998	IBGE
Total supply	IBGE Subsector Classification	Brazil	1985, 1990-1998	IBGE
Transport costs	IBGE Subsector Classification	Brazil	1985, 1990-1998	IBGE
Tariffs	IBGE Subsector Classification	Brazil	1987-1998	Kume, Piani, Souza (2000)
Population	Country	Argentina, Brazil, Uruguay, Paraguay	1985-1998	IMF
Total GDP	Country	Argentina, Brazil, Uruguay, Paraguay	1985-1998	PADI/ECLAC
Industrial GDP	Country	Argentina, Brazil, Uruguay, Paraguay	1985-1998	PADI/ECLAC
Skill level of population	Country	Argentina, Brazil, Uruguay, Paraguay	1985-1999	Barro and Lee (2000)
Agricultural production	Country	Argentina, Brazil, Uruguay, Paraguay	1985-1998	ECLAC
Infrastructure	Country	Argentina, Brazil, Uruguay, Paraguay	1985-1998	World Bank

Note: For Paraguay, data for most variables is only available for the period 1985-1994.

In particular, our database include variables at the industry level: imports and exports, value added, employment, the number of establishments, qualifications of workers, intermediate intensity, sales to industry, final demand, labour compensation, agricultural inputs, total supply, transport costs; and MFN tariffs; and variables at the country level: population, total GDP, industrial GDP, skill level of population, agricultural production, and infrastructure.

Import and export data used for calculating the expenditure variable defining market size, employment, and value added data for each country and for each manufacturing industry at the *ISIC Rev.2* at 3 digit – level, and total and industrial GDP are taken from the *PADI* database.

Information on the number of establishments and hence on average establishment size, which is employed as a proxy for scale economies, as well as data on the qualification level of workers in each sector for the period 1985-1998 come from the *RAIS* database (Annual Social Information Report) and were kindly provided by the Brazilian Ministry of Works.

Data on intermediate consumption intensity, from the own sector and from the whole manufacturing sector, sales to industry as a share of total demand, final demand also as a share of total demand, total supply, labour compensation, agricultural inputs, and transport costs are derived from the Brazilian input-output tables published by *IBGE* (Brazilian Statistics Bureau). Tariff data for each manufacturing sector in the period 1987-1998 are taken from Kume, Piani, and Braz de Sousa (2000).

The data for several variables, such as the number of establishments, qualifications of workers, intensity of use of intermediate inputs, were available only for Brazil. Similar statistical information for Argentina and Uruguay was not found. In the case of Argentina, there exist data only for a few particular years.¹⁹ A simple inspection of such available data suggests that using the Brazilian data should not be, however, significantly misleading. For instance, by comparing the establishment size between Argentina and Brazil, it turns out that the Spearman-rank correlation coefficient was 0.57 in 1985 and 0.66 in 1994, in both cases significant at the 1% level. On the other hand, the simple correlation between Argentinean and Brazilian external tariffs for the *ISIC* Classification at 4 digits was 0.68 in 1992 and 0.77 in 1994 (Sanguinetti and Sallustro, 2000).

The data which is only available for Brazil are reported according to the *IBGE* subsector classification. In order to get comparable figures, we have mapped them into the *ISIC Rev. 2* Classification using a concordance table supplied by *IBGE*. Furthermore, we should mention that our econometric analysis focuses on the period 1985-1998. However, our tariff data are available beginning with 1987. We assume that sectoral tariffs rates in 1985 and 1986 did not significantly differ from those in 1987.²⁰

Finally, the data on remaining country characteristics, namely, population and its skill level, agricultural production, and infrastructure were obtained from publications and databases of international organizations available on the web.

¹⁹ Information on the number of establishments is only available for the years 1985 and 1994 from the National Economic Census. Data on intermediate intensity exist only for 1997 and can be extracted from the input-output matrix elaborated that year. The previous one corresponds to the 1970s.

²⁰ Kume, Piani, and Souza (2000) indicate that the Brazilian import policy at the starting year of their study, 1987 was essentially based on a tariff structure set in 1957.

4.2. Specialization Patterns

This section analyses manufacturing specialization patterns in Mercosur over the period 1971-1998. We begin with a description of the measures used for absolute and relative specialization. We then discuss patterns of manufacturing specialization in each country over the whole period, 1971-1994 (1971-1998) and two sup-periods, 1971-1984, 1985-1994 (1985-1998) and highlight the industries in which each country specialized as well as changes in production structures across the four countries over the analysed period. We then relate several industry characteristics to manufacturing specialization patterns and explain thus for each country the tendency to specialize in certain industries. We then proceed with an econometric analysis of determinants of manufacturing specialization and find that small countries are more specialized both absolutely and relatively. Further, openness appears also positively associated with absolute and relative manufacturing specialization. Finally, our estimation results suggest that the preferential trade liberalization within Mercosur had no significant effect on absolute manufacturing specialization. Lower preferential tariffs within Mercosur were associated however with lower relative manufacturing specialization, in particular, for the larger countries.

4.2.1. Measuring Absolute and Relative Specialization

Specialization can be defined as the narrowness of the range of activities developed in a certain geographical unit. In other words, *specialization* is the extent to which a given country concentrates its manufacturing activity in a small number of sectors (WIFO, 1999). Thus, a country is “highly specialized” if its productive structure is such that a few industries account for a large share of its overall industrial activity.

We can distinguish between *absolute specialization* and *relative specialization*. A country is *absolutely specialized* if a small number of industries accounts for a very large share of its overall manufacturing activity. On the other hand, a country is *relatively specialized* if its productive structure in terms of sectoral composition differs from that of a benchmark, such as the group of countries as a whole, or the remaining countries that belong to the relevant common economic space, individually or jointly considered.

In order to measure the degree of absolute specialization, we use a variant of the *Hirschman-Herfindahl Index*. This index is simply the sum of the squared share of each industry in total national manufacturing production value.²¹ The variant that we use is similar to the measure for concentration in Haaland, Kind, Midelfart-Knarvik, and Torstensson (1999). It consists of the square root of this sum divided by the number of sectors (M) that we are considering (Equation 3). This index ranges between $(1/M)$ when all industries have the same share in national manufacturing production value and $(1/M)^{1/2}$ when only one activity accounts for the whole production value.

Relative specialization is measured by means of an index whose formula is inspired by the index used by Amiti (1996, 1997) and Haaland, Kind, Midelfart-Knarvik, and Torstensson (1999) for measuring relative concentration. *Mutatis mutandis*, this index is constructed on the basis of differences of shares $((1-a)-(1-b))$ (rather than working out their quotients like in the Gini Coefficient). More precisely, for each country we compare the share of each sector in total national manufacturing production value with the respective share in remaining countries within Mercosur as a whole ($z_{.j}$). The corresponding differences are squared, which assures that all

²¹ Formally, $HH_i \equiv \sum_{k=1}^M z_{ik}^2$.

sectors get a positive weight in the measure, with those sectors further away from partners' average receiving the largest weight, and then summed across industries. Finally, as before, we normalize dividing by the number of industries and taking the square root (Equation 4). This index ranges between 0 -when there is perfect matching between the productive structures of the country under analysis and that of the remaining partners- and $(2/M)^{1/2}$ -when there is no coincidence-.

Table 5

Specialization indices
Absolute specialization (Normalized Hirschman-Herfindahl Index)
$(3) \quad AS_i \equiv \sqrt{\sum_{k=1}^M z_{ik}^2 / M}$
Relative specialization (Amiti/HKMT)
$(4) \quad RS_i \equiv \sqrt{\sum_{k=1}^M (z_{ik} - z_{k-i})^2 / M}$

4.2.2. The Specialization of Countries

In this section we analyse absolute and relative specialization indices for each country. They help us to uncover differences with respect to the degree of specialization across countries in Mercosur. In addition, we know from economic theory that increasing trade liberalization may result in changes of the specialization extent. Accordingly, we have estimated time trend models in order to test whether the degree of specialization has changed significantly in the countries under analysis. Formally, we use the following specification:

$$(5) \quad \ln(\text{specind}_{it}) = \alpha + \beta \text{year} + \varepsilon_i$$

We have estimated this regression equation for the whole sample period 1971-1994 (1971-1998) and separately for two sub-periods: 1971-1984 and 1985-1994 (1985-1998). We have selected 1984 as a break year for two reasons. First, larger countries started to move towards unilateral trade liberalization and closer regional integration since the mid-1980s. Second, when we exclude Paraguay, we have two size-symmetric sub-periods.

Figures 1.a-1.c. show the evolution of absolute and relative specialization indices for each country on a two year moving average basis. Tables A1.1a-A1.1c in Appendix A1 report those indices for four-year sub-periods, while Tables A1.2a-A1.2c present estimation results.²²

²² Throughout the report we will use four-year averages for reporting indices (1971-1974, 1975-1978, 1979-1982, 1983-1986, 1987-1990, 1991-1994, 1995-1998) and two year moving averages for their graphical presentation in order to remove spurious fluctuations due to differential timing of country and sector business cycles.

Figure 1.a. Absolute specialization

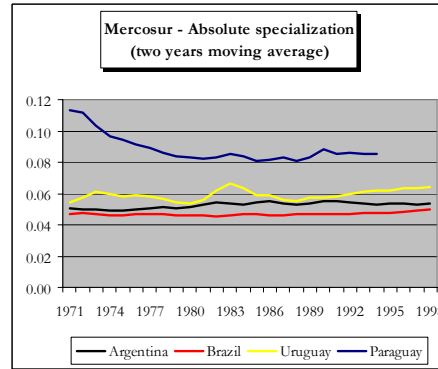


Figure 1.b. Relative specialization (with Paraguay)

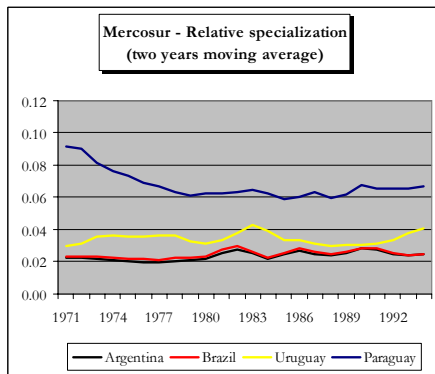
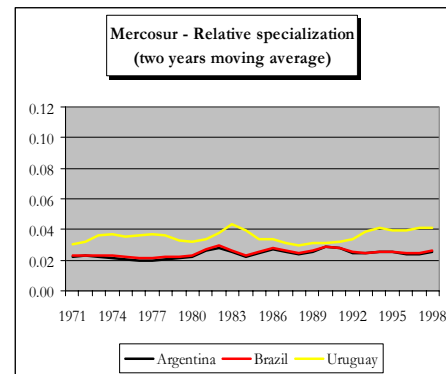


Figure 1.c. Relative specialization (without Paraguay)



Our results indicate that Paraguay and Uruguay have highest absolute manufacturing specialization. Furthermore, specialization has increased since the mid-1980s in Paraguay and the early 1990s in Uruguay. It is noteworthy that, as suggested by the relative specialization indices, these countries became more dissimilar with respect to the larger partners during such periods. This is confirmed by the time trend analysis. The coefficient on the time variable is positive and significant for the sub-period 1985-1994 (1985-1998).

Argentina and Brazil display lower degrees of absolute specialization. In the case of Argentina, we observe a steady increase in manufacturing specialization until 1987-1990 and a slight decrease thereafter. In the case of Brazil, the rise in absolute specialization concentrates on the last three sub-periods. Moreover, differences in manufacturing productive structures with respect to the other trade partners increase for both countries, especially until the late 1980s, and show lower levels afterwards. Again, estimated time trends confirm those findings.

Finally, we look at the joint share of the three largest sectors (Table A1.3a in Appendix A1). This measure provides additional information about the level of specialization. This combined share exhibits a steady increase over the sample period for Argentina. The time profile seems to be a U-shaped one for Uruguay and Paraguay. Thus, this share has risen in the recent years. In Brazil we detect a slight increase towards the end of the period. Which are the three largest sectors? The answer to this question will give us a first insight on the patterns of manufacturing specialization.

4.2.3. Specialization Patterns

Looking within the groups of the largest industries, we can observe certain regularities across countries and over time (Table A1.3b in Appendix A1). Table 6 highlights these sectors.

Table 6

<i>The three largest sectors by country (average over 1971-1998)</i>	
Argentina	Petroleum refineries, <i>food products</i> , and transport equipment
Brazil	<i>Food products</i> , non-electrical machinery, transport equipment/electrical machinery
Uruguay	<i>Food products</i> , petroleum refineries, and textiles
Paraguay	<i>Food products</i> , textiles, and wood products

Note: Argentina, Brazil, and Uruguay: 1971-1998.
Paraguay: 1971-1994.

Notice, first, that food products appear as one the three largest sectors in the four countries. Further, petroleum refineries is one of the largest industries in Argentina and Uruguay. The same applies for wood products in Paraguay. This pattern mirrors the comparative advantage of Mercosur countries in industries using intensively their abundant resources. Transport equipment is an important sector in the manufacturing structures of the larger countries. This relates mainly to their relative sizes and the prevalence of a special regime for this sector (see Section 3).

Increasing economic integration is associated not only with varying degrees of specialization, but also with changing specialization patterns. Then, an interesting question is: which sectors became more relatively important in each country's manufacturing structure and which lost significantly their relative importance? Table 7 presents for each country the industries with the largest increases in π , the sectoral share in national manufacturing production value, between 1987-1990 and 1995-1998 and those with the largest decreases in this share over the same period. We have chosen these sub-periods, with the aim to compare the situation prevailing immediately before the launching of Mercosur and that emerging after its entry into force.

Table 7

Mercosur - Sectors with the five highest share increases and decreases		
Country/year	Expanding sectors	Contracting sectors
Argentina	<i>Transport equipment</i>	<i>Textiles</i>
	Other non-metallic minerals	Petroleum refineries
	<i>Iron and steel</i>	Fabricated metal products
	Furniture	Non-electrical machinery
	Plastics	Food products
Brazil	<i>Transport equipment</i>	<i>Textiles</i>
	Electrical machinery	Wearing apparel
	Food products	Footwear
	<i>Iron and steel</i>	Paper products
	Industrial chemicals	Non-electrical machinery
Uruguay	<i>Food products</i>	<i>Textiles</i>
	Petroleum refineries	<i>Transport equipment</i>
	Printing and publishing	<i>Rubber products</i>
	Tobacco	Leather products
	Fabricated metal products	Industrial chemicals
Paraguay	Beverages	<i>Textiles</i>
	Wood products	Non-electrical machinery
	<i>Food products</i>	Tobacco
	Leather products	Petroleum refineries
	Industrial chemicals	<i>Rubber products</i>

Note: Argentina, Brazil, and Uruguay: 1987-1990/1995-1998

Paraguay: 1987-1990/1991-1994

Table 7 indicates a number of changes in production structures over the analysed period. First, in the large countries, Argentina and Brazil, transport equipment and iron and steel increased their shares. As already mentioned in section 3, the former was subject to a special regime and in the latter some specific trade barriers prevailed within Mercosur. Meanwhile, transport equipment contracted in Uruguay and the same is true for rubber products in both Uruguay and Paraguay. Second, food products gained share in the small countries, Uruguay and Paraguay, as well as in Brazil. Third, in Paraguay, almost all expanding sectors are closely related to natural resources based advantages of the country (beverages, wood products, food products, leather products). Fourth, textiles experienced the largest share losses in all four countries. Not surprisingly then, if we follow the composition of the group of industries with largest shares over time, we can observe that textiles leaves this group towards the end of the sample period. In Uruguay and Paraguay, its place is occupied by beverages (see Table A1.3b in Appendix A1).²³ Looking at the transport intensity across sectors, we can conclude that smaller countries tend to specialize increasingly specialized in industries that are more tied to the geography (less “footloose”).

²³ The smallest sectors are: professional and scientific instruments; other manufacturing industries; miscellaneous products of coal and petroleum in Argentina; leather products; pottery, china, and earthenware; and glass products in Brazil; non-ferrous metals; professional and scientific instruments; and miscellaneous products of petroleum and coal in Uruguay; and professional and scientific instruments; other manufacturing industries; miscellaneous products of coal and petroleum in Paraguay.

The previous paragraphs dealt with specific sectors. Even though this is very insightful, it does not provide a general picture. In order to get this picture, we should summarize the relevant information in some way. In other words, we should answer the following questions: How can specialization patterns be generally characterized? How have these patterns changed?

A simple way to characterize specialization patterns is to calculate the so-called *Industry Characteristic Bias of Countries (ICB)* (Midelfart-Kanrvik, Overman, Redding, and Venables, 2000). The idea is to compute, for each country, the average score on each industry characteristic, and to weight each of them by the share of the industry in each country's manufacturing production value. Formally,

$$(6) \quad ICB_i(t) \equiv \sum_k z_{ik}(t) \theta_k(1985)$$

where θ_k is a set of industry characteristics. Note that, in principle, both sectoral shares in total manufacturing production value and industry characteristics may vary over time. Thus, if we used both contemporaneous scores, we could not distinguish what is driving observed changes in biases. Therefore, we use initial scores (for 1985) for industry characteristics to isolate the impact of changes in productive structures.

This index allows us to address questions such as: Does Argentina show a stronger tendency to host increasing return activities? Does Paraguay tend to specialize relatively in activities that use intensively agricultural inputs? Does Brazil have an industrial structure in which predominate activities that rely heavily on industrial intermediate inputs? Does Uruguay display a particular bias towards skill intensive sectors?

Figures A1.1 in Appendix A1 show that Paraguay and Uruguay have manufacturing structures that are more biased towards sectors with high agricultural inputs intensity, high final demand bias, high transport intensity, and high external tariff barriers. In contrast, in Argentina and Brazil, we observe a bias towards industries with high skill intensity, high increasing returns to scale, high industrial intermediate inputs intensity, and high relative importance of industry itself as an output purchaser. As expected, Brazil, the country with the largest population, displays the strongest bias towards labour-intensive industries. Lastly, it is noteworthy that, since the early 1990s, in Uruguay and Paraguay, sectors with high degree of scale economies, high intensity in intermediate inputs, and high external tariff barriers are losing share in total manufacturing.

A complementary and more formal way to look at specialization patterns is to calculate for each country the Spearman rank correlation between the share of a sector in total national manufacturing production value and the sectoral score in a given industry characteristic (see Table A1.4a for definition of industry characteristics and Table A1.4b for data sources). A significant association between the relative size of a sector and, say, the intensity in the use of skilled labour suggests that the country tends to specialize in skill intensive industries. Tables A1.5 in Appendix A1 report the Spearman correlation coefficients for each country and each sub-period. From the significant associations that we have found, we can draw several conclusions. First, Argentina tends to specialize in sectors with high increasing returns to scale, high skill intensity (since early 1990s), and high total intermediate inputs intensity. Second, Brazil is specializing in sectors with a high degree of scale economies and high skill intensity and is de-specializing from transport intensive industries. Third, Uruguay tends to be specialized in sectors that use intensively intermediate inputs, high final demand bias, and high increasing returns to scale. Note that in the last two cases, this tendency is less clear since the mid-1990s. Fourth, Paraguay tends to be specialized in sectors with an intensive use of agricultural inputs and since the early 1990s has become specialized in industries with high final demand bias.

4.2.4. Determinants of Specialization

Economic theory indicates that large economies tend to be less specialized, since they are likely to have more heterogeneous economic and natural resources (neoclassical theory) and scale economies may be exhausted for a larger number of industries (new trade theories) (Brühlhart, 2001). In addition, we know that a reduction in trade costs, i.e., trade liberalization, is associated with increased specialization of countries in their sectors of comparative advantages (neoclassical theory), which implies larger overall specialization when demand is less spatially concentrated than endowments. Decreased trade costs also fosters higher specialization (new trade theories) (Brühlhart, 2001). One question that we can pose is then whether size and openness are, indeed, relevant factors to explaining differences in observed levels of specialization. In particular, we can test the following hypotheses:

Hypothesis 1: There is a negative relationship between the degree of specialization and the country size.

Hypothesis 2: There is a positive relationship between the degree of specialization and the degree of openness.

A straightforward way to assess the significance of these factors is to estimate the following model:

$$(7) \quad \ln\left(\frac{specindex_{it}}{1 - specindex_{it}}\right) = \alpha + \beta size_{it} + \gamma open_{it} + \varepsilon_{it}$$

Notice that specialization indices range within the interval [0,1]. OLS estimates with such a truncated dependent variable will be biased. Therefore, we use a logistic transformation of the original index as in Balassa and Noland (1987); Torstensson (1997); Volpe Martincus (2003); and Longhi, Traistaru, and Nijkamp (2003). Moreover, we use three alternative measures of size: population, industrial GDP, and total GDP (see Tables A1.6a and A1.6b in Appendix A1 for definition and data sources).

Estimation results are summarized in Table 8. Details are reported in Tables A1.7 in Appendix A1.

Table 8

<i>Determinants of specialization</i>				
Variable/Regression		(1)	(2)	(3)
Size	Population	-		
	GDP		-	
	Industrial GDP			-
Openness		+	+	+

Table 8 shows that, as expected, smaller countries are more specialized, both absolutely and relatively. The same is true for more open economies. This implies that openness was associated not only with increased overall specialization, but also with different specialization patterns across countries, i.e., with they becoming differently specialized. Notice that these results are robust to the correction for heteroscedasticity and cross-sectional correlation across panels and the use of one-period lagged explanatory variables controlling for endogeneity. They are also generally robust to the inclusion of country fixed effects.

Previous econometric results show that trade liberalization, in general, has induced higher levels and diverging patterns of specialization. However, they do not provide us an answer to the question whether *preferential trade liberalization* in the context of Mercosur has played a specific role, i.e., whether it has deepened or ameliorated this effect. To address this issue we have run the following regression:

$$(7') \quad \ln\left(\frac{specindex_{it}}{1 - specindex_{it}}\right) = \alpha + \beta size_{it} + \gamma open_{it} + \sigma regopen_{it} + \varepsilon_{it}$$

where *regopen* is (average) preferential tariffs to Mercosur partners or (corrected) share of total trade within the bloc to total trade.²⁴

Estimates are reported in Tables A1.7c-A1.7d in Appendix A1 and summarized in Table 9.

Table 9

<i>Determinants of absolute specialization</i>				
Variable/Regression		(1)	(2)	(3)
Size	Population	-		
	GDP		-	
	Industrial GDP			-
Openness		+	+	+
Regional Openness		0	0	0

<i>Determinants of relative specialization</i>				
Variable/Regression		(1)	(2)	(3)
Size	Population	-		
	GDP		-	
	Industrial GDP			-
Openness		+	+	+
Regional Openness*		-	-	-

* when we exclude Paraguay

Regional openness means *decline* internal tariff or *increase* of regional trade.

As shown in Table 9, our estimation results indicate that preferential trade liberalization within Mercosur has no clear effect on absolute manufacturing specialization. It is however *negatively* associated with relative specialization when Paraguay is not included in the analysis²⁵. Inspecting Table A1.1c in Appendix A1, we can conclude that this result is mainly driven by the behaviour of Argentina and Brazil during the 1990s. Thus, regional integration seems to be associated with converging specialization patterns in the larger countries.²⁶

²⁴ Estevadeordal, Goto, and Saez (2000) present preferential tariffs for each Mercosur country to each of their partners for 1985, 1988, 1991, and 1994 (see Table 2 in Section 3), whereas Olarreaga and Soloaga (1998) report the means for 1996 (see Table 3 in Section 3). We have calculated the mean and interpolated for the years with missing data. On the other hand, the share of regional total trade (exports plus imports) is highly (negatively) correlated with the relatively time constant size measures (over 0.90). Thus, in order to avoid collinearity problems, we have regressed the raw regional trade share on country dummies to remove the effect of country-fixed characteristics and used the unexplained residuals as a regressand in equation (7').

²⁵ Results using lag values are essentially the same. They can be obtained from the authors upon request.

²⁶ Results are also robust to the inclusion of time-fixed effects for those years in which there was no "linear" reduction in tariffs, namely, 1986, 1987, and 1990 (see Estevadeordal, Goto, and Saez, 2000).

4.3. Concentration Patterns

This section focuses on manufacturing concentration patterns in Mercosur over the period 1971-1998. We start with a discussion of the measures we use for absolute and relative concentration. We then present a descriptive analysis of absolute and relative manufacturing concentration patterns in the four countries included in this analysis. In this part, we highlight the industries with the highest increases and decreases in absolute and relative concentration and check for significant changes in absolute and relative manufacturing concentration over the analyzed period. We conclude our descriptive analysis with an assessment of correlations between absolute and relative concentration and a set of industry characteristics. We then proceed with an econometric analysis of determinants of relative manufacturing concentration patterns in Mercosur suggested by the international trade theories we reviewed in chapter 2. Our estimations indicate that relative factor intensities (labour and skilled labour), technology differences and relative expenditure concentration were the main driving forces explaining the manufacturing concentration patterns in Mercosur over the past three decades. While the impact of relative skilled labour and technology differences on manufacturing concentration declined over time, the impact of relative expenditure concentration appears stable over the whole period. It is also worth noticing that at the end of the analysed period, over 1995-1998, the intensity in intermediate inputs (from the own sector and the whole manufacturing sector) was positively related to manufacturing concentration, whereas transport intensity appears negatively associated with it. Finally, regional integration, interpreted as reduced tariffs on a preferential basis, seems to have contributed significantly to shape relative concentration pattern over the last years.

4.3.1. Measuring Absolute and Relative Concentration

Concentration of economic activity can be defined as the narrowness of the range of geographical units in which a certain activity is located. In other words, *concentration* is the extent to which a given activity is distributed across space (WIFO, 1999). Hence, an industry is “highly concentrated” if its spatial pattern is such that a few countries account for a large share of its activity.

As mentioned before, we can distinguish between *absolute concentration* and *relative concentration*. The distinction between *absolute* and *relative* is important in the presence of heterogeneity in the sizes of relevant units. Take, for instance, the notions of absolute and relative concentration. If the set of countries being considered is symmetric in their size, the two measures coincide. However, this is not necessarily the case under the presence of size asymmetry, as shown in Haaland, Kind, Midelfart-Knarvik, and Torstensson (1999).

In order to measure absolute concentration, we use, as in the case of specialization, a variant of the *Hirschman-Herfindahl Index*. This index is defined as the square root of the sum of the squared share of each country in Mercosur’s total manufacturing production value divided by the number of countries (N) (Equation 5). It ranges between $(1/N)$ when all countries have the same share in Mercosur manufacturing production value and $(1/N)^{1/2}$ when activity in the industry under examination concentrates on one country.

Consistently, we measure relative concentration through the *Amiti-Haaland, Kind, Midelfart-Knarvik, and Torstensson Index*. This index is constructed on the basis of differences of countries’ shares rather than working out their quotients. Those differences are squared, which ensures that all countries get a positive weight in the measure, with those countries further away from average receiving the largest weight (Amiti, 1996). The index takes the value of 0 when there is perfect

matching between the spatial distribution of the industry being analysed and that of the whole manufacturing sector. The upper bound is 1.²⁷

Table 10

<i>Concentration indices</i>	
Absolute concentration (Normalized Hirschman-Herfindahl Index)	
(8)	$AC_k \equiv \sqrt{\sum_{i=1}^N s_{ik}^2 / N}$
Relative concentration (Amiti/HKMT)	
(9)	$RC_k \equiv \sqrt{\sum_{i=1}^N (s_{ik} - s_i)^2 / N}$

4.3.2. The Spatial Concentration of Industries

The share of Argentina in total manufacturing production value has a U-shaped time profile. In turn, Brazil seems to have an inverted U-shaped path. Paraguay and Uruguay witnessed significant declines of their shares after 1991.

Figure 2a. Country shares in Manufacturing Production Value (with Paraguay)

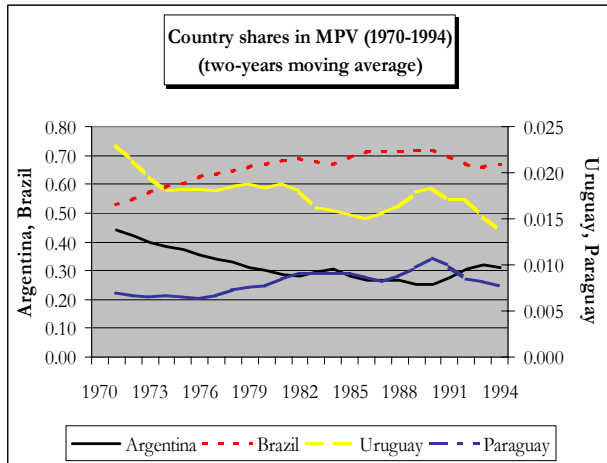
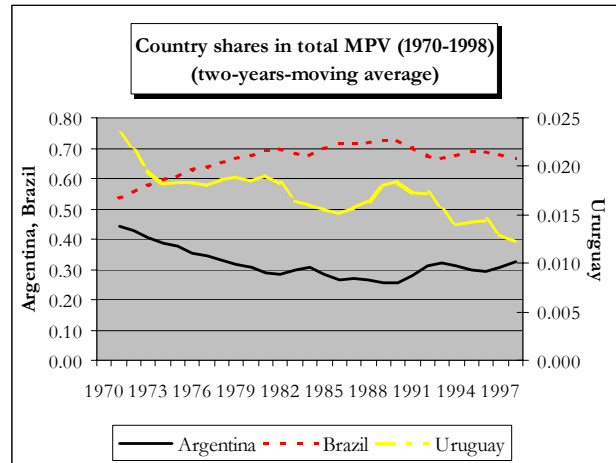


Figure 2a. Country shares in Manufacturing Production Value (without Paraguay)



Of course, there are noticeable cross-sectional differences. Table 11 shows for each country the sectors with largest increases (decreases) in Mercosur's total manufacturing production value

²⁷ We could, as for specialization, exclude from the benchmark the unit, namely, the industry we are considering. However, in this case, this would not change substantially the results because the relative size differences across sectors are significantly smaller than those across countries.

shares, s , over the periods 1987-1990 and 1995-1998. This summary classification allows us to assess the production structures before and after the entry into force of Mercosur.

Table 11

Mercosur - Sectors with the highest share increases and decreases by country		
Country/year	Expanding sectors	Contracting sectors
Argentina	<i>Leather products</i>	Non-ferrous metals
	Other non-metallic minerals	<i>Professional and scientific instruments</i>
	<i>Pottery, china, and earthenware</i>	
Brazil	<i>Professional and scientific instruments</i>	<i>Leather products</i>
	Non-ferrous metals	Other non-metallic minerals
		Paper products
Uruguay	Printing and publishing	<i>Leather products</i>
	<i>Professional and scientific instruments</i>	Rubber products
	Wearing apparel	<i>Pottery, china, and earthenware</i>
Paraguay	<i>Leather products</i>	<i>Pottery, china, and earthenware</i>
	Wood products	Textiles
	Footwear	Tobacco

Note: Argentina, Brazil, and Uruguay: 1987-1990/1995-1998

Paraguay: 1987-1990/1991-1994

Argentina and Paraguay increased their shares in leather products, while Brazil and Uruguay registered decreases. The opposite is true for professional and scientific instruments. Brazil and Uruguay expanded their shares, whereas Argentina lost relative importance within the bloc. The higher share of Argentina in pottery, china, and earthenware comes essentially at the expense of the two smaller countries, Uruguay and Paraguay, while the higher share in other non-metallic minerals at the expense of Brazil. These changes reflect previous patterns of specialization.

The four figures below show the average absolute and relative concentration in Mercosur over the analyzed periods. The figures in the first row (Figures 3a. and 3b.) plot the evolution of average absolute concentration of manufacturing in Mercosur on the basis of two-year moving averages. One can notice that it raised until 1989 and decreased afterwards. The next two figures (Figures 3c. and 3d.) present the time profile of average relative concentration. We can see that it displays an upward trend since the beginning of the 1980s, which becomes more pronounced towards the end of this decade.

Figure 3.a. Absolute concentration (1971-1994)

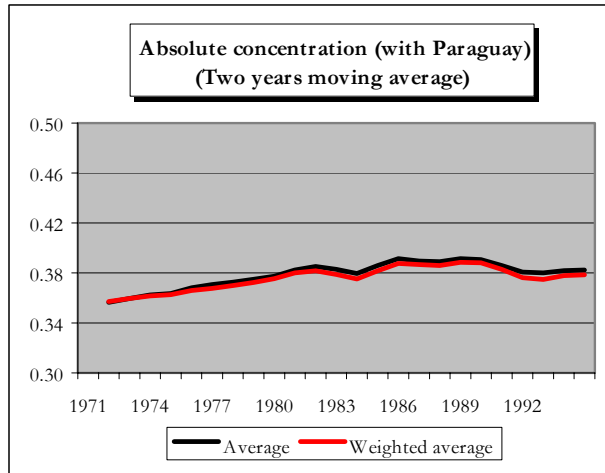


Figure 3.b. Absolute concentration (1971-1998)

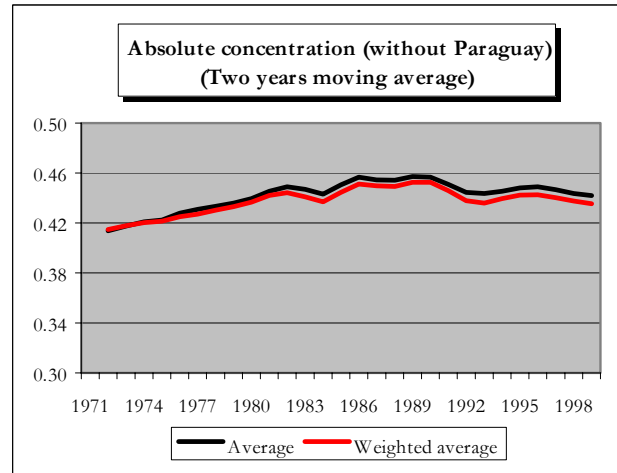


Figure 3.c. Relative concentration (1971-1994)

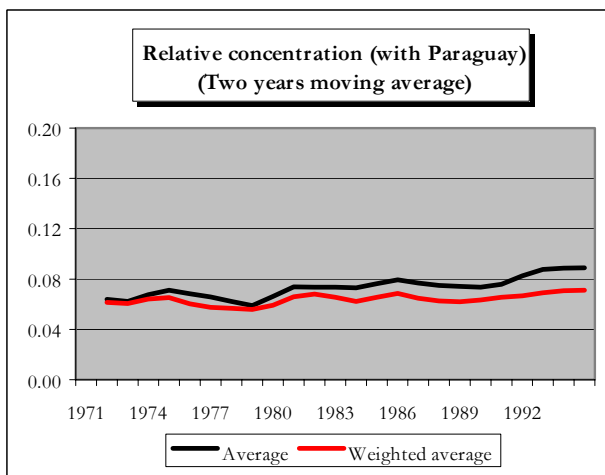
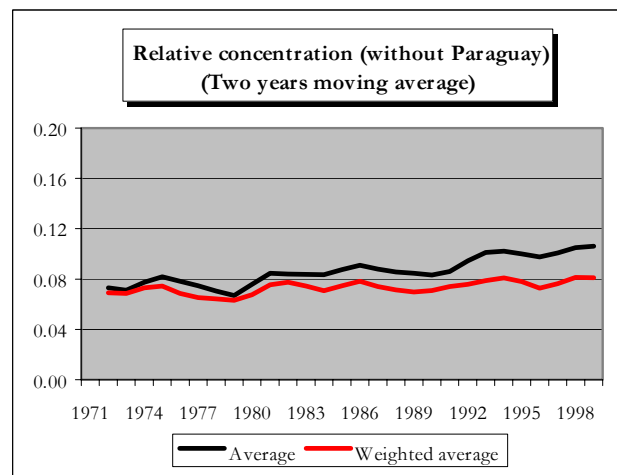


Figure 3.d. Relative concentration (1971-1998)



Tables A2.1 in Appendix A2 show each concentration index at the sectoral level on a four-years average base and the variation between the last and the initial sub-period, e.g., VII-I.

The industries with the highest increases in absolute concentration include professional and scientific instruments; other manufacturing industries; and footwear. In particular, as shown in Tables A2.4a and A2.4b in Appendix A2, the share of Brazil has increased substantially in these sectors. Petroleum refineries; other non-metallic minerals; furniture, and printing and publishing registered decreases

In the case of changes in relative manufacturing concentration, we find that the industries with the highest increases are tobacco; leather products; and professional and scientific instruments. Argentina increased its share in the first two sectors and Brazil in the third one. At the other end of the spectrum, furniture; wearing apparel; and petroleum refineries exhibit the highest reductions in the index. The reduced relative concentration in petroleum refineries is mainly driven by the declined share of Argentina.

The significance of changes in concentration indices for each industry can be simply assessed by regressing the natural logarithm of the index on a time trend. Consistently with previous exercises

with consider the whole sample period, 1971-1994 (1971-1998), and two sub-periods: 1971-1984 and 1985-1994 (1985-1998) (see Tables A2.3 in Appendix A2).

Overall, absolute concentration increased significantly over the period 1971-1994 (1971-1998), in particular, over the first sub-period, 1971-1984. Note, however, that this increase was partially reverted afterwards. Most industries follow this pattern. Such opposite changes result for some industries in non-significant variations over the whole period (furniture; and, when we exclude Paraguay, paper products; iron and steel; and transport equipment), while for other sectors reversions do not impede the emergence of a clear trend towards higher absolute concentration (wearing apparel; industrial chemicals; miscellaneous products of petroleum and coal). Finally, note that plotting the initial concentration indices against their change over time (Figure A2.1 in Appendix A2), we can infer that initially concentrated industries registered large as well as small increases in their indices.

On average, relative concentration increased over the whole period. In particular, this increase seems to stronger since the end of the 1980s. A number of industries, such as pottery, china, and earthenware; non-electrical machinery; electrical machinery; and professional and scientific instruments show monotonic increases. In the first case, the reason is the increased share of Argentina and in the remaining cases the above average growth of the Brazil's share. Other industries, such as, food products; rubber products; and non-ferrous metals exhibit a reversion in their relative concentration levels. Finally, one industry, furniture, displays a monotonic declining trend. It is worth noting that, as shown in Figure A2.1 in Appendix A2, sectors which initially were relatively dispersed experienced the larger increases in their relative concentration indices.

Finally, we find low correlations between indices measuring relative concentration and indices measuring absolute concentration. In particular, there are industries that rank higher in relative concentration than in absolute concentration, such as beverages; tobacco; leather; pottery; and petroleum refineries. Argentina and Uruguay (and in some cases Paraguay), the smaller countries within the bloc, have an important presence in those activities. On the other hand, there exist industries that rank higher in absolute concentration than in relative concentration, such as footwear (from the second sub-period on); furniture; other-non metallic minerals (in the first sub-period); rubber products; glass products; non-electrical machinery; electrical machinery; and professional and scientific instruments. The location of those activities is biased towards Brazil, the larger country in the considered area.

In summary, on average, absolute as well as relative manufacturing concentration have increased over the whole sample period. However, while relative concentration shows an increasing monotonic trend, which seems to accentuate towards the end of the 1980s, absolute concentration experiences a reversion by this time, i.e. it declines over the 1990s.

4.3.3. Concentration Patterns and Industry Characteristics

As in the case of specialization, we use the Spearman rank correlation index to examine the association between sectoral levels of concentration and industry characteristics. The correlation coefficients indicate a positive and significant association between the degree of absolute (relative) industrial production concentration and the degree of absolute (relative) expenditure concentration. Furthermore, this correlation analysis suggests that industries facing lower transport costs tend to be more absolutely concentrated.

Figures A2.2 in Appendix A2 provide a complementary graphical analysis of concentration patterns based on the relationship between concentration levels and selected industry characteristics. For each attribute, we order industries in a descending way according to their respective score averaged over the whole sample period. The top 9 industries are grouped in a category labelled *H*, the middle 10 industries in a category labelled *M*, and the bottom 9 industries

in a category labelled L . Then, we calculate the average concentration levels for these three categories and plot their evolution over time. The resulting graphs suggest the following findings:

First, industries using intensively agricultural inputs show a lower absolute concentration, whereas industries with high relative agricultural inputs intensity have a higher relative concentration.

Second, industries with high absolute (relative) expenditure concentration tend to be more absolutely (relatively) concentrated.

Third, sectors with high relative labour intensity and large relative technological differences across countries have higher relative concentration.

Fourth, industries with high final demand bias are absolutely dispersed, but relatively concentrated.

Fifth, sectors with higher transport intensity exhibit lower absolute concentration.

Sixth, there are no clear-cut associations between scale economies and intermediate inputs intensity (from the whole manufacturing sector as well as from the own sector) and concentration levels.

Similar results have been derived from a cluster analysis using Mac Queen's K-means method (Anderberg, 1973).²⁸

*4.3.4. Determinants of Concentration Patterns*²⁹

Economic theory suggests different possible explanatory factors for concentration patterns of activities. In the previous section we have associated some of these industry characteristics to concentration levels, but once at a time. In this section we formally assess the relative influence of these features through an econometric analysis. We focus on relative concentration. Since our sample includes 4 (3) countries and one of them is significantly larger than the others, an examination of absolute concentration does not seem to be very interesting. In fact, preliminary regression results indicate that absolute expenditure concentration is the main determinant of absolute manufacturing concentration, which is consistent with the informal findings in previous section. Scale economies also seem to have a positive impact on absolute concentration, albeit to a less extent (when the whole sample period is considered). Other determinants of absolute concentration levels according to economic theory, such as intermediate inputs intensity, are in general insignificant.³⁰

The main predictions of international trade theories with respect to concentration patterns of economic activity can be summarized in the following set of testable hypotheses.

Hypothesis 1: Other things equal, there is a positive relationship between relative concentration and relative technology differences across countries (the Ricardian model).

Hypothesis 2: Other things equal, under a lumpy distribution of endowments, there is a positive relationship between relative concentration and relative factor use intensities. In particular, the higher the relative intensity in (skilled) labour, the higher the relative concentration (the Heckscher-Ohlin model).

Hypothesis 3: Other things equal, there is a positive relationship between relative concentration of production and relative concentration of expenditure (the new trade theory).

²⁸ Results can be obtained from the authors upon request.

²⁹ This section is based on Traistaru and Volpe Martincus (2003).

³⁰ Results can be obtained from the authors upon request.

Hypothesis 4: There is a negative relationship between relative concentration and trade costs (according to the neoclassical theory -when demand is less concentrated than endowments- and the new trade theory -when factor market considerations are not taken into account-). On the other hand, a U-shaped relationship prevails (according to the new trade theories -when factor market considerations are taken into consideration-).

Finally, note that there are no clear-cut predictions for the relationship between relative concentration and scale economies, the intensity of input-output linkages, and transport intensity. The fact that the *a priori* influence is not defined does not necessarily imply that these elements are irrelevant for explaining concentration patterns. Therefore, we decide to include them to control for their impact.

In order to test previous hypothesis we use the following specification:

$$(10) \ln \left(\frac{rc_{kt}}{1 - rc_{kt}} \right) = \alpha + \beta relabint_{kt} + \gamma relskillint_{kt} + \delta technology_{kt} + \sigma scale_{kt} + \eta relexpconc_{kt} + \\ + \phi osint_{kt} + \phi transp + \lambda np_{kt} + \mu_k + \varepsilon_t + \nu_{kt}$$

where $k=311, \dots, 390$ (28 sectors), $t=1985, \dots, 1998$, and μ_k, ε_t represent industry and time fixed effects. Note that also in this case we resort to a logarithmic transformation due to the limited range of variation of the original indices. Tables A2.6a-A2.6c in Appendix A2 show the variables' definition and the data sources.

We first perform the regression analysis for the whole sample period (1985-1994/1985-1998). We have estimated the models with White-corrected standard errors (White, 1980) and panel-corrected standard errors (Beck and Katz, 1996). On the other hand, from the new economic geography, we know that causality may run in both directions, i.e., expenditure location determines production location and production location determines expenditure location. Thus, there might be an endogeneity problem. Therefore, we have instrumented relative expenditure concentration with lagged values and calculated the Hausman test statistics. This test indicates that endogeneity is not a matter of concern. The same conclusion stems from Arellano-Bond regressions.³¹

The results obtained from our Least Square Dummy Variable (LSDV) estimations for the whole sample period are summarized in Table 12. Table A2.7a in Appendix A2 reports detailed estimates.

³¹ See Traistaru and Volpe Martincus (2003).

Table 12.

<i>Determinants of relative concentration patterns (whole period)</i>	
Variable/Period	1985-1998
Relative labour intensity	+
Relative skill intensity	+
Relative technology differences	+
Relative expenditure concentration	+
Economies of scale	0
Intermediate consumption from own sector	0
Intermediate consumption from the whole industry	0
Transport intensity	0/+
External nominal tariffs	+

The results shown above suggest that variables suggested by the neoclassical theory, namely, relative factor intensity (labour and skilled labour) and relative technological differences across countries, and relative expenditure concentration as indicated by the new trade theory are the main determinants of relative concentration patterns for the whole sample period. Furthermore, high external trade barriers are associated with higher relative concentration. This is exactly what we should expect in a scenario of *preferential trade liberalization*, i.e., a group of countries free their bilateral trade more than that with the Rest of the World (Section 2.1.). We will address this issue explicitly latter on.

The establishment of Mercosur might have induced changes in relative concentration patterns and, in particular, it might have altered the relative importance of their determinants over time. In order to test for this possible structural break, we have created a dummy variable which takes the value 1 for the Mercosur period, 1991-1998, and 0 otherwise. Then we have interacted this dummy with the explanatory variables previously used and included them in the regression equation. The test statistics indicate that the interacting terms are jointly significant.³² Therefore, the relative influence of the different determinants seems to have changed as regional integration proceeded. Further, as have seen in Section 3, the evolution of Mercosur can be split out in two mains phases: the transition towards a FTA between 1991 and 1994 and the customs union period from 1995 onwards. Average and cross-sectional openness differ markedly across these two periods. Thus, we have replicated the structural break tests, this creating a dummy variable which takes a value of 1 for 1995-1998 and 0 otherwise (1991-1994). The test statistics also show a break in 1995.³³ Hence, we report estimation results for the sub-periods 1985-1990, 1991-1994, and 1995-1998 in Table A2.7b in Appendix A2. Table 13 provides a summary.

³² See Traistaru and Volpe Martincus (2003).

³³ See Traistaru and Volpe Martincus (2003).

Table 13

<i>Determinants of relative concentration patterns (subperiods)</i>			
Variable/Period	1985-1990	1991-1994	1995-1998
Relative labour intensity	0	+	+
Relative skill intensity	0	+	0/+
Relative technology differences	+	+	0
Relative expenditure concentration	+	+	+
Economies of scale	0	0	0
Intermediate consumption from own sector	-	-	+
Intermediate consumption from the whole industry	-	0	+
Transport intensity	+	-	-
External nominal tariffs	0/-	-/+	0

The relative importance of the determinants have varied over time, except that of relative expenditure concentration, which has remained relatively stable. The coefficient on relative labour intensity shows a clear upward trend, as suggest by the neoclassical theory. The opposite is true for relative skilled labour intensity, which might be due to the relative convergence across industries in qualification requirements that we see in the data, and relative technological differences, which might obey to the technological convergence induced by trade liberalization. It is noteworthy that the coefficient on intensity in intermediate inputs (from the own sector and the whole manufacturing sector) becomes positive and significant. This appears to be consistent with the new economic geography. Finally, the coefficient on transport intensity becomes negative and significant in the period 1995-1998. This is exactly what we would expect from the theory, i.e., industries with a high transport intensity and thus less footloose, such as other non-metallic minerals, food products, wood products, and paper products, tend to have a more relatively disperse spatial configuration. In summary, a new economic geography seems to have emerged after regional integration took place.

The previous econometric exercises have assessed the impact of preferential trade liberalization using a “dummy variables approach”. We have also mentioned that the positive sign of the coefficient on external trade obstacles is consistent with such a process. To evaluate this explicitly we would need data on preferential tariffs at the sectoral level, which are still not available.³⁴ However, we could gain some insights in this respect by constructing one proxy for regional integration. Thus, we have applied the liberalization schedule set in the Treaty of Asunción on the Brazilian MFN tariffs with some exemptions, such as textiles-wearing apparel, footwear, paper, and iron and steel. Tariffs on these sectors were then automatically reduced from 1995 onwards according to the Adaptation Regime to the Customs Union (see Section 3).³⁵ Undoubtedly, the most interesting is the Customs Union phase, because we can distinguish between sectors with an already prevailing free trade regime and sectors converging gradually to it with a CET in force for most tariffs lines. Therefore, we concentrate our analysis in the period 1995-1998. Table A2.7c. in Appendix A2 presents the estimation results. They are summarized in Table 14.

³⁴ Antoni Esteveordal at the IADB is preparing this database.

³⁵ Regarding the automobile industry, we have adopted two criteria. First, we have treated it as a sector within the group of initially exempted and lately liberalized industries. Second, we have exempted it from internal free trade, i.e., external tariffs apply also for trade within the bloc. We only report the results based on the first strategy; the other ones are essentially identical.

Table 14

Determinants of relative concentration patterns (Pref. Tariffs)	
Variable/Period	1995-1998
Relative labour intensity	+
Relative skill intensity	0
Relative technology differences	0
Relative expenditure concentration	+
Economies of scale	0
Intermediate consumption from own sector	+
Intermediate consumption from the whole industry	+
Transport intensity	-
Preferential tariffs	-

The coefficients on the original variables are similar as before. Most importantly, we can see, as expected from the theory (*Hypothesis 4*) that preferential tariffs have a negative impact on relative concentration, i.e., lower internal trade barriers are associated with higher relative concentration.

In summary, regional integration seems to have affected relative concentration patterns as well as the relative impact of the different factors contributing to their explanation.

4.4. Determinants of Manufacturing Location

In the previous sections, we have analysed specialization and concentration patterns in countries forming Mercosur and uncovered their determinants. In doing this, we have used as dependent variables summary measures of specialization and concentration and as explanatory variables country and industry characteristics, respectively. In fact, actual location is the resultant of multivariate interactions between industry and country characteristics (Midelfart-Knarvik, Overman, Redding, and Venables, 2000). Industries and country do not differ in only one feature, but their differences are multi-dimensional. Thus, industries have distinct intermediate input structures, different biases in the main destination of their sales, might be subject to increasing returns to scale of varying degree, and may face different trade costs. On the other hand, countries differ in their industrial base, the access they provide to important markets, and their endowments such as the abundance of agriculture products and the skill level of their population. The spatial distribution of industries is determined by the interaction between industry and country characteristics. Therefore, in this section, we use the complete distribution of locational shares instead of summary statistics as dependent variables and both industry and country characteristics as explanatory variables. In this manner we come closer to the theory (Overman, 2003). Not all factors that we consider here need to be equally significant for the phenomenon under examination. In other words, the relevant question is: which interactions are really important for explaining the geographical configuration of the manufacturing sector in Mercosur? In order to answer this question, we carry out an econometric analysis based on several model specifications. First, we describe the main hypotheses to be tested. Second, we define the selected model specifications. Third, we report and discuss our main empirical results.

4.4.1. Main Hypotheses

Locational patterns in Mercosur are described by the distribution of country shares in Mercosur manufacturing production value for each industry, the share variable s_{ik} (Section 3). The approach that we follow in order to explain them has been used by Ellison and Glaeser (1999); Midelfart-Knarvik, Overman, Redding, and Venables (2000); Midelfart-Knarvik, Overman, and Venables (2000); Volpe Martincus (2003); and Longhi, Traistaru, and Nijkamp (2003). Generally, the idea is that industries that use intensively a given “factor” tend to locate in countries that are relatively abundant in this “factor” (Midelfart-Knarvik, Overman, Redding, and Venables, 2000).³⁶ Thus, if countries differ in their endowments of educated population, then industries which use intensively well educated workers will be drawn to countries with relatively high shares of these workers. This suggests explaining the locational patterns through a set of interactions resulting from a specific pairing of industry characteristics and country characteristics. The particular correspondence of those characteristics is defined according to the theories reviewed in section 2. Those interactions terms will be considered next in detail.

Table 15

Regressions			
Category	Explanatory variables	Name	Dimension
Country characteristics	Agriculture abundance	ags	S.T
	Human capital abundance	edus	S.T
	Market potential	mp	S.T
	Industrial market potential	mpi	S.T
	Infrastructure	inf	S.T
Industry characteristics	Agriculture intensity	agi	.IT
	Human capital intensity	edui	.IT
	Economies of scale	scn	.IT
	Industrial intermediate consumption	ici	.IT
	Sales to industry	si	.IT
	Transport intensity	transp	.IT
Interaction terms	Agriculture abundance * Agriculture intensity	agsi	SIT
	Human capital abundance * Human capital intensity	edusi	SIT
	Market potential * Economies of scale	mpscn	SIT
	Industrial market potential * Industrial intermediate consumption	mpiici	SIT
	Industrial market potential * Sales to industry	mpisi	SIT
	Infrastructure * Transport intensity	inftransp	SIT

Note:

S.T: Variables that vary across countries and years, but not across industries.

.IT: Variables that vary across industries and years, but not across countries.

SIT: Variables that vary across states, industries, and years.

Table 15 presents the country and industry characteristics, and their interactions used in the econometric analysis.³⁷ The dimensions on which variables vary is also specified.

The first two interaction variables aim at controlling for the contribution of *comparative advantage* considerations. The general hypothesis is that industries tend to locate in those countries that are relatively abundant in the factors they use intensively in their production processes. In particular,

³⁶ Torstensson (1997) and Brühlhart and Trionfetti (1998) also employ interaction terms between country and industry characteristics in order to explain trade patterns among developed countries and locational patterns in Europe, respectively.

³⁷ For a precise definition of variables and aspects related to their construction see Table A3.1 in Appendix A3.

*Hypothesis 1: Industries that use intensively agriculture inputs tend to locate in countries in which agriculture accounts for an important share of total production.*³⁸

Hypothesis 2: Industries that use intensively skilled workforce tend to be drawn to countries which are relatively well endowed with skilled labour.

The next interaction terms capture several aspects related to the interplay between trade costs, scale economies, and input-output linkages, as highlighted in the new trade theory and the new economic geography.

Hypothesis 3: Industries with high increasing returns to scale tend to locate in countries with high market potentials (central places).

Hypothesis 4: Industries for which the manufacturing sector itself is an important user of their products find advantageous to locate in countries providing a better access to a relatively large industrial base and hence to a significant demand source.

*Hypothesis 5: Industries which rely highly on industrial intermediate inputs tend to locate in countries ensuring a better access to a relatively large industrial base and thus to their relevant providers.*³⁹

Notice that industrial base amounts to a specific form of market potential. The two measures, *inds* and *mp*, are constructed by considering the own country's industrial GDP and total GDP, respectively, and those of the other countries weighted by the inverse of the respective bilateral distance (see Appendix A1).

Firms that use intensively transport services tend to locate in countries with better infrastructure, since this implies a lower effective price for the purchaser and therefore a higher relative demand for goods produced in such territories. Therefore,

Hypothesis 6: Transport intensive industries tend to locate in countries with relatively good infrastructure.

Finally, different internal trade impediments across sectors might affect differently the intensity of the interaction between country and industry characteristics. Thus,

Hypothesis 7: Intra-bloc tariffs have an impact on the pattern of matching between country and industry characteristics.

4.4.2. Specification

The dependent variable is the share of a country in total manufacturing production value in each industry, s_{ik} . Note that this ratio can only take values within $[0,1]$, so that the dependent variable is truncated. As a consequence, estimation with OLS will lead to biased estimates. Therefore, as before, we perform a logistic transformation, similar to Balassa and Noland (1989) and Torstensson (1997). The variable becomes $\ln[s_{ik}/(1-s_{ik})]$.⁴⁰

The dependent variable is expressed as a function of country characteristics, industry characteristics, and their interaction. Formally, we use the following specification:

³⁸ Note that, following Midelfart-Knarvik, Overman, Redding, and Venables (2000), agriculture production is taken as an exogenous measure of "agriculture abundance".

³⁹ Black and Henderson (1999) find that in United States capital goods plants agglomerate in locations with high manufacturing employment, which is considered by authors as a supporting evidence for the role of inter-industry linkages.

⁴⁰ This expression ranges in $(-\infty, +\infty)$

$$(11) \quad \ln\left(\frac{s_{ikt}}{1-s_{ikt}}\right) = \sum_j \beta(j) (\varpi_{it}(j) - \bar{\varpi}(j)) (\theta_{kt}(j) - \bar{\theta}(j)) + \varepsilon_{ikt}$$

$$\text{or} \quad (12) \quad \ln\left(\frac{s_{ikt}}{1-s_{ikt}}\right) = \alpha + \sum_j \left(\beta(j) \varpi_{it}(j) \theta_{kt}(j) - \beta(j) \bar{\theta}(j) \varpi_{it}(j) - \beta(j) \bar{\varpi}(j) \theta_{kt}(j) \right) + \varepsilon_{ikt}$$

$\varpi_i(j)$ is the level of the j th characteristic in country i and $\theta_k(j)$ is the industry k value of the industry characteristic paired with the state characteristic; the upper bar denotes a reference value.

The coefficients to be estimated are the $\beta(j)$, which measures the importance of the interaction, $-\beta(j)\bar{\theta}(j)$ and $-\beta(j)\bar{\varpi}(j)$, which amount to level effects in the interaction and a constant α , which contains the sum (over j) of the products of all level effects.

The intuition behind the selected functional form is exhaustively explained in Midelfart-Knarvik, Overman, Redding, and Venables (2000). The specification includes 6 interaction terms. By examining one characteristic it is possible to illustrate its logic. Consider, for example, skill, so that $j=\text{skill}$, $\varpi_i(\text{skill})$ is the abundance of skilled workers in country i and $\theta_k(\text{skill})$ is the skill intensity of industry k . Then, for the case in question, expression (3) means:

- There exists an industry with skill intensity $\bar{\theta}(\text{skill})$ whose location is independent of the skill abundance of the country.
- There exists a skill abundance level $\bar{\varpi}(\text{skill})$, such that the state's share of each industry is independent of the skill intensity of the industry.
- If $\beta(\text{skill}) > 0$, then industries with skill intensity greater than $\bar{\theta}(\text{skill})$ tend to locate in countries with skill abundance greater than $\bar{\varpi}(\text{skill})$ and out of countries whose skill is abundance lower than this level.⁴¹

The equation is estimated in the first place by OLS, pooling across industries, and, in principle, across years. The exercise considers 27 industries, 4 (3) countries, and 10 (14) years, 1985-1994 (1985-1998).⁴² Therefore, the sample contains 1080 (1134) observations. Moreover, we condition on the standard deviation of the underlying variables in order to make comparison across variables more appropriate, so that the coefficients that will be presented are standardized ones. Notice that there are three potential sources of heteroscedasticity, across countries, across industries, and across time.⁴³ Hence, White's heteroscedastic consistent standard errors are reported when possible and used for hypothesis testing. We include dummy variables to control for industry, country, and time effects. On the other hand, we are aware that there might be an endogeneity problem; more specifically, skill intensive industries tend to locate in skill abundant countries, but causation can run also in the opposite direction: by settling in a country, industries employing highly qualified workers may end up changing its relative skill abundance. Therefore,

⁴¹ Midelfart-Knarvik, Overman, Redding, and Venables (2000) maintain that the general equilibrium nature of the system makes difficult to define the cut-off points defining abundance and intensity. They suggest that the mean or the median are intuitive candidates, but there is no a priori reason to think that they are the correct points. Note, moreover, that in the present specification one variable, such as industrial GDP, captures the cut-off of the two intensities which are interacted with it.

⁴² The industry "Other products", which is a residual component, was dropped out. In this way, we also assure the observance of the adding up restriction.

⁴³ The White's general test was carry out to test for heteroscedasticity (Greene, 1997). Unlike other usual tests, like the Goldfeld-Quandt and Breusch-Pagan, it does not require to specify the nature of heteroscedasticity. In this case, it suggests that indeed there exists heteroscedasticity. The corresponding chi-square statistic is highly significant for all specifications.

we have also used lag values for the explanatory variables. Finally, we also control for groupwise heterocedasticity and cross-sectional correctional, as suggested in Beck and Katz (1996).

4.4.3. Results

Estimation results are reported in Tables A3.2a in Appendix A3. Table 16 summarizes the main findings for the whole period.

Table 16

<i>Determinants of locational patterns (whole period)</i>		
Variable/Period		1985-1998
Agricultural abundance*Agricultural intensity	agsi	+
Human capital abundance*Human capital intensity	edusi	+
Market potential*Economies of scale	mpscn	+
Industrial market potential*Industrial intermediate consumption	mpiici	-/+
Industrial market potential*Sales to industry	mpisi	+
Infrastructure*Transport intensity	inftransp	0/+

They indicate that there is a certain pattern of matching between specific country characteristics and specific industry characteristics. Notice that results using lag values are basically the same.⁴⁴ Thus, endogeneity does not seem to be a matter of concern.

First, industries that use intensively agricultural inputs tend to be located in countries that are relatively abundant in agricultural output as measured by the share of agriculture in national GDP.

Second, industries that use intensively skilled labour tend to be located in countries that are relatively abundant in this factor.

Third, industries with high increasing returns to scale tend to locate in countries with larger market potentials. This tendency accentuates over time when we exclude Paraguay.

Fourth, there is no clear pattern for sectors that use intensively industrial intermediate inputs. These industries tend to locate in countries with larger industrial market potentials according to the regressions excluding Paraguay.

Fifth, industries whose output is mainly demanded by the manufacturing sector itself tend to locate in countries with larger industrial market potentials.

Sixth, industries that face higher transport costs tend to locate in countries providing a better physical infrastructure.

As we have seen in our econometric analysis of relative concentration patterns, the relative importance of explanatory variables might have changed over the sample period due to increased economic integration. Thus, as before, we have tested for structural breaks in 1991 and 1995. The test statistics also in this case point to their occurrence. Consequently, we have run also separate regressions for sub-periods that mirror the evolution of Mercosur: 1985-1990 (preparation period), 1991-1994 (transition period), and 1995-1998 (customs union period). Results are presented in Table A3.2b and summarized in Table 17.

⁴⁴ They can be obtained from the authors upon request.

Table 17

<i>Determinants of locational patterns (subperiods)</i>				
Variable/Period		1985-1990	1991-1994	1995-1998
Agricultural abundance*Agricultural intensity	agsi	+	+ / 0	-
Human capital abundance*Human capital intensity	edusi	+	+	+
Market potential*Economies of scale	mpscn	+	+	+
Industrial market potential*Industrial intermediate consumption	mpiici	- / 0	- / +	+
Industrial market potential*Sales to industry	mpisi	+	+	+
Infrastructure*Transport intensity	inftransp	+	0 / +	+

It is noteworthy that when we include Paraguay, correspondence between agricultural intensity and agricultural abundance strengthens as trade becomes freer. However, when we exclude this country, this result reverts towards the end of the sample period, 1995-1998. In this sub-period, Brazil becomes the country with the largest share of agriculture in GDP. Recall that we have seen that, within this group, Uruguay has the strongest bias towards activities that use intensively agricultural inputs.

We also observe a declining trend for the matching between skill intensity and skill abundance. This might be related to the previously mentioned relative convergence across industries in qualification requirements detected in the data.

The tendency of sectors with increasing returns to locate in countries with larger market potentials and that of sectors using intensively industrial intermediate inputs to settle in countries with larger industrial market potentials (when we exclude Paraguay and we control for groupwise and cross-sectional correlation) become stronger as trade liberalization deepens. On the contrary, the regression results obtained when Paraguay is included in the analysis suggest an opposite pattern: industries intensive in industrial intermediate consumption tend to de-locate from countries with larger industrial market potential. On the other hand, the demand linkage, i.e., the matching between this latter country characteristic and the importance of the manufacturing sector as a buyer of sectoral output does not display a clear temporal pattern. However, the intensity of this effect is clearly larger during the 1990s.

Finally, the propensity of industries which are transport intensive to locate in countries with appropriate infrastructure has increased over time. This result holds only for the regression excluding Paraguay. For the other regression we do not find a significant association, which might be explained by the fact that sectors in which Paraguay, a country with relatively bad infrastructure, is specialized are, at the same time, intensive in agriculture inputs and intensive in transport.

Let us focus on the set of regressions that do not include Paraguay. Undoubtedly, they are more reliable for our purposes, since they are based on a longer time span, which allows for adjustment lags in changing locational patterns as integration deepens. Linking our empirical results with the theoretical framework, we can conclude, based on the econometric evidence, that factors suggested by the new trade theory and the new economic geography, particularly the interaction among market potential and economies of scale, have gained importance as locational determinants *relative* to comparative advantage considerations (recall that we do not include the measure of labour intensity in these estimations). We can corroborate this explicitly by incorporating a variable reflecting preferential trade liberalization, as we have done in the sub-section on concentration. We have included this variable as such and interacted with the original set of explanatory variables. Estimations results are reported in Table A3.2c and summarized in Table 18.

Table 18

<i>Determinants of locational patterns - Interaction with preferential tariffs</i>		
Variable/Period		1985-1998
Agricultural abundance*Agricultural intensity	agsi	+
Human capital abundance*Human capital intensity	edusi	+
Market potential*Economies of scale	mpscn	-
Industrial market potential*Industrial intermediate consumption	mpiici	0
Industrial market potential*Sales to industry	mpisi	-
Infrastructure*Transport intensity	infrtransp	-

They indicate, in concordance with our previous findings, that high intra-bloc tariffs reduce the intensity of the correspondences postulated by the new trade theories. In particular, they ameliorate in a significant way the tendency of increasing returns industries to locate in countries with larger market potentials as well as that of industries selling a substantial part of their output to the manufacturing sector itself to settle in countries with broad industrial bases. The same is true for the propensity of transport intensive industries to locate in countries with better physical infrastructure. The opposite is true for the interactions involving comparative advantage factors.

4.5. Implications for Smaller Countries

The countries making up Mercosur are asymmetric in size. Brazil is relatively large, Argentina has a medium size and Paraguay and Uruguay are small. In 1994 Mercosur accounted for 195.95 million inhabitants of which Brazil amounted to 78.45 percent, Argentina 17.51 percent, Paraguay 2.40 percent and Uruguay 1.63 percent. Representing two thirds of the Mercosur combined GDP, Brazil is by far the largest economy. Argentina accounts for almost one third and Paraguay and Uruguay have below 2 percent of the combined Mercosur GDP (See Table 13).

As shown in Table 19 the small economies of Paraguay and Uruguay are more open compared to Brazil and Argentina. The share of traded manufactures in total manufacturing value was in 1994 62.31 percent in Uruguay while in Brazil was 25.54 percent and Argentina 25.59 percent. In the case of Paraguay manufactured trade amounted to 107 percent of the total manufacturing value in this year.

Table 19

Mercosur - Size and openness indicators (1994)			
Country	Population	GDP	Openness^a
Argentina	17.51	30.82	25.59
Brazil	78.45	65.79	25.54
Paraguay	2.40	1.62	107.38
Uruguay	1.63	1.77	62.31

^a Manufactures exports and imports in total manufacturing production value

Sources: IMF International Financial Statistics Yearbook 2002, PADI (ECLAC).

Given the asymmetric size of the four countries the question whether and to what extent small countries within Mercosur benefit from the economic integration is important and policy relevant.

Uruguay and Paraguay have been front-runners on the way of opening their economies to trade. The average tariffs have steadily declined since the end of the 1970s to levels which are the lowest in Mercosur. For example, in 1994 the average tariffs were 13.6 percent in Uruguay and 7.3 percent in Paraguay. The CET tariff introduced in 1995 was thus higher than the average external tariffs of Uruguay and Mercosur.

Our analysis indicates that Paraguay and Uruguay experienced a decline of their shares in total Mercosur manufacturing after 1991. However, this is not true for each individual industry, i.e., there were important differences across sectors. Paraguay increased its share in leather products, wood products and footwear, while reduced its share in pottery, china, and earthenware; textiles; and tobacco. In the case of Uruguay, expanding industries include printing and publishing; professional and scientific instruments; and wearing apparel, while sectors such as leather products; rubber products; and pottery, china, and earthenware declined.

Moreover, over the period 1971-1998, Paraguay and Uruguay had the highest absolute manufacturing specialization. *In these two countries, since mid 1980s absolute specialization has increased significantly. In relative terms, the manufacturing structure in the two small countries has become more dissimilar in comparison with the two large countries.* To the extent shocks are industry-specific the increasing specialization in Paraguay and Uruguay makes these two countries more vulnerable to asymmetric shocks. Also less similar industrial structures make correlation of business cycles in Mercosur countries a less likely outcome.

The absolute specialization in Uruguay and Paraguay is in line with natural resources endowments. In general, these countries have manufacturing structures biased towards sectors intensive in agricultural inputs and with high final demand. Those industries are also less likely to move (less “footloose”) as suggested by their high transport intensity. In particular, over the period 1971-1998, the three largest sectors included in Paraguay food products, textiles, and wood products and in Uruguay food products, petroleum refineries and textiles. Trade liberalization resulted in changes in the production structures of the participating countries, which in the cases of Paraguay and Uruguay, can be interpreted as a deepening of pre-existent specialization patterns. Expanding industries are resource intensive while declining sectors include labour intensive, scale intensive as well as capital intensive industries. In Uruguay sectors with the highest gains include food products, petroleum refineries, printing and publishing, tobacco, fabricated metal products. Declining sectors include textiles, transport equipment, rubber products, leather products, and industrial chemicals. Expanding sectors in Paraguay include beverages, wood products, food products, and leather products, while declining sectors include textiles, non-electrical machinery, tobacco, petroleum refineries, and rubber products. Since the early 1990s, scale intensive sectors, intermediate inputs intense and with high tariff barriers have declined relatively in both countries.

In summary, the results of this study show that the two small countries, Paraguay and Uruguay, are the most open and specialized within Mercosur. To the extent shocks are industry-specific, a high manufacturing specialization may increase the vulnerability of these countries to asymmetric shocks.

4.6. Summary

Specialization Patterns

Absolute manufacturing specialization is the highest in Paraguay and Uruguay while Argentina and Brazil are more diversified. Over the period 1971-1998, absolute specialization has increased, in particular after 1985. However, in Argentina, during the 1990s absolute specialization has decreased. The three largest industries in each country uncover specialization patterns in line with resource endowments. Food products is one of the three largest industries in each country. Petroleum refineries has a large share in the manufacturing production in Argentina and Uruguay and the same is true for wood products in the case of Paraguay. On the other hand, Uruguay and Paraguay are also specialized in textiles. Scale intensive industries such as transport equipment are important in Argentina and Brazil, while non-electrical machinery is among the three largest industries in Brazil.

Increased integration has resulted in production structures changes within the four countries. In Argentina and Brazil the expanding industries include capital and scale intensive industries such as transport equipment, iron and steel (Argentina and Brazil), industrial chemicals, electrical machinery (Brazil), while labour intensive industries such as textiles; footwear, wearing apparel (Brazil) declined. In Paraguay and Uruguay the expanding sectors included industries closely related to natural resources based advantage of the countries (wood products, beverages, food products, and leather products in Paraguay; petroleum refineries, food products, tobacco, in Uruguay) In these two small countries capital and scale intensive industries such as transport equipment, industrial chemicals (Uruguay), non-electrical machinery (Paraguay) declined.

On the basis of the industry characteristic biases of countries and the correlations between the relative size of industries within countries and industry characteristics we find that Argentina has specialized in industries with increasing returns to scale, high skills intensive, and high total and industrial intermediate inputs intensity. Brazil has specialized in industries with high scale economies, high skills intensity, and high labour intensity. Paraguay has specialized in industries intensive in agricultural inputs and since early 1990s in industries with a high final demand basis. Uruguay has specialized also in industries which use intensively agricultural inputs and have a high a final demand bias and are intensive in total intermediate inputs. During the 1980s, this country had specialized in sectors with increasing returns to scale.

Our econometric analysis confirms that on average, other things equal, the smaller and more open the economy the higher the absolute and relative specialization is. Further, we find that the preferential trade liberalization within Mercosur had no significant impact on absolute manufacturing specialization. Lower trade tariffs within Mercosur had led to lower relative manufacturing specialization. This latter result is driven by Argentina and Brazil suggesting that regional integration was associated with converging patterns of manufacturing specialization in the large Mercosur countries.

Concentration Patterns

Over the period 1971-1998, the share of Argentina in total manufacturing production in Mercosur had a U-shaped evolution, while Brazil had an inverted U-shaped evolution. The manufacturing sector declined relatively in Paraguay and Uruguay after 1991. Overall absolute concentration increased significantly over the period 1971-1998. In particular, the increase was stronger in the period 1971-1984. After 1989 there is evidence of a partial reversion, i.e., absolute concentration decreased over the 1990s. Initially industries with high absolute concentration experienced both large and small increases in absolute concentration. The industries with the

highest increases in absolute concentration include professional and scientific instruments, other manufacturing industries, and footwear. The highest decreases in absolute manufacturing concentration were registered in petroleum refineries, other non-metallic minerals, furniture, and printing and publishing. Average relative concentration increased since the beginning of 1980s. This increasing trend becomes more pronounced since the end of this decade. Industries initially dispersed in relative terms experienced the largest increases in their relative concentration. In particular, industries with the highest increases include tobacco, leather products, professional and scientific instruments. The highest decreases in relative manufacturing concentration were registered in the cases of furniture, wearing apparel, petroleum refineries. We find low correlations between absolute and relative concentration.

The correlation between concentration levels and industry characteristics suggest a positive and significant association between the degree of absolute (relative) concentration and the degree of absolute (relative) expenditure concentration. Industries facing low transport costs tend to be more absolutely concentrated. The univariate analysis of the relationship between concentration patterns and industry characteristics suggest the following patterns: a) industries intensive in agricultural inputs have a low absolute concentration while industries with high relative agricultural inputs intensity have high relative concentration; b) industries with high absolute (relative) expenditure concentration tend to be more absolutely concentrated; c) industries with high relative labour intensity and large relative technological differences across countries have higher relative concentration; d) industries with high final demand bias are absolutely dispersed but relatively concentrated; e) industries with high transport intensity have lower absolute concentration; f) there is no clear cut pattern for scale economies and intermediate inputs intensity.

Our econometric analysis suggests that, on the one hand, relative factor intensity (labour and skilled labour) and relative technological differences across countries as well as relative concentration of expenditure, on another hand, are the main driving forces of manufacturing concentration patterns. These results are in line with the predictions of neoclassical trade theory and the new trade theory, respectively. The importance of relative labour intensity has increased over the analysed period, while it decreased in the case of relative skilled labour intensity and relative technological differences. Relative convergence across industries in qualification requirements and technological convergence induced by trade liberalization might explain the latter developments. We find that, over the period 1995-1998, manufacturing concentration is positively (in accordance with the new economic geography) and significant related to the intensity in intermediate inputs and negatively and significant associated to transport intensity. This latter result is in line with the international trade theory predicting that less footloose industries tend to be relatively more disperse across space. Finally, we find that lower internal trade tariffs within Mercosur were associated with higher relative manufacturing concentration.

Determinants of Locational Patterns

Our econometric analysis of determinants of manufacturing location defined by the distribution of country shares in each industry indicates that interactions between factor endowments and factor intensity as well as market potential and scale economies and intermediate inputs consumption are the main driving factors for manufacturing location patterns. More exactly, we find that: a) industries intensive in agricultural inputs are located in countries abundant in agriculture output measured as a share of agriculture to national GDP (this result is stronger when Paraguay is included in the analysis); b) skills intensive industries tend to be located in countries abundant in skilled labour; c) industries with increasing returns to scale tend to locate in countries with larger market potentials; d) industries whose output is mainly demanded by the manufacturing sector tend to locate in countries with large industrial market potential; e)

industries facing high transport costs tend to locate in countries providing a better physical infrastructure (this result holds when Paraguay is not included in analysis).

In order to distinguish the role of increased economic integration on changing manufacturing location patterns, we re-estimated the above model for three sub-periods corresponding to the integration progress within Mercosur: 1985-1990 (preparation period), 1991-1994 (transition period), 1995-1998 (customs union period). We find that increased economic integration is associated with a stronger effect of the interaction between agricultural intensity and agricultural abundance. When Paraguay is not included in the analysis, over the period 1985-1998, this effect declines however. Increased integration appears associated with a stronger effect of the interaction between increasing returns of scale and market potential, and, when Paraguay is not included in the analysis, with a stronger effect of the interactions between the intensity in industrial intermediate inputs and large industrial market potential, and transport intensity and infrastructure quality. We also find a declining effect of the interaction between skill intensity and skill abundance associated with increased integration. We suggest that this result might be explained by the relative convergence of qualification requirements across industries supported by our data.

We find that increased economic integration is associated with a stronger effect of the interaction between agricultural intensity and agricultural abundance. When Paraguay is not included in the analysis, over the period 1995-1998, this effect declines however. Increased integration appears associated with a stronger effect of the interaction between increasing returns of scale and market potential, and, when Paraguay is not included in the analysis, with a stronger effect of the interaction between the intensity in industrial intermediate inputs and large industrial market potential, as well as in the case of the interaction between transport intensity and infrastructure. Furthermore, we find a declining effect of the interaction between skill intensity and skill abundance associated with increased integration. We argue that this result might be explained by the relative convergence of qualification requirements across industries supported by our data.

From our econometric analysis covering Argentina, Brazil, and Uruguay (whose time length is the largest, 1985-1998), we conclude that factors suggested by the new trade theory and the new economic geography, in particular the interaction between market potential and economies of scale, have gained importance as locational determinants *relative* to comparative advantage considerations (we do not include the measure of labour intensity in these regressions). In order to strengthen the formal support for this conclusion, we include in our model of manufacturing location determinants an additional control variable reflecting preferential trade liberalization and we interact it with the original set of explanatory variables. Our estimation results are in line with the previous findings and suggest that low intra-bloc tariffs increase the intensity of the interactions postulated by the new trade theories. In particular, they ameliorate in a significant way the tendency of increasing returns industries to locate in countries with larger market potentials as well as that of industries selling a substantial part of their output to the manufacturing sector itself to settle in countries with broad industrial bases. The same is true for the propensity of transport intensive industries to locate in countries with better physical infrastructure. Interactions suggested by comparative advantages, in particular, those involving skill and agricultural intensity, appear to weaken with increased economic integration.

Implications for Smaller Countries

The results of this study show that the two small countries, Paraguay and Uruguay, are the most open and specialized within Mercosur. The shares of these two countries in the total manufacturing in Mercosur declined after 1991, but there were significant differences across industries. They became even more specialized, both absolutely and relatively. In general, these countries have manufacturing structures biased towards sectors intensive in agricultural inputs and with high final demand. Those industries are also less likely to move (they are less

“footloose”) as suggested by their high transport intensity. To the extent shocks are industry-specific, a high manufacturing specialization may increase the vulnerability of these countries to asymmetric shocks.

5. Cross-country production clusters

In this section we identify and discuss production clusters across Mercosur using two distinct avenues. First, we assess whether and to what extent trade among the members of Mecosur has become more intra-industry in nature as opposed to extra-regional trade flows. After a descriptive analysis of intra-industry patterns, we analyse in a more formal manner the effect of the Mercosur trade policy on intra-industry trade. Second, we analyse the regional dimension of production clusters by investigating production structures in regions situated along borders between the Mercosur countries. In particular, in this part of our study we highlight existing production complementarities in border regions, mainly in agricultural products and food processing industries.

5.1. Intra-industry Trade Patterns: Descriptive and Econometric Evidence

5.1.1. Estimation of IIT Indicators

One way to identify the formation of production clusters across Mercosur countries is to analyse whether and to what extent trade among members has become more intra-industry in nature compared to extra-regional flows.

To measure the degree of intra-industry trade we use the well-known Grubel-Lloyd (1975) index defined as,

$$(13) \quad IIT_{ikt}^i = 1 - \frac{|X_{jkt}^i - M_{jkt}^i|}{X_{jkt}^i + M_{jkt}^i}$$

Where IIT_{jkt}^i indicates the intra-industry index indicator for country i with trade partner j in industry k at time t . X and M are respectively country i exports to and imports from country j in industry k at time t . To obtain an aggregate IIT indicator for country i for a set of determinate countries (say, Mercosur partners) across all industries we will follow two alternative methodologies. The first one consists of just summing the corresponding sector and countries specific IIT s using total trade as weights,

$$(14) \quad IIT_{jkt}^i = \sum_{j=1}^N \frac{X_{jt}^i + M_{jt}^i}{\sum_{j=1}^m (X_{jt}^i + M_{jt}^i)} \left[\sum_{k=1}^M \frac{X_{jkt}^i + M_{jkt}^i}{\sum_{k=1}^M (X_{jkt}^i + M_{jkt}^i)} \left[1 - \frac{|X_{jkt}^i - M_{jkt}^i|}{X_{jkt}^i + M_{jkt}^i} \right] \right]$$

A second alternative suggested by Fontagne and Freudenberg (1997) (see also Nilesen and Luthje, 2002) is to classify the individual trade flows trade between two countries as being either intra-industry trade or inter-industry trade but not both. Following their suggestion we will define that trade between countries i and j in industry k is pure intra- industry when,

$$(15) \quad \frac{\text{Min}(X_{jkt}^i, M_{jkt}^i)}{\text{Max}(X_{jkt}^i, M_{jkt}^i)} \geq 0.10$$

The information to be used to calculate the *IIT* indices is that provided by INTAL/IADB data base version 4.0 which includes flows of exports and imports for all countries in America for the 1986-2001 period disaggregated at 4 digit level of the *ISIC* classification. For each Mercosur country we will compute the *IIT* measure for up to 145 industries, for all the 16 years of the sample period and for trade with each Mercosur partner and the rest of the world. This gives a potential data points of about 9,280 observations per country.

5.1.2. Descriptive Evidence

Aggregate Analysis

Tables A4.1a to A4.1d in Appendix A4 present a summary of the statistics corresponding to the distribution of the *IIT* estimates using expression (13) for Argentina, Brazil, Paraguay and Uruguay for selected years within the 1986-1999 periods.⁴⁵ Overall, we observe an increasing trend in the mean *IIT* measure across time in most countries. When we compare across economies we see that the big economies, Argentina and Brazil, have larger values for their mean *IIT* indicator especially for those corresponding to the bilateral trade with each other and with the Rest of the World. On the other hand, Uruguay and Paraguay, in particular the latter nation, have much smaller *IIT* indices, reflecting the less diversified economic structure. This is confirmed by the fact the *IIT*s are calculated over a quite different set of observations depending on the countries that are considered. In the case of the bilateral trade between Argentina and Brazil, trade flows cover a larger number of industries and this number increased in the mid-1990s compared to the mid-1980s. Thus, in 1986 bilateral trade between Argentina and Brazil covered 119 sectors, 123 in 1990, and 140 in 1998 and 2001. On the other hand, industry trade between Paraguay and Uruguay covered only 58 sectors in 1986, 66 in 1990, and 93 and 92 in 1998 and 2001.

Thus, trade has become more diversified not only within industry sectors (this is what the raise in the *IIT* for each individual industry would suggest) but also across sectors.

The value of the standard deviation and of the Min and Max indicates that there is a substantial variability in the *IIT* value across industries ranging from 0 (no intra-industry trade) to values above 0.95 indicating industries where most of trade is of intra-industry character.

The above raw estimates of *IIT* indices calculated at 4-digit level of *ISIC* can be conveniently used to obtain more aggregate measures. Thus using expression (14) we can compute an overall trade-weighted measure of *IIT* for each Mercosur country. These estimates are presented in Table A4.2. Figures 4.a to 4.d plot the *IIT* variable (on a two-years moving average basis) for Mercosur and that for the Rest of the World. We observe that some of the conclusions we arrived at before are confirmed. In particular, *the degree of intra-industry trade of Mercosur countries is significantly larger at the end of the 1990s compared to the values we find in mid-1980s*. For example, the weighted average *IIT* for Mercosur raises more than 50% for Argentina (0.288 in 1986 to 0.439 in 2001). A similar increase is observed for Brazil. For the cases of Paraguay and Uruguay the increase is even higher although they start and end at lower values. An interesting finding is that for most countries the

⁴⁵ We present the bilateral calculation for each Mercosur country. This may imply the repetition of *IIT* calculation for some of the bilateral indices. Still as exports and imports are not valued in the same way (FOB vs CIF) we would not expect to find a perfect match between, say, the Argentina-Brazil index and the reversed Brazil-Argentina indicator.

indicated raise in IIT takes place both between 1986 and 1991 and also from 1991 onwards. Nevertheless it is clear that during the 1990s we see the stronger increase in the degree of intra-industry trade for intra-Mercosur flows. A second fact is that, *in general, IIT with the Rest of the World has also gone up* (not so much in the case of Argentina). Still *the raise in IIT within Mercosur has been more important*. This could be consistent with *the surge of regional production clusters*, which are driving the increase in intra-industry trade within the region compared to third countries.

Figure 4.a.

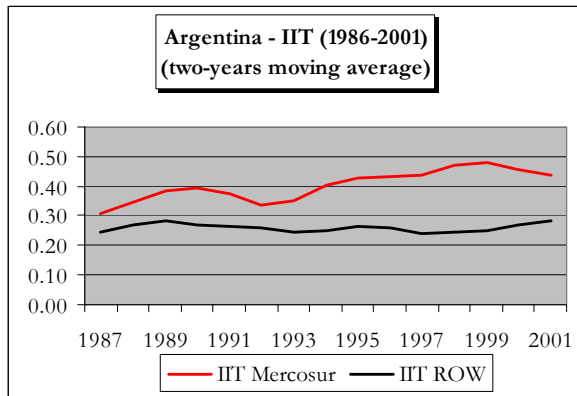


Figure 4.b.

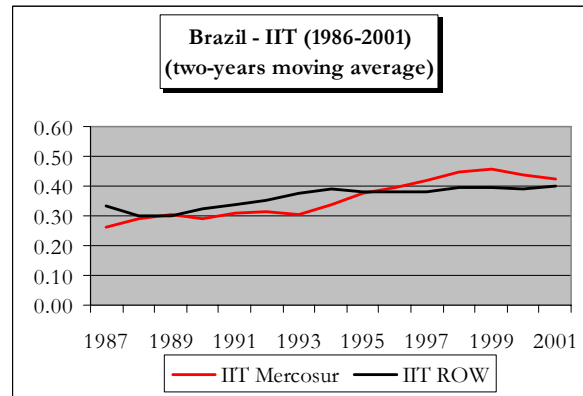


Figure 4.c.

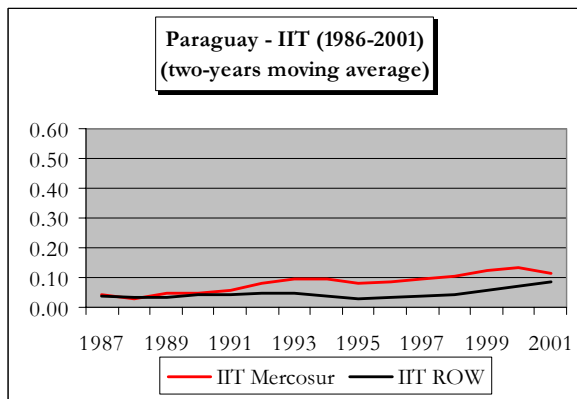
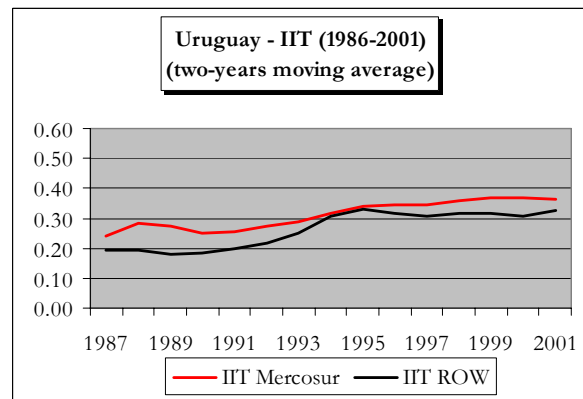


Figure 4.d.



As indicated above, in the existing literature a second alternative to classify total trade in each industry as intra-industry or inter-industry has been proposed. This is a rather discrete-type of measure separating trade flows between intra-industry and inter-industry depending on whether condition (15) is met. The Figures 5.a-5.d below plot the resulting estimates for the 4 Mercosur countries (see Tables A.4.3a-A4.3d in Appendix 4 for the actual values)

The trend followed by the participation of intra-industry trade within total trade follows a similar pattern as the one we obtain with the other methodology. In particular there is a clear positive trend during the whole period, although the raise in IIT trade seems to be more significant since the beginning of the 1990s. Also, as before, IIT with Mercosur countries is larger as compared with the rest of the world. The main difference with the other estimates is that the level of IIT (participation of intra-industry trade within total trade) seems to be quite significant using this methodology, especially for the larger countries. For example, 45% of the bilateral trade of Argentina with Brazil was intra-industry in 1986, and it reached almost 70% at the end of 1990s.

Figure 5.a

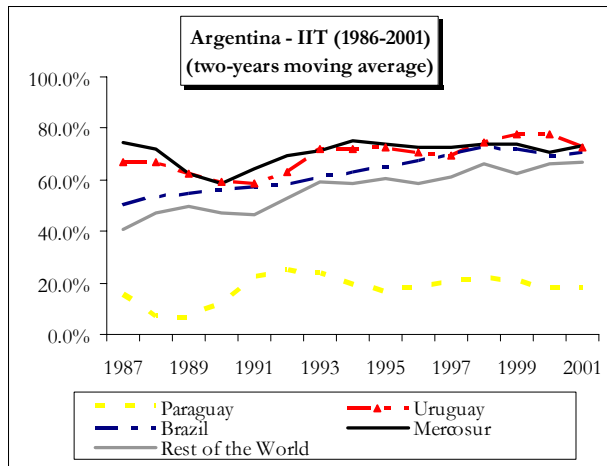


Figure 5.b

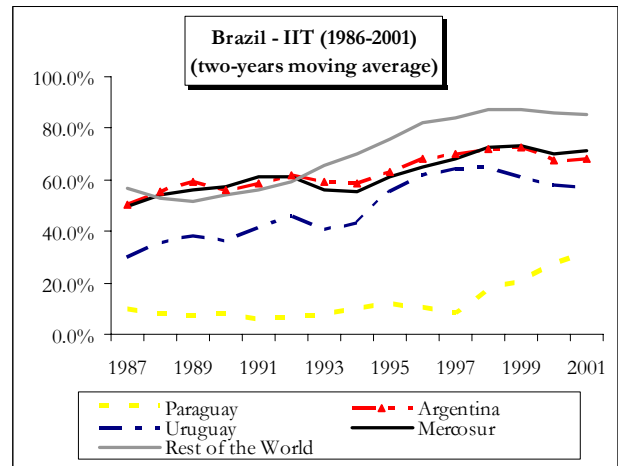


Figure 5.c

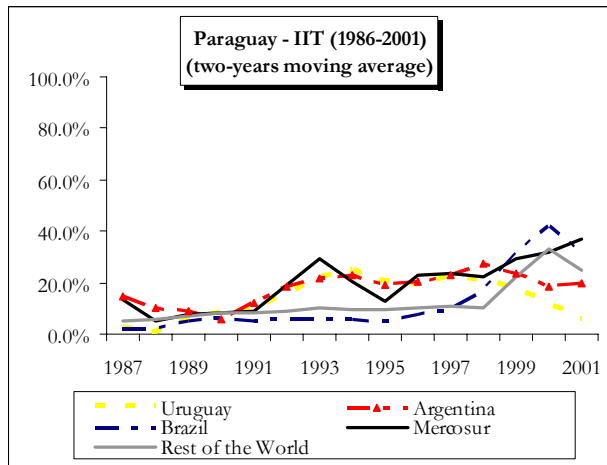
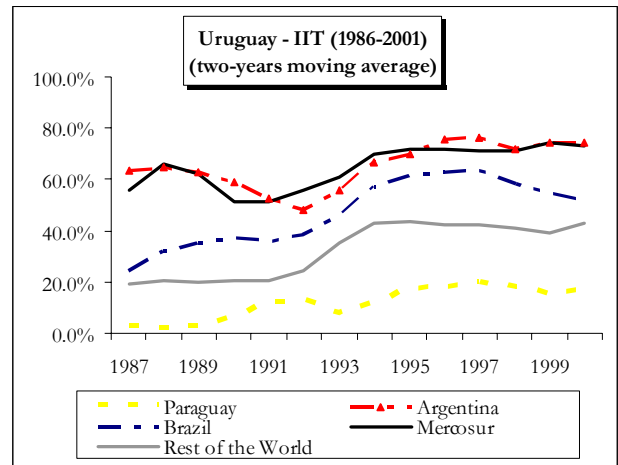


Figure 5.d



Industry-level (2-digit) Analysis

We can also use expression (14) to compute 2-digit industry aggregates with the aim of getting an easy grasp of the distribution of IIT across main industry groups (we will use the original 4-digit data in the regression analysis of the next subsection). Table A4.3a to A4.3d in Appendix 4 present the estimates of the Mercosur IIT indicators for each country across the 22 2-digit ISIC industries for some selected years. The industries are ordered in terms of the IIT index of 1998. Table 20 below summarizes the main findings. The questions we want to address with this data are the following: Which are the industries with higher IIT index in each country? Does this ordering change over time?

We see that within the top IIT sectors in 1998 Argentina and Brazil coincide in having manufacture of chemicals and chemical products; manufacture of motor vehicles; manufacture of rubber and plastic products; tanning, dressing of leather and manufacturing of luggage; and electrical machinery. Recall that, as we have seen in Section 4, both countries show relatively high and even increasing specialization in most of these sectors. Both pieces of evidence indicate the formation and expansion of cross-country production clusters in such industries. In just one sector we observe a clear discordance pattern. This is Manufacture of Wearing Apparel: it ranks 19 for Argentina in 1998 (IIT value of 0.39), while it ranked first for Brazil in the same year (IIT value of 0.98). This would suggest that no cluster seems to have been developing with the same intensity for the case of wearing apparel, at least not between Argentina and Brazil. When we

look at the data for Paraguay and Uruguay we notice that these countries coincide in having textiles as one of the top sectors in terms of IIT trade within Mercosur. As mentioned in Section 4, both countries are specialized in this sector. Something similar occurs with publishing and printing. Besides this, Uruguay similarly with Argentina and Brazil had in 1998 larger values of IIT in rubber and plastics, motor vehicles, and chemicals and chemical products.⁴⁶ Paraguay on its part have, like Argentina and Brazil, a high index of Mercosur intra-industry trade in leather and luggage, and coincides with Brazil in a high place for wearing apparel. This again would indicate some additional production complementarities among Mercosur member countries.

⁴⁶ Note that we have identified these industries as contracting sectors in Uruguay, i.e., sectors losing relative importance in Uruguayan production structure (Table 7 in Section 4). The reason could be a re-dimensioning driven by a within sectoral specialization as a consequence of the new division of labour across countries induced by economic integration. This would be especially the case of the auto-industry (and may be of some related sectors, such as rubber products), for which national regimes aiming at this specialization and administrated trade rules were in place (see Bastos Tigre, Laplane, Lugones, Porta, and Sarti, 1998).

Table 20

Mercosur: Industries with the highest IIT level. Selected years			
Country/Year	1986	1991	1998
Argentina	Tobacco; <i>motor vehicles</i> ; non-metal mineral products; rubber and plastics; machinery and equipment.	<i>Other transportation equipment</i> ; <i>Medical and instruments</i> ; <i>chemicals</i> ; <i>printing and publishing</i> ; <i>non-metal mineral products</i> .	<i>Chemicals</i> ; <i>motor vehicles</i> ; <i>rubber and plastics</i> ; electrical machinery; <i>leather and luggage</i> .
Brazil	Refined petroleum; other transportation equipment; printing and publishing; wood products; <i>motor vehicles</i> .	<i>Printing and publishing</i> ; <i>chemicals</i> ; <i>medical and optical instruments</i> ; refined petroleum; <i>other transportation equipment</i> .	Wearing apparel; <i>leather and luggages</i> ; <i>motor vehicles</i> ; <i>chemicals</i> ; <i>rubber and plastics</i> .
Paraguay	Leather and luggage; Food and beverages; <i>textiles</i> ; wearing apparel; <i>chemicals</i> .	<i>Textiles</i> ; basic metals products; food and beverages; leather and luggage; printing and publishing.	Food and beverages; <i>textiles</i> ; leather and luggage; <i>wearing apparel</i> ; furniture.
Uruguay	<i>Chemicals</i> ; <i>textiles</i> ; electrical machinery; furniture; metal products	Chemicals; <i>textiles</i> ; furniture; paper; <i>non metal mineral products</i> .	Printing and publishing; <i>textiles</i> ; <i>rubber and plastics</i> ; non-metal mineral products; paper.

How has this ordering changed over time? Table 21 (see also Tables A4.3a to A4.3d in Appendix A4) suggests that some sectors have always showed a top placement in terms of their IIT indicator. This is clearly the case of motor vehicles, rubber and plastics and chemicals in the case of Argentina and Brazil; textiles, food and leather and luggage for Paraguay, and textiles, chemicals and paper in the case of Uruguay. On the other hand, for some sectors the change in the ordering has been significant. For example, in the case of Argentina and Brazil, leather and manufacturing of luggage was not within the top sectors in 1986 and 1991 (for Argentina, it was in the 22nd and 21st place in 1986 and 1991, respectively having a very small IIT value of 0.01 y 0.10 respectively, and it jumped to 0.77 in 1998). Another industry in Argentina that experienced significant changes in its position was electrical equipment: this industry was ranked the 9th in

1986 and it went up to the 6th and 4th place in 1991 and 1998 respectively (its IIT value raised from 0.548 in 1986 to 0.87 in 1998). Paper products also went up from the 18th to the 7th place between 1986 and 1998. In the case of Brazil we have significant changes in IIT values and rankings in the case of rubber and plastics and electrical machinery. In Paraguay we observe significant changes in cases such as furniture with an IIT value of 0 in 1986, 0.01 in 1991 and 0.35 in 1998. Actually for this small country, we find that in 1986 out of the 21 ISIC industries we just six industries have positive values of the Mercosur IIT (say, above 1%), while 16 industries surpassed this threshold in 1991 and 17 in 1998). In the case of Uruguay we see large changes in IIT values and the corresponding rankings of sectors in motor vehicles, which jumped from the 11th position in 1986 and 1991 to the 6th in 1998 (the IIT value was 0.39 in 1986, 0.34 in 1991 and 0.76 in 2001) and non-metal mineral products (from 0.46 in 1986 to 0.81 in 2001).

A better appraisal of the degree of changes in the ranking of sectors in terms of IIT values can be obtained by estimating the Spearman rank correlation coefficient (see Table A4.3a to A4.3d in Appendix 4). The estimated coefficient can help us to assess how different is the structure of the industries' rankings in different years. The analysis of these correlations tells us that changes in the structure of IIT values and rankings were already present in 1991 but they continue also during 1991-1999. Actually, in the case of Argentina, Brazil and Uruguay, the most significant changes occurred in 1991-1998 (the coefficient fell more significantly during this latter period). In particular, for the larger countries the rank correlation with respect to 1986 fell to less than 0.20 indicating substantial modifications in the ranking of industries. In the case of Paraguay we find that the most important changes occurred in 1986-1991 (the correlation coefficient is about the same for 86/91 and 86/98). This is consistent with the evidence cited above regarding the raised in IIT values in Paraguay between 1986 and 1991.

It is clear that the above large changes in the rankings in some industries are related to significant increases in the IIT values. Using the information provided in Tables A4.3a to A4.3d in the Appendix 4 we construct Table 21 highlighting for each country the industries where we found the most significant increases in the IIT index for the two analyzed sub-periods: 1986-1991 and 1991-1998. Industry sectors are shown in descending order. The idea of this table is to see if the top industries change across periods and also whether there is a coincidence across countries for the same period. We see that some sectors have a very dynamic behaviour in both periods such as leather and luggage in Argentina and Brazil; basic metal in Paraguay and food and beverages in Uruguay. On the other hand, there are industries that show important increases only in the 1990s such as TV and communication equipment in Argentina and Brazil.

Table 21

Mercosur: Industries with the largest changes in the IIT index. 1986/1991 and 1991/1998		
Country/Year	1986-1991	1991-1998
Argentina	<i>Leather and luggage; wood products; printing and publishing; other transport equipment; medical and optical instruments.</i>	<i>Leather and luggage; TV and communication equipment; wood products; paper products; Furniture.</i>
Brazil	<i>Basic metals; textiles; medical and optical instruments; furniture; leather and luggage.</i>	<i>TV and communication equipment; leather and luggage; food and beverage; motor vehicles; rubber and plastics.</i>
Paraguay	<i>Basic metals; printing and publishing; textiles; chemicals; food and beverages.</i>	<i>Furniture; wearing apparel; food and beverages; basic metal products; leather and luggage; rubber and plastic.</i>
Uruguay	<i>Food and beverages; other transport equipment; non-metal mineral products; basic metal products; paper products.</i>	<i>Refined petroleum; printing and publishing; motor vehicles; food and beverages; medical and optical instruments.</i>

Finally, we compare the IIT computed for Mercosur with that with the Rest of the World. The aggregate data show that the evolution of these two indices followed different patterns. The disaggregated data provide a complementary way to look at sectoral clusters. More specifically, the comparison could suggest the formation of regional production clusters in those cases for which a significant difference in favour of Mercosur is found. In other words, a high IIT index for Mercosur relative to that of with the Rest of the World would indicate particularly higher production complementarities within the region. This information is presented in Tables A4.5a-A4.5d in Appendix A4 and summarized in Table 22. This table shows the sectors for which we found the largest values of the relative IIT, averaged over 1996-98. For example, in the case of Argentina, these are: wood; medical instruments; leather and luggage; electrical machinery; publishing and printing; television and communication equipment; motor vehicles; and machinery and equipment are sectors where intra-industry trade is strong with Brazil. Paraguay has a strong regional IIT with Argentina and Brazil in sectors such as furniture; paper, non-mineral metal products; wood, and textiles. Finally, again in accordance with the evidence from production data reported in Section 4, both smaller countries display a relatively large bilateral intra-industry trade in textiles.

Table 22

Mercosur – Industries with the largest ratio IIT Mercosur/IIT Rest of the World (Average 1996-1998)				
Intra-industry with →	Argentina	Brazil	Paraguay	Uruguay
Argentina		TV and communication equipment; medical instruments; electrical equipment; motor vehicles; machinery and equipment; food and beverages.	Textiles; leather and luggage.	Medical instruments; food and beverages; other transport equipment; office machinery; paper products.
Brazil	Wood; medical instruments; leather and luggage; electrical machinery; printing and publishing; television and communication equipment.		Food and beverages; wood products; publishing and printing.	Leather and luggage; medical instruments; refined petroleum; publishing and printing; chemicals.
Paraguay	Furniture; non-metal mineral products; paper; rubber and plastic; basic metals.	Printing and publishing; wood; furniture; textiles; paper.		Furniture; printing and publishing; rubber and plastic; basic metals; textiles.
Uruguay	Electrical machinery; motor vehicles; medical instruments; food and beverages; paper products; textiles.	Motor vehicles; medical instruments; furniture; rubber and plastics; textiles.	Textiles; refined petroleum; electrical machinery.	

Note: Sectors were also chosen taking into account the level of the IIT to Mercosur.

The above analysis suggests that there has been a significant change in the pattern of intra-industry trade in Mercosur countries during the last fifteen years or so. In general we see an increasing trend in the level of the IIT indices. However, this trend has not been similar across sectors and across countries. This amounts to the development of production clusters with varying intensity across industries. What can explain this cross-sectional diversity? In the next subsection we apply econometric techniques to uncover its determinants.

5.1.3. Determinants of Intra-industry Trade Patterns

Specification and Econometric Issues

We use as basic specification the following regression equations:

$$(16-a) \quad IIT_{ijkt} = \alpha + \beta_l X_{kt} + \gamma_m Z_{it} + nt_t + pt_t + \varepsilon_{ijkt}$$

$$(16-b) \quad IIT_{ijkt} = \alpha + \beta_l X_{kt} + \gamma_m Z_{jt} + pm_t + \varepsilon_{ijkt}$$

where:

- IIT_{jkt} is the level of intra-industry trade in country i for industry k , with the country partner j in time t ;
- X_{kt} is a set of time-varying industry characteristics including labour intensity, intensity, economies of scale, and intermediate inputs intensity; or, alternatively, a set of industry-fixed effects;
- Z_{jt} indicates a set of time-varying country specific variables including the GDP level of the partner country j and the (absolute) difference of income per capita also with partner country j ; or, alternatively, a set of country-fixed effects;

We focus essentially on the impact of regional integration on intra-industry trade patterns. Therefore, our main variables of interest are:

- nt_t is the MFN tariff in sector k at time t ;
- pt_t is the preferential tariff in sector k at time t (constructed as indicated in Section 4);
- pm_t is a combination of both trade policy measures, namely, the preferential margin in sector k at time t .⁴⁷

As in our previous econometric exercises, the dependent variable ranges only within the interval $[0,1]$. Furthermore, in this case, there are several zero observations. More specifically, they account for 11.20% of total observations in Argentina; 13.21% in Brazil; 42.36% in Paraguay; and 18.59% in Uruguay. Thus, following the empirical literature (Wang and Winters, 1991; Eichengreen and Irwin, 1995, 1997; Stein, Daude, and Levi Yeyati, 2001), we transform our dependent variable in two alternative ways. First, we add $(\min IIT/2)$ to the original IIT index and then apply the logistic transformation, from which results:

$$IIT_1 = \ln \left(\frac{IIT + \frac{\min IIT}{2}}{1 - \left(IIT + \frac{\min IIT}{2} \right)} \right)$$

Second, we add 1 to the original IIT index and the apply natural logarithm resulting:

$$IIT_2 = \ln(1 + IIT).$$

On the other hand, we have encountered serious difficulties to obtain comparable data on firm characteristics for the four Mercosur countries defined at the same level of aggregation and covering the whole period of analysis. We were able to find these data for Brazil. These data were

⁴⁷ The preferential margin is calculated as $pm = \frac{(1 + nt)}{(1 + pt)}$

already used in section 4⁴⁸. As we indicated in that section, the Brazilian information is available on annual basis since the mid-1980s and can be easily mapped into the 3-digit of ISIC Revision 2. Thus we use the Brazilian industry characteristic covering the 1986-1998 period for all countries and we run the regression transforming our original IIT' indices from 4-digit ISIC Revision 3 to 3 digit ISIC Revision 2.

Finally, as before, we have estimated the models with White-corrected standard errors (White, 1980) and panel-corrected standard errors (Beck and Katz, 1996).

Results

We run various versions of the specification described by equation (16) depending of how we transform the explanatory variable IIT (to avoid losing observation when we have zeros) and which of the explanatory variables we include. All the details of the regressions are presented in Tables A4.6a-A4.6d in appendix A4. Table 23 below summarizes the results. In each table we describe the results with two alternative transformation of the dependent variable (IIT1 and IIT2) and with two alternative specifications for the explanatory variables. In the first row we summarize the results that we have obtained for each country when we use both the external MFN tariff and the internal Mercosur tariffs on the right hand side of the regression, controlling for time-varying industry and country characteristics or industry and country fixed-effects. In second row we report the results when we combine the two tariff variables into the preferential margin and use the same sets of control variables.

We concentrate on describing the estimated effect of Mercosur trade policy on intra-industry trade and show how these estimates are robust to various changes in the estimated equation. Overall we find that, as we expected, larger tariff preferences within Mercosur has a positive effect on intra-industry trade. In the case of first table this is confirmed by the positive and significant sign obtained for the MFN tariff, while at the same time we obtain a negative sign for the internal (preferential) Mercosur duty. In the case of second table, we see that for most countries we observe a positive and significant relationship between preferential margin and intra-industry trade. Only in the case of Uruguay the results do not adjust to expectations as we obtain the inverse sign in one specification and no effect in the other (when we use country and industry characteristic dummies).

⁴⁸ We also obtained some data for Argentina defined at 4-digit of ISIC rev 3. Nevertheless, they were only available for some selected years during the 1990s. Therefore, we decided not to use these data for the regression analysis.

Table 23

Regional integration and intra-industry trade patterns (MFN and preferential tariffs)					
Country	Variable	ITT ₁		ITT ₁	
		Country characteristics Industry characteristics	Country dummies Industry dummies	Country characteristics Industry characteristics	Country dummies Industry dummies
Argentina	MFN Tariffs	+	0	+	0
	Preferential Tariffs	-	-	-	-
Brazil	MFN Tariffs	+	+	+	+
	Preferential Tariffs	-	-	-	-
Paraguay	MFN Tariffs	0	+	0	0
	Preferential Tariffs	-	-	0	-
Uruguay	MFN Tariffs	-	-	-	-
	Preferential Tariffs	+	+	+	+

Notes: $ITT_1 = \text{logistic}(IITC)$, with $IITC = IIT + (\min(IIT/2))$; $ITT_2 = \ln(IIT+1)$

Country and industry characteristics vary over time.

The sign is positive or negative if the effect is significant at least at 10% level

Regional integration and intra-industry trade patterns (Preferential margins)					
Country	Variable	ITT ₁		ITT ₁	
		Country characteristics Industry characteristics	Country dummies Industry dummies	Country characteristics Industry characteristics	Country dummies Industry dummies
Argentina	Preferential Margin	+	+	+	+
Brazil	Preferential Margin	+	+	+	+
Paraguay	Preferential Margin	+	+	0	+
Uruguay	Preferential Margin	-	0	-	0

Notes: $ITT_1 = \text{logistic}(IITC)$, with $IITC = IIT + (\min(IIT/2))$; $ITT_2 = \ln(IIT+1)$

Country and industry characteristics vary over time.

The sign is positive or negative if the effect is significant at least at 10% level

5.2. Descriptive Evidence on Economic Activities in Border Regions

The previous sections have analyzed descriptively and econometrically production and trade patterns at the country level. Now we want to focus on the regional developments. We should stress in this respect that explaining the distribution of economic activities at the regional level using econometric tools, as in Sub-section 4.4., is not feasible, because the relevant data is not available for all countries. Specifically, there are no disaggregate manufacturing data at the sub-national level for Uruguay and Paraguay, whereas only for 1985 and 1993 in the case of Argentina. Brazil is the only country for which sectoral employment data is available at the state level. An empirical study using these data has shown that locational patterns respond to the matching of industry and region characteristics, as we have found at the country level. Further, economic integration seems to have had an impact on the spatial distribution of manufacturing activity in Brazil. In particular, those industries trading relatively more have tended to move southwards, i.e., closer to Argentina (Volpe Martincus, 2003). We believe that, in general, these results are also valid for the regional spread of economic activities in the remaining countries. In fact, as we will see, productions settled in border regions are precisely those we would expect from the “comparative advantages” they have (land, climate, geography, etc).

Keeping this in mind, our aim, in this case, is much more modest. In sub-section 5.1. we have examined cross-country production clusters looking at intra-industry trade statistics. In this sub-section we complement this analysis by looking at the structure and evolution of production patterns in the border regions of Mercosur member countries. Therefore, we want to determine whether the phenomenon of clusters has a specific regional dimension. More precisely, we attempt to establish whether there exist similarities and/or complementarities along the production chain (e.g., firms in one region are specialized in intermediate products and firms in a neighbour region are specialized in final products) in border zones, which might be associated with the potential presence of clusters. To accomplish this objective, we first identify the regions included in each bilateral border area (see Table A5.1 in Appendix A5).⁴⁹ Second, we present descriptive evidence on agricultural and manufacturing production/employment and trade in each of these border regions and, when possible, we report indices measuring absolute and relative specialization (see Table A5.2 and Tables A5.3 in Appendix A5).⁵⁰ Thus, we provide a static picture of production and trade structures and, when data are available, some insights about their evolution over time.

5.2.1. Paraguay-Brazil

The border region between Paraguay and Brazil is formed by the departments Alto Paraguay, Concepción, Canindeyú, and Amambay on the Paraguayan side; and the state Mato Grosso do Sul on the Brazilian side. In general, this region is inhospitable and does not have a good communication system.

On the side of Paraguay we find different kind of crops, especially yerba mate, coffee, tobacco, cotton, sweet potato, habilla, locote, soy, tartago, and banana. The regional production of these crops accounts for large shares of national production, in most cases above 40%. In summary, this region is an important agricultural producer. Farming of animals concentrates on Concepción, which can be seen as a middle size producer. The only one frigorific on the

⁴⁹ We identify a specific bilateral border region between each small country and Argentina and Brazil and a trilateral one. Thus, the bilateral border region between the large countries is subsumed in the trilateral ones.

⁵⁰ Due to data availability reasons, we had to use different measurement units for different activities/countries (i.e., employment, production, cultivated area, etc).

Paraguayan side of the border region is settled in this department. Moreover, other activities locate there, such as ceramics, cal, concrete industry, mining, and a small leather industry, which in 1997 was formed by 42 tanning plants (BCP, 2000).

Mato Grosso do Sul, on the Brazilian side, is a more dynamic region. Agriculture and farming of animal have accounted, on average, for 25% of state's GDP during the 1990s. This state is one the most important producers of cattle and their derivatives. In particular, it accounts for 13% of total production of cattle. Even though Mato Grosso do Sul exhibits low absolute specialization in temporary and permanent crops, it is highly specialized in relative terms, i.e., with respect to the country as a whole, in yerba mate, mango, and banana among permanent crops and cotton and soy bean among temporary crops.⁵¹ In particular, more than 8% of Brazilian production of cotton and soy bean comes from this state. Manufacturing has accounted, on average, for 15% of state's GDP over the 1990s. This share has tended to increase over the first half of this decade. Within this sector, Mato Grosso do Sul is relatively specialized in wood products, food products, beverages, and, to a less extent, in non-metallic minerals, printing and publishing, and leather and hides. There have been some interesting changes in manufacturing specialization patterns over the last decade. More specifically, relative specialization in food products, beverages, and leather and hides has increased, while relative specialization in non-metallic minerals, wood, and printing and publishing has decreased. Note, further, that this state was initially relatively specialized in chemicals, but, the index fell below one by the mid-1990s indicating a relative de-specialization in this sector.

There might be some complementarities in leather production. Products are, in general, semi-finished in Paraguay and Brazil has several plants elaborating final products. Supportive evidence in this respect comes from the previous section. Recall that, as we reported in Table 20, Brazil and Paraguay have a high level of intra-industry trade within Mercosur in this sector. In the case of cotton, Paraguayan departments have an important production, while there is a concentration of clearing plants in Mato Grosso do Sul. This is also consistent with the high IIT indices found in textiles and wearing apparel for Paraguay and in wearing apparel for Brazil. Similarly, Concepción hosts production of cattle and only one frigorific, whereas there is a concentration of frigorific plants in Mato Grosso do Sul. As previously seen, the food sector has a relatively high IIT index in the countries under consideration. Further, available data at the regional level indicate that the Paraguayan share in total imports by Mato Grosso do Sul grew substantially during the second part of the 1990s and at the same time point to a marked increase in the share of live animals. This tends to confirm the existence of production complementarities. Finally, notice that soy is cultivated on both side of the border.

5.2.2. Paraguay-Brazil-Argentina

This region is formed by the Argentinean provinces Misiones and Corrientes; the Paraguayan departments Itapúa and Alto Paraná; and the Brazilian states Paraná, Río Grande do Sul, and Santa Catarina.

Misiones and Corrientes are highly specialized in industrial crops, both in absolute and relative terms. The relative specialization index reaches 16.6 for Misiones and 2.6 for Corrientes. In the case of Misiones, more than 30% of the total area is devoted to these crops. This area has increased 5% from 1988 to 2002, while reduced in all remaining provinces including Corrientes (Argentinean National Agricultural Census, 1988, 2002).⁵² Absolute and relative specialization in farming of animals is low in Corrientes. This activity has contracted over the 1990s, as the number of heads decreased in all groups of animals. In turn, Misiones has a high relative

⁵¹ The capacity to extract cotton has increased in the recent years (BCP, 2000).

⁵² This is not the case of Corrientes, where the area devoted to industrial cultivates such as oleaginous decreased.

specialization in pigs. With respect to manufacturing activities, both provinces exhibit high relative specialization in tobacco products and, to a less extent, in food products and beverages. Misiones is also relatively specialized in paper and wood products, which is consistent with its orientation towards forestry activities (BCP, 2000). From a dynamic point of view, the larger increase in relative specialization between the mid-1980s and the mid-1990s corresponds to textiles (from 1 to 4.3) in the case of Corrientes and tobacco (from 0.3 to 13.6), paper, and wood in the case of Misiones. Thus, this last province has deepened its specialization pattern over this period.

The region Itapúa-Alto Paraná is the principal producer of temporary and permanent crops in Paraguay. This region's shares exceed 40% in seven temporary crops (carrot, wheat, soy, mint, sunflower, irrigated rice, and garlic) and five permanent crops (orange, yerba mate, tung, grape, and mandarin). In particular, Itapúa has the highest absolute specialization in both crops. Furthermore, several crops exhibit relative specialization indices above one in both departments. Moreover, Itapúa and Alto Paraná have a high absolute specialization in animals. Their share in national production reaches 33% in the case of pigs. Finally, with respect to manufacturing activity, we can mention that two new frigoríficos were installed recently; one of them processes only pork. In addition, there are two oil firms, some plants producing fruits and beverages, and one starch enterprise (BCP, 2000).

Paraná, Santa Catarina, and Rio Grande do Sul form the South Region of Brazil. Agriculture and farming of animals have accounted, on average, for 15%, 12%, and 13% of the respective state's GDP over the 1990s. These shares have remained essentially stable over this period. Paraná is one of the most important producers of temporary crops. Specifically, the share of this state exceeds 20% in eight out of thirteen temporary crops. Accordingly, it has a high absolute specialization in their production. Rio Grande do Sul is also a relevant producer of these crops. Regarding permanent crops, the three states display high relative specialization in yerba mate. Furthermore, relative specialization is high in tobacco for Paraná and Santa Catarina and in grape for Rio Grande do Sul. In particular, this last state accounts for 60% and 86% of national production of yerba mate and grape, respectively. Moreover, these states have a joint share of 45% in poultry and show high relative specialization in those animals. Over the 1990s, industrial activities have accounted, on average, for 18%, 34%, and 28% of state's GDP in Paraná, Santa Catarina, and Rio Grande do Sul, respectively. These shares have tended to decrease over the aforementioned period. States in the Brazilian South Region jointly account for large shares of national employment in leather and hides, wood, tobacco, furniture, wearing apparel and footwear, paper, and mechanics. There are similarities and differences in manufacturing specialization patterns across these states. In general, they are relatively specialized in furniture. Paraná is also relatively specialized in wood, paper, and, to a less extent, in non-metallic minerals, leather and hides, food products, and tobacco. Santa Catarina is relatively specialized in wood and textiles, and, to a less extent, in non-metallic minerals, mechanics, paper, plastics, and wearing apparel and footwear. Rio Grande do Sul is relatively specialized in leather and hides, wearing apparel and footwear, and tobacco, and, to a less extent, in mechanics and rubber products. In general, sectors in which states had initially high relative specialization display declining indices over time. This implies a lower disparity in production structures with respect to the country as a whole.

The previous description allows us to infer a certain pattern of comparative advantage across borders. First, Itapúa and Alto Paraná in Paraguay are relatively specialized in pigs and temporary crops. Misiones and Corrientes in Argentina are relatively specialized in industrial crops and tobacco manufacturing activities and, particularly Misiones, in wood and paper products. Finally, Brazilian states, like Paraguayan departments, are relatively specialized in temporary crops, but they exhibit a larger and more diversified manufacturing activity including leather and hides, tobacco, furniture, and wood and paper products..

In this case, there might be also some complementarities and synergetic effects. First, there are significant productivity differences in the wood sector across countries, which might lead to a certain distribution of labour along the production chain. The relatively high IIT indices found in this sector for Brazil and Paraguay (Table 22) and the high increase detected for Argentina (Table 16) tend to support this hypothesis. At the regional level, we note that wood products have gained significance in Parana's export structure, from 4.1% in 1991 to 8% in 1998 and 12% in 2000, and that of Rio Grande do Sul, from 1% in 1991 to 3% in 1998 and 4.1% in 2000. Not surprisingly, closely related industries are also involved. Misiones and the states in the South Region of Brazil are important producers of paper and the region needs paper for packaging, especially for yerba mate. Again, recall that paper products appear as a sector with a relatively high IIT index for Paraguay (Table 22) and with a significant increase within the region for Argentina (Table 16). In the same direction, we observe that paper pulp is the most important export product in Misiones. It accounted for 40% total provincial exports in 1998. Further, Brazil has absorbed an increasing share due to the lower transport costs (Ministerio del Interior de Argentina, 1999). Similar conclusions also apply to furniture and printing and publishing. (Tables 21 and 22).

Second, this region is the most productive producer of yerba mate in the world.⁵³ Therefore, a cooperation at the regional level to operate in a coordinated way at the global level could be explored. Moreover, Misiones is relatively specialized in pigs and there is an expanding frigorific activity in the region Itapúa-Alto Paraná. Furthermore, Misiones, Itapúa, and Alto Paraná produce fruits and in Misiones and Brazil there are plants producing beverages. Complementarities in this respect tend to be corroborated by the high relative IIT index found for food products and beverages in Brazil (Table 22) as well as by the high and increasing index in Paraguay (Tables 20 and 21). Interestingly, trade data at regional level indicate consistent developments. Thus, tea and yerba mate are relevant export products in Misiones, whereas the same is true for fruits in Corrientes. Further, food products account for roughly 50% and 35% of total exports from Paraná and Rio Grande do Sul, respectively.

Third, Brazil and Paraguay have large tobacco production and Misiones and Corrientes are relatively specialized in its processing. Fourth, Misiones and Itapúa produce tung and there are four oil merchants in the region and firms producing machinery on the Brazilian side.⁵⁴ Finally, Argentinean provinces and Brazilian states produce manioc and a starch manufacturing plant is settled in Itapúa.

5.2.3. Paraguay-Argentina

The border region between Paraguay and Argentina is formed by Boquerón, Presidente Hayes, Central, Ñeembucu and Misiones on the Paraguayan side; and Chaco and Formosa on the Argentinean side.

Paraguay departments are highly specialized in sorghum. This crop has increased its relative importance in the area, especially in Presidente Hayes, where total production grew six times from 1998 to 2001. Central is specialized in tomato and strawberry with respective production shares of 20% and 50%. Misiones is an important producer of temporary crops. This department accounts for very large shares of national production of rice, sorghum, and potato. Indeed, it is highly specialized in relative terms in these crops. In particular, the relative specialization index is 28 in the case of rice and 40 in the case of potato. Farming of animals is also an important activity in this region. This region accounts for more than 50% of national production of cattle, sheep, and goats. Industrial activities in Paraguay are highly concentrated in Asunción and its

⁵³ Misiones is the most productive area.

⁵⁴ Tung is an oleaginous from which a fine oil to sensible machines can be extracted.

surrounding area. More precisely, Asunción and Central jointly account for 75% of total manufacturing establishments. The most important industries in this region are food and beverages, textiles, substances and chemical products, and wood products. In Boquerón there are several firms which repair machinery and produce different stores. The relative importance of tobacco has increased in recent years. Its share raised from 1.6% in the period 1991-1994 to 5.7% in 2002.

On the Argentinean side, Formosa is highly specialized in relative terms in industrial crops. Chaco is also relatively specialized in industrial crops and, to a less extent, in oleaginous crops. The area devoted to oleaginous crops has grown 361% in Formosa and 120% in Chaco from 1988 to 2002 (Argentinean National Agricultural Census, 1988, 2002). On the other hand, the area with industrial crops has decreased 78% in Formosa and 39% in Chaco over the same period. The reduced relative importance of the main crop amounts to a decreased overall agricultural specialization. Moreover, both provinces are relatively specialized in farming of cattle and sheep. The relative specialization has evolved differently for both kinds of animals. In particular, both provinces have become relatively more specialized in sheep and less in cattle. Overall, Formosa and Chaco are not important manufacturing producers. Only in the case of tobacco products, Chaco has some relevance. Its share increased from 4% in 1985 to 10% in 1994. Both provinces have a low absolute specialization. In relative terms, Formosa is specialized in non-metallic products, furniture, and wood products, and Chaco is specialized in textiles and wood products.

In summary, tobacco is an important activity on both sides of the border. Furthermore, there are some linkages in food processing. In particular, most exports of live animals by Formosa have Paraguay as the main destination, where they are processed and latter exported to Brazil (Ministerio del Interior de Argentina, 1999). Finally, cotton and linen are typical industrial crops in the region and there are several processing textile plants in Paraguay (and in Brazil). Trade data amount also to complementarities in the textile sector. Recall that, as reported in Table 20, Paraguay has a high IIT index for Mercosur in this sector, while Argentina, as shown in Table 22, has a high relative index (Mercosur/Rest of the World), precisely with Paraguay. Further, cotton fibres are one of the main export products for Chaco and have some relevance for Formosa.

5.2.4. Uruguay-Argentina

The border region between Uruguay and Argentina is formed by the departments Colonia, Soriano, Río Negro, and Paysandú on the Uruguayan side; and Capital Federal, Buenos Aires, and Entre Ríos on Argentina's side.

The Uruguayan side is the major agro producer in the country. This region accounts for 60% of the total area devoted to growing of crops. The four departments are relatively specialized in wheat and barley, i.e., the corresponding indices are above one. Other important crops are citrus fruits, sunflower, sorghum, and maize. The region accounts for 40%, 90%, 60%, and 60% respectively. This group of regions present also high values of absolute specialization in growing of crops. Furthermore, the region is relatively specialized in farming of cattle and pigs. In particular, Colonia is highly specialized in relative terms in pigs. Departments in this region jointly account for only 8.4% of total manufacturing production value, being Colonia and Paysandú the most important with respective shares of 4.5% and 2.5%.

Buenos Aires is absolutely and relatively specialized in cereals. With the exemption of industrial crops, this provinces accounts for more than 30% of total cultivated area. Entre Ríos is relatively specialized in cereals and oleaginous. The area devoted to the growing of these crops increased 124% and 109% from 1988 to 2002, respectively (Argentinean National Agricultural Census, 1988, 2002). Moreover, Buenos Aires and Entre Ríos are relatively specialized in farming of cattle. Buenos Aires is also absolutely specialized in these animals. This province accounts for

large shares of the national production of cattle, pigs, and sheep. Regarding the manufacturing activity, Capital Federal and Buenos Aires are the most important industrial producers in Argentina. Their combined share exceeds 50% in almost all industries. The specialization patterns of these provinces does not seem to have significantly changed from 1985 to 1993. The manufacturing production located in Entre Ríos is substantially smaller. The share of this province is relatively large only in the case of tobacco, which reaches 10% in 1993. This province is relatively specialized in tobacco and woods products and, to less extent, in food and beverages.

In this case, there might some complementarities in farming of animals, conservation and elaboration of fruits, production of animal aliments, and elaboration of spirit beverages. Entre Ríos and relevant Uruguayan departments are specialized in cereals and citrus fruits. Consistent with this, trade evidence indicates clustering in food and beverages between Argentina and Uruguay. More specifically, both countries have a high bilateral IIT index (Mercosur/Rest of the World) in this sector (Table 22). Notice also that, for Uruguay, intra-industry trade with Mercosur partners experienced an important increase in this industry over the period 1991-1998 (Table 21).

5.2.5. Uruguay-Brazil-Argentina

The border region between Uruguay, Brazil, and Argentina is formed by Salto and Artigas on the Uruguayan side; Rio Grande Do Sul on the Brazilian side; and Corrientes on the Argentinean side.

Artigas is not important in growing of crops. This departments has a low absolute specialization and has a high relative specialization in rice. Salto is important in growing of vegetables and horticultural specialties and citrus fruits. In particular, this department accounts for 45% of total national production of citrus fruits. Accordingly, it displays a high relative specialization in this product. Artigas is relatively specialized in farming of cattle and Salto is relatively specialized also in farming of cattle and pigs. Manufacturing activities are scarce in this region. These two departments jointly account for 1.5% of total national industrial production value.

As previously mentioned, Rio Grande do Sul is specialized in yerba mate, grapes in agriculture; and furniture, leather an hides, wearing apparel and footwear, and tobacco, and, to a less extent, in mechanics and rubber products among manufacturing industries. Corrientes is relatively specialized in oleaginous and industrial crops, tobacco, and food products and beverages.

There might be complementarities in food products. The same considerations made in subsection 5.2.4 apply in this case regarding supportive trade figures.

5.2.6. Uruguay-Brazil

The border region between Uruguay and Brazil is formed by the departments Rivera, Cerro Largo, and Treinta y Tres on the Uruguayan side; and Rio Grande do Sul on the Brazilian side.

Uruguayan departments are relatively specialized in horticulture and rice. They account for more than 50% of national production. Their shares are small in other crops. In addition, these departments are relatively specialized in farming of cattle. With respect to manufacturing activities, they are almost meaningless. They account for only 0.8% of total national industrial production.

Recall that, as stated before, Rio Grande do Sul is specialized in yerba mate, grapes in agriculture; and furniture, leather and hides, wearing apparel and footwear, and tobacco, and, to less extent, in mechanics and rubber products among manufacturing industries.

In this case, there might complementarities between the horticultural production in Uruguay and the food and beverage processing industry in Brazil and in the leather sector. With respect to this last sector, we have found a high and increasing IIT index in Brazil (Tables 20 and 21) and a high relative index also in this country with Uruguay (Table 22).

5.3. Implications for Smaller Countries

Uruguay and, in particular, Paraguay have aggregate intra-industry levels which are significantly lower than those of Argentina and Brazil. This mirrors the less diversified economic structure of the former countries. In general, intra-industry trade with Mercosur partners has been larger than intra-industry trade with the Rest of the World.

On average, intra-industry trade has increased over the period 1986-2001, both with Mercosur countries and, to less extent, with the Rest of the World. Sectors with the highest increases in intra-industry trade within Mercosur between 1991 and 1998 include food and beverages; refined petroleum; printing and publishing; motor vehicles; and medical and optical instruments in the case of Uruguay; and furniture; wearing apparel; food and beverages; basic metal products; leather and luggage; and rubber and plastics in the case of Paraguay.

The fact that the raise in intra-industry trade within Mercosur has been larger than with the Rest of the World might be consistent with the surge of cross-country production clusters within the bloc. Over the period 1996-1998 we have identified the following sectors with significant differences in intra-industry trade across destinations:

Table 24

<i>Paraguay and Uruguay</i>	
<i>Industries with largest ratio IIT Mercosur (at least one member)/IIT Rest of the World</i>	
Paraguay	Textiles; food and beverages; wood products; furniture; paper products; printing and publishing; rubber and plastics; basic metals; non-metallic minerals.
Uruguay	Textiles; food and beverages; refined petroleum; furniture; paper products; rubber and plastics; motor vehicles; electrical machinery; medical instruments.

The analysis of production activities in border regions suggests that in some cases the clustering may have a specific regional dimension. This study further indicates that there is scope for more intense interaction across borders.

5.4. Summary

The analysis of the importance of intra-industry trade in the bilateral trade flows of the four Mercosur countries compared to extra-regional flows enable us to uncover the extent of production clusters across these four countries. We find that, over the period 1986-1999, the average intra-industry trade measure increased in most countries. Argentina and Brazil had a relatively higher average intra-industry trade index, both with respect to their bilateral trade flows and trade with the Rest of the World. Uruguay and Paraguay had lower average intra-industry trade, as expected given their less diversified economic structure. Our results suggest that trade has become more diversified both within and across industries. The degree of intra-industry trade was significant higher at the end of the 1990s in comparison to mid 1980s. The increase in the intra-industry trade was higher in the case of the bilateral trade flows among the Mercosur

countries compared to their trade with the Rest of the World suggesting the formation of regional production clusters.

Matching high intra-industry trade indices within Mercosur was registered by 1998 in the following sectors: a) in the cases of Argentina and Brazil chemicals; motor vehicles; rubber and plastics; leather and luggage; b) in the case of Brazil wearing apparel; leather and luggage ; c) in the case of Paraguay: textiles; food and beverages; leather and luggage; wearing apparel; and furniture; d) in the case of Uruguay printing and publishing; textiles; rubber and plastics; and paper products. High and increasing sectoral intra-industry trade within Mercosur relative to intra-industry trade with the Rest of the World might suggest the formation of production clusters within the bloc. From the point of view of small countries, this is the case, for example, of paper products; furniture; printing and publishing; and textiles in Paraguay; and motor vehicles; medical and optical instruments and also textiles in Uruguay.

Using econometric techniques, we uncovered the estimated effect of the Mercosur trade policy on intra-industry trade. We find that, overall, as expected, larger tariff preferences within Mercosur have a positive effect on intra-industry trade. This result is supported by the positive and significant sign obtained for the MFN tariff, while at the same time we obtain a negative sign for the internal (preferential) Mercosur duty. Furthermore, except Uruguay, we find a positive and significant relationship between the preferential tariff margin and intra-industry trade. In the case of Uruguay, our estimation results uncover a negative relationship between preferential tariffs and intra-industry trade or no effect.

Our analysis of production structures in regions situated along borders between the Mercosur countries suggests that clustering may have a specific regional dimension. In particular, this study shows the existence of production complementarities in border regions, mainly in agricultural products and food processing industries. A few examples illustrate this finding: a) leather products, cotton, and meat products in the case of the regions along the border between Paraguay and Brazil; b) wood products, paper, tobacco; and food processing in the case of the regions situated along the border between Paraguay, Brazil, and Argentina; c) tobacco, textiles, and food processing in the cases of regions situated along the border between Paraguay and Argentina; d) agricultural products and food processing in the case of regions situated along the border between Uruguay and Argentina; e) tobacco, agricultural products, and food processing, in the cases of regions situated along the border between Uruguay, Brazil and Argentina; f) agricultural products, food processing, and leather in the cases of regions situated along the border between Uruguay and Brazil.

6. Lessons and Implications for Further Integration

What are the implications that the evidence on the patterns and determinants of industry specialization and concentration across Mercosur countries has for pursuing further integration in the region? Have integration implied a strong bias in terms of favouring specific sectors and countries (and regions within countries)? Have these trends affected specially the small economies? What this implies for Mercosur internal and external agenda regarding integration policies? In this section we want to address these questions with the aim of deriving some policy implications.

6.1. Impact of integration on location of economic activity within the expanded market and its effect on the small countries

We have documented that during 1971-1998 there has been significant changes in the production structures in the four Mercosur countries. In Argentina and Brazil the expanding industries include capital and scale intensive industries such as transport equipment, iron and steel (Argentina and Brazil), industrial chemicals, electrical machinery (Brazil), while labour intensive industries such as textiles, footwear and wearing apparel (Brazil) declined. In Paraguay and Uruguay the expanding sectors included industries closely related to natural resources-based advantage of the countries (wood products, beverages, food products, and leather products in Paraguay; petroleum refineries, food products, tobacco, in Uruguay). In these two small countries capital and scale intensive industries such as transport equipment, industrial chemicals (Uruguay), non-electrical machinery (Paraguay) declined.

On the basis of the industry characteristic biases of countries and the correlations between the relative size of industries within countries and industry characteristics we find that Argentina and Brazil has specialized in industries with increasing returns to scale, high skills intensive, and high total and industrial intermediate inputs intensity. In addition, Brazil has specialized in industries with high labour intensity. On the other hand, Paraguay and Uruguay has specialized in industries intensive in agricultural inputs, high final demand bias and high transport intensity. In addition since the early 1990s, in Uruguay and Paraguay, sectors with high degree of scale economics and high intensity in intermediate inputs are losing share in total Mercosur manufacturing.

These last results are consistent with the evidence coming from the regression analysis which shows that relative labour abundance, and total and own industrial intermediate input intensity have become more significant determinants of industrial location in recent years. More directly related to the impact of Mercosur, these factors have played a stronger role in those sectors where tariff preferences were more important. Thus, it is not surprising we find preliminary evidence that Mercosur tariff preferences are at the same time associated with a lower level of relative specialization of countries and also with a higher level of relative concentration of industries. What is happening is that Mercosur internal trade liberalization has helped countries to foster production in new products making their production structures more similar, especially in the case of Argentina and Brazil. At the same time, to gain from agglomeration economies, production of these “new goods”, is more geographically concentrated the lower are the internal tariffs.

Did this process imply a significant bias against industrial development in the smaller economies (Paraguay and Uruguay) as compared to the larger countries (Argentina and Brazil)? Not necessarily. Both production and intra-industry trade data suggest the formation of production cluster across countries and that in part this clustering has been fostered by internal tariff

liberalization as suggested by the positive association between intra-industry trade and tariff preferences. Cross country production clusters have been identified in activities such as motor vehicles; other transportation equipment; TV and communication equipment; electrical machinery; leather and luggage; wood; furniture; paper products; textiles; and food and beverages. Some of these clusters are quite relevant for the small economies (such as leather; textiles; wood; and furniture for Paraguay; and textiles, food and beverage, paper; and motor vehicles for Uruguay).

Moreover, in the last section we showed that some of these clusters have a regional dimension as they are localized in frontier regions. This could potentially constitute a positive factor helping to develop frontier economies, usually located far away from the political and economic centres of the countries (of course this is not the case with the Rio de La Plata region frontier between Argentina and Uruguay).

6.2 Deepening of integration within Mercosur

The question that now arises is how this positive trend of production complementarities and cluster formation across economies can be further encouraged within Mercosur. The key issue is to facilitate the flow of merchandises and factor of production across borders so as to make joint production more efficient. For this, and also to take advantage of the larger domestic market, Mercosur has still a way to go in two specific areas: a) completely eliminate internal trade barriers; and b) improve the physical integration between the countries. We discuss each of these issues next.

6.2.1. Remaining intra-Mercosur trade barriers

Most intra-Merocur tariffs are already close to zero. The remaining barriers are non-tariff restrictions, namely antidumping measures (AD) and regulations associated with technical and fitosanitary issues. In addition there are two sectors that have been excluded all together from Mercosur internal liberalization: Autos and Sugar.

In the case of antidumping measures, their incidence over total imports within the region is low, but this is not the case when we focus in some specific sectors. For example, there is a big concentration of cases affecting imports of basic steel products (hot and cold rolled steel plates) of Argentina from Brasil.⁵⁵ One potential solution to this problem could be to resort to harmonize anti-trust regulations across Mercosur countries and eliminate the use of intra-Mercosur ADs altogether. If this is not possible, then it might be useful to re-negotiate a regional Safeguards codes and eliminate the use of ADs as well. The advantage of reviving the use of safeguard duties that are consistent with WTO standards is that the duties must be temporary and the executive branch of the government must make the final policy decision. This mechanism is more transparent than the use of ADs because the final decision is recognized to be a political one, rather than pretending that it is supported by pseudo-technical criteria.

Another important issue to assure the effective free circulation of goods within the extended market is the mutual approval of sanitary and technical standards issued by each member country. Within Mercosur these standards are certificated by national agencies, which are not recognized as equivalent by the other partners. Thus in many instances a double (or tripled) certification is required. This clearly implies inefficiencies, by increasing the transaction costs within the extended market. There are ongoing negotiations to solve this through horizontal

⁵⁵ These actions not only affect imports from Brazil but also from most other third country origins (CNCE 2002).

cooperation between the national agencies. Still a long-term solution could be to merge the national authorities and created Mercosur- level independent agencies. This could be especially important in the case of vegetal and animal sanitary certifications. This is an area where enforcement of national and international standards has been poor by Mercosur countries (e.g. the problem with foot and mouth disease). A regional agency, by pooling resources and be more independent from national political pressures may be more efficient in pursuing this matter.

Besides this, the harmonization and certification of sanitary and technical requirements, in Mercosur there are two conspicuous sectors where Mercosur discipline has not been imposed, namely sugar and motor vehicle. An ad-hoc group for sugar and a technical committee for autos were created to work towards consensus final solution. In the interim, trade in these products has been subjected to a very complicated set of rules and restrictions. Argentina maintained tariffs and quotas on sugar imports from its Mercosur partners. For autos, a managed trade arrangement was in place during most of the nineties. It featured local content requirements, preferential entry of auto-parts, and a bilateral trade balance requirement. As we see from the evidence reported in Section 5 this system did not apparently impede trade flows among Mercosur partners, especially between Argentina and Brazil. In fact we have identified a strong IIT index for this industry. The question is whether this evolution could have been even more favorable in case of a more liberal regime had been in place⁵⁶. What is important for localization decisions within the extended market is that, given initial advantages in terms of factor endowments and market size, preferential access to the larger markets of the region (i.e Brazil) should be warranted. This objective can be better achieved by a simpler regime that gives less room for discretionary changes of market access regulations. In the long run it might be useful to subject both the sugar and the auto sectors to the discipline of a reduced CET.

6.2.2. Strengthening physical integration

Trade cost not only depend on trade-policy-induced-barriers, but also on transport and other cost associated to the utilization of the infrastructure of communication that links the economies that are integrated. In this respect, the “new trade theory” and the “economic geography” approaches have highlighted this factor as an important determinant of production localization and of trade. In the last section, we have indicated that in border regions, coinciding with the localization of some key input of production, some industry cluster has started to emerge. At the same time it was indicated that in some of this localizations the infrastructure connecting the bordering countries and also that linking the border with the main centers in each country is not well developed. This factor reduces the efficiency of these places as production locations acting as a wedge or tax on the profitability of investment. Moreover, the theoretical models presented in section 2 have emphasized that concentration of economic activities (across countries and within countries) could arise as a consequence of a process of trade liberalization and integration if this policies are not accompanied by the require investment in infrastructure that can reduce transport cost to near-by partner’s markets. In addition the idea of investing in infrastructure in border regions is important as to take advantage of the possible backward and forward linkages that can be encouraged given the already existing production facilities (in manufactures as well as in basic inputs and materials) in these areas.

⁵⁶ It is difficult to evaluate this counterfactual scenario. In fact the justification for the establishment of the indicated restrictions was the fear that under free trade the industry would concentrate in the large country, i.e., Brazil. Still the evidence presented in this document suggest that the fears of increasing concentration were disproportionate There were other capital intensive sectors, where production was subject to economies of scale that were nor subject to special regimes and did not show a dramatic increase in concentration .

6.3. Pursuing Trade Agreements with Nafta, European Union and with the Andean Community: the implication for IIT trade

Whereas most of the gains from import liberalization can be attained either through unilateral or Mercosur actions, on the export side there could be substantial economic gains for these countries if they pursue market access negotiations with third nations. The experience of the 1990s showed that many Latin American economies liberalized their trade regimes but this process was not always accompanied by improvements in export behavior. For example, Sturzenegger, Nogués, and Sanguinetti (2001) showed that while Argentina exports with Mercosur partners were dynamic, those to the U.S. and the E.U. did not increased as much. These authors find that this is partially related to the presence of trade barriers in these countries, especially in agriculture and food products where Argentina and Mercosur nations have a strong comparative advantage (Sanguinetti and Bianchi, 2002).

The key question we want to address in this section is whether FTAs can be an efficient instrument for solving this market access problem. In particular, what are the implications of these FTAs agreements for intra-industry trade flows and the surge of potential cross-country production clusters now with extra Mercosur nations? What are the sectors in which country could benefit the most in this respect?

Figures 6a-6.d show the evolution of aggregate intra-industry trade for each Mercosur member with NAFTA (USA), the European Union and the Andean Pact countries.

Figure 6.a.

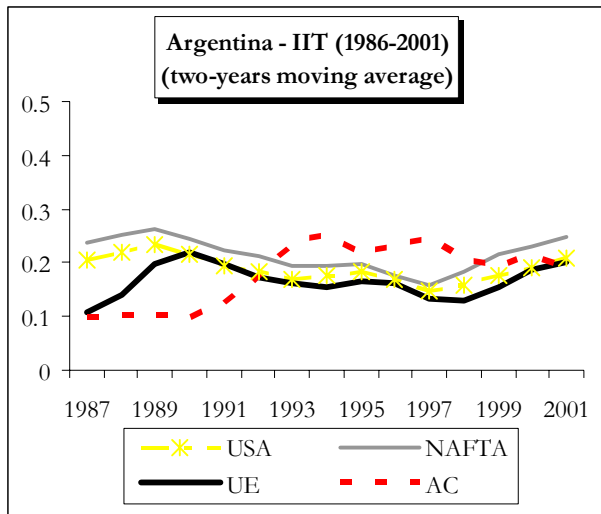


Figure 6.b.

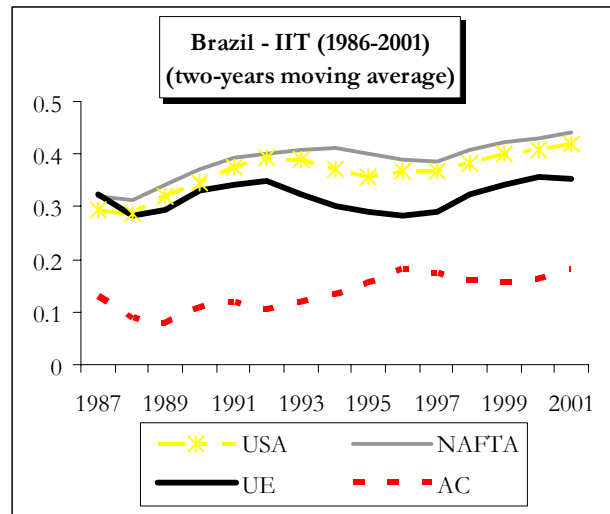


Figure 6.c.

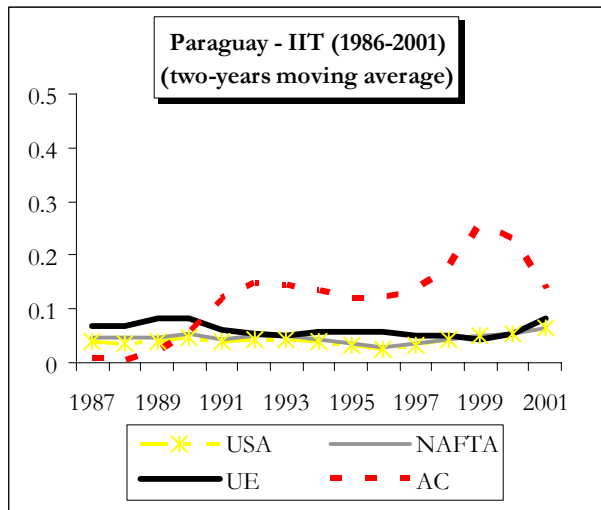
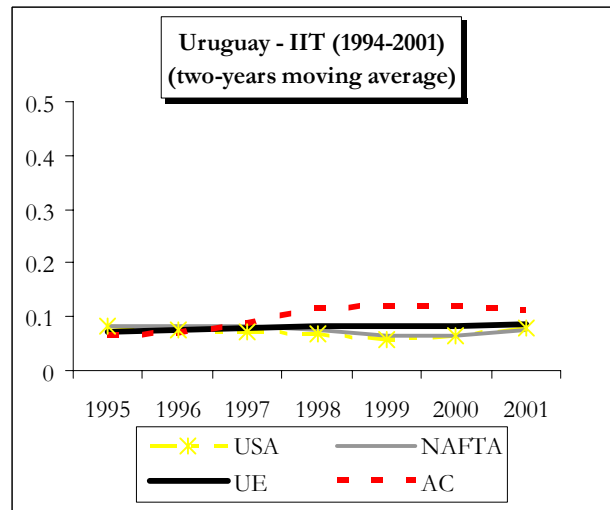


Figure 6.d.



Comparing the above Figures with those presented in section 5.1, we clearly see that trade within Mercosur is more intra-industry in nature than that with the other two major trading partners of Mercosur countries: NAFTA and the EU. This is specially the case with Argentina, Paraguay and Uruguay and to a lesser extent with Brazil, which shows a relative high level of IIT trade with the NAFTA countries. In this regard Argentina and Brazil show a higher IIT indicator with NAFTA (and USA) as compared to the EU. In the case of Paraguay and Uruguay the pattern is not clear though in the inverse ordering seems to prevail in Paraguay during most of the period and in Uruguay in the late 1990s.

From the above evidence we can preliminary conclude that, in terms of fostering IIT trade, the country that could benefit the most from an FTA with NAFTA and the UE is Brazil with Argentina in second place. Uruguay and Paraguay show very low levels of IIT with these destinations (well below 0.10). Regarding the Andean Community, we see that Brazil shows a very low level of IIT trade as compared with NAFTA and the EU, while exactly the inverse picture arises in the case of Paraguay and Uruguay (since 1996). In the case of Argentina the pattern is less clear though IIT trade with these nations has raised considerably in the first half of the 1990s, while decline in the second half. What is clear is that in terms of fostering IIT trade

the smaller countries of Mercosur have much more to gain from a FTA agreement with the Andean Community.

Beyond the aggregate picture, it could be interesting to know, in each country, which are the sectors with potential for increasing IIT and thus production complementarities as a result of these agreements. For answering this question we provide two pieces of evidence: we present the top 5 sectors with the largest IIT index during 1996-98 in Table 25 and we report the prevailing average tariff rates by importer country/bloc and chapter of the HS in Table 26.

Table 25

Mercosur – Industries with the largest IIT index (Average 1996-1998)				
Intra-industry with →	NAFTA	USA	EU	Andean Community
Argentina	Furniture; <i>iron and steel</i> ; wood products; petroleum refineries; <i>tobacco</i> .	Furniture; <i>iron and steel</i> ; wood products; petroleum refineries; <i>tobacco</i> .	<i>Iron and steel</i> ; wearing apparel; <i>textiles</i> ; <i>tobacco</i> ; petroleum refineries.	Furniture; printing and publishing; <i>textiles</i> ; fabricated metal products; rubber products.
Brazil	Furniture; <i>tobacco</i> ; motor vehicles; other non-metallic mineral products; <i>textiles</i> .	Paper products; furniture; <i>tobacco</i> ; other transport equipment; <i>textiles</i> .	<i>Textiles</i> ; other non-metallic mineral products; furniture; <i>wearing apparel</i> ; other transport equipment.	<i>Food and beverages</i> ; <i>wearing apparel</i> ; other non-metallic mineral products; <i>iron and steel</i> ; other chemical products.
Paraguay	<i>Food and beverages</i> ; <i>iron and steel</i> ; <i>wearing apparel</i> ; <i>footwear</i> ; other chemical products.	<i>Food and beverages</i> ; <i>iron and steel</i> ; <i>wearing apparel</i> ; <i>footwear</i> ; other chemical products	<i>Textiles</i> ; <i>food and beverages</i> ; other chemical products; <i>wearing apparel</i> ; <i>footwear</i> .	Other chemical products; <i>textiles</i> ; motor vehicles; furniture; paper products.
Uruguay	Other non-metallic mineral products; <i>textiles</i> ; wood products; <i>wearing apparel</i> ; <i>iron and steel</i> .	Other non-metallic mineral products; <i>textiles</i> ; wood products; <i>iron and steel</i> ; <i>wearing apparel</i> .	<i>Iron and steel</i> ; wood products; <i>textiles</i> ; other non-metallic mineral products; <i>food and beverages</i> .	Medical and optical instruments; <i>wearing apparel</i> ; other chemical products; machinery and equipment, n.e.c.; rubber products.

Table 26

Chapters of the Harmonized System		Tariffs								
		NAFTA			UE	Andean Community				
		USA	Mexico	Canada		Bolivia	Colombia	Ecuador	Peru	Venezuela
I	Live animals; Animal products	6.3	40.9	2.0	25.5	9.7	17.0	16.8	17.2	17.0
II	Vegetable products	5.3	18.8	2.4	13.5	10.0	12.9	12.5	16.9	13.0
III	Animal or vegetable fats and oils	3.5	21.4	4.8	12.8	9.4	17.8	17.0	12.0	17.0
IV	Food products; beverages; tobacco	12.0	24.0	6.8	19.2	10.0	18.6	18.4	17.5	18.6
V	Mineral products	0.2	11.6	0.9	1.0	9.7	5.9	5.2	12.0	6.0
VI	Chemical products	3.8	11.4	2.9	4.7	9.9	6.8	6.5	12.0	7.1
VII	Plastic and rubber products	3.7	16.1	4.4	5.0	10.0	12.8	11.3	12.0	13.0
VIII	Hides and leather products	4.9	18.0	3.6	2.7	9.8	9.6	9.4	12.0	11.0
IX	Wood products	2.2	19.6	2.5	1.9	10.0	12.0	12.2	12.0	12.0
X	Paper products	0.6	13.9	0.9	0.0	9.8	12.1	10.8	12.0	13.3
XI	Textiles and textile articles	9.3	23.6	10.2	7.9	10.0	18.0	17.8	17.6	18.1
XII	Footwear	11.1	31.9	11.7	8.0	10.0	18.9	18.9	12.0	18.9
XIII	Articles of stone, plaster, cement; ceramic products; glass products	5.1	18.7	3.3	3.9	10.0	13.7	12.7	16.6	13.9
XIV	Natural or cultured pearls; precious stones and metals	3.0	15.3	2.3	0.7	10.0	11.1	11.8	12.0	12.1
XV	Basic metals	2.3	16.1	2.5	1.7	9.9	10.5	9.7	12.0	10.8
XVI	Machinery and mechanical appliances; electrical equipment	1.6	14.5	2.0	2.6	6.3	9.2	8.4	12.0	10.2
XVII	Transport equipment	2.6	17.1	5.2	4.6	8.0	13.9	8.9	12.3	13.2
XVIII	Medical and optical instruments	2.0	15.1	1.8	2.6	9.7	6.8	10.0	12.0	7.6
XIX	Arms and munitions and accessories	1.2	20.5	3.9	2.5	10.0	18.8	18.8	12.0	17.0
XX	Miscellaneous manufactured articles (e.g. furniture)	2.8	23.5	5.2	2.4	9.9	17.9	18.6	12.0	17.8
XXI	Works of art	0.0	6.5	0.0	0.0	10.0	20.0	20.0	12.0	10.0
Average		4.0	19.0	3.8	5.9	9.6	13.5	13.1	13.2	13.2

Notes: In the case of the CAN, there are some preferences to Mercosur countries, but the difference with respect to the MFN tariffs is small (except for Bolivia, due to the FTA with Mercosur)

In the case of EU, there are also some preferences under the GSP to Mercosur countries (see Giordano (2003).

Source: CEI (2003).

Table 25 shows that textiles-wearing apparel are among the industries with relatively high intra-industry trade for Argentina with the Andean Pact and the EU; and for Brazil, Paraguay, and Uruguay with all countries/blocs. Furthermore, we find a high intra-industry trade in food products and beverages for Brazil with the Andean Community; Paraguay with the EU, USA/NAFTA, and Uruguay with the EU. Moreover, the level of intra-industry trade in tobacco is important for Argentina with the EU, USA/NAFTA, and for Brazil with the USA/NAFTA. In addition, Argentina, Uruguay, and Paraguay have high intra-industry trade levels with USA/NAFTA in iron and steel. The same is true for the first two countries with the EU and for Brazil with the Andean Community. Finally, observe that, for Paraguay, intra-industry trade is high in footwear, when the partners are EU and USA/NAFTA. On the other hand, it is worth noting, as shown in Table 26, that precisely in these sectors the EU, the Andean Community countries, and the NAFTA countries have relatively high tariff rates (except iron and steel). Therefore, combining these facts with our econometric results reported in Sub-section 5.1.3., we can conclude that there is room for increasing intra-industry trade and thus intra-industry specialization and production complementarities in these sectors. Further, the coincidences detected in some cases could potentially be a positive factor for the successful development of the negotiations.

As a summary of the discussion presented in this section, we can preliminary conclude that the formation of production clusters across Mercosur countries has been an important development of the integration agreement. Eliminating the remaining barriers to trade within Mercosur can further encourage this process. The negotiation of FTA with other regions can also foster intra-industry trade and cross-country production cluster with non-Mercosur nations. Still, given the actual levels of IIT trade with these other regions, Brazil and Argentina will be the country that will benefit the most from agreements with the EU and Nafta, while Paraguay and Uruguay will gain with an FTA with the Andean Pact. At the sectoral level, and taking the four countries together, we find opportunities in activities such as textiles; wearing apparel; food and beverages, tobacco; and iron and steel.

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Appendix

A0. Industry Classifications

International Standard Industrial Classification, Revision 2, 3 digits

Code	Description
311	Food products
313	Beverages
314	Tobacco
321	Textiles
322	Wearing apparel, except footwear
323	Leather and leather products, except footwear and wearing apparel
324	Footwear, except vulcanized or moulded rubber or plastic footwear
331	Wood and wood and cork products, except furniture
332	Furniture and fixtures, except primarily of metal
341	Paper and paper products
342	Printing, publishing and allied industries
351	Industrial chemicals
352	Other chemicals product
353	Petroleum refineries
354	Miscellaneous products of petroleum and coal
355	Rubber products
356	Plastic products not elsewhere classified
361	Pottery, china, and earthenware
362	Glass and glass products
369	Other non-metallic mineral products
371	Iron and steel
372	Non-ferrous metals
381	Fabricated metal products
382	Machinery, except electrical
383	Electrical machinery apparatus
384	Transport equipment
385	Professional, scientific, measuring, controlling, photographic and optic equipment
390	Other manufacturing industries

International Standard Industrial Classification, Revision 3, 2 digits

Code	Description
15	Food products and beverages
16	Tobacco products
17	Textiles
18	Wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; luggages, handbags, saddlery, harness, and footwear
20	Wood and wood and cork products, except furniture
21	Paper and paper products
22	Publishing, printing, and reproduction of recorded media
23	Coke, refined petroleum products, and nuclear fuel
24	Chemicals and chemical products
25	Rubber and plastic products
26	Other non-metallic mineral products
27	Basic metals
28	Fabricated metal products, except machinery and equipment
29	Machinery and equipment, not elsewhere classified
30	Office, accounting, and computing machinery
31	Electrical machinery and apparatus not elsewhere classified
32	Radio, television, and communication equipment and apparatus
33	Medical, precision, and optical instruments, watches, and clocks
34	Motor vehicles, trailers, and semi-trailers
35	Other transport equipment
36	Furniture, manufacturing not elsewhere classified

A1. Specialization Patterns

Table A1.1a

Mercosur - Absolute specialization (1970-1998) - Four year averages							
Country/year	1971-1974	1975-1978	1979-1982	1983-1986	1987-1990	1991-1994	1995-1998
Argentina	0.0497	0.0502	0.0527	0.0538	0.0541	0.0534	0.0535
Brazil	0.0468	0.0467	0.0458	0.0466	0.0465	0.0472	0.0489
Uruguay	0.0585	0.0578	0.0574	0.0611	0.0564	0.0607	0.0636
Paraguay	0.1043	0.0887	0.0829	0.0827	0.0845	0.0856	

Table A1.1b

Mercosur - Relative specialization (with respect to the bloc without the reference country) (1970-1998) - Four year averages						
Country/year	1971-1974	1975-1978	1979-1982	1983-1986	1987-1990	1991-1994
Argentina	0.0219	0.0202	0.0249	0.0246	0.0261	0.0249
Brazil	0.0230	0.0220	0.0264	0.0256	0.0267	0.0251
Uruguay	0.0339	0.0361	0.0346	0.0362	0.0302	0.0372
Paraguay	0.0830	0.0661	0.0629	0.0616	0.0639	0.0662

Table A1.1c

Mercosur - Relative specialization (with respect to the bloc without the reference country) (1970-1998) - Four year averages							
Country/year	1971-1974	1975-1978	1979-1982	1983-1986	1987-1990	1991-1994	1995-1998
Argentina	0.0221	0.0204	0.0252	0.0248	0.0264	0.0250	0.0247
Brazil	0.0230	0.0219	0.0263	0.0256	0.0267	0.0252	0.0254
Uruguay	0.0342	0.0364	0.0349	0.0366	0.0307	0.0376	0.0402
Paraguay							

Table A1.2a

Absolute specialization - Time trends			
Country\Period	1971-1998	1971-1984	1985-1998
Argentina	0.003425*** (0.000530)	0.006942*** (0.001420)	-0.001614 (0.001287)
Brazil	0.001482*** (0.000526)	-0.001332 (0.001015)	0.005173*** (0.000763)
Uruguay	0.003116*** (0.001105)	0.004490 (0.005068)	0.010660*** (0.002547)
Paraguay	-0.008071*** (0.002818)	-0.022526*** (0.004196)	0.008392* (0.004454)

Note: In the case of Paraguay, the sample period is 1970-1994.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A1.2b

Relative specialization - Time trends			
Country\Period	1971-1994	1971-1984	1985-1994
Argentina	0.010800*** (0.002389)	0.010645 (0.007198)	-0.006492 (0.005960)
Brazil	0.007896*** (0.002082)	0.010000 (0.007017)	-0.012109* (0.005644)
Uruguay	0.000277 (0.003395)	0.008996 (0.008508)	0.024265* (0.012212)
Paraguay	-0.008847*** (0.003815)	-0.027696*** (0.005331)	0.015254** (0.006077)

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A1.2c

Relative specialization - Time trends			
Country\Period	1971-1998	1971-1984	1985-1998
Argentina	0.007801*** (0.001848)	0.011045 (0.007260)	-0.006556 (0.004373)
Brazil	0.005910*** (0.001576)	0.009740 (0.006920)	-0.007157 (0.004330)
Uruguay	0.004171** (0.002147)	0.009132 (0.008572)	0.024473*** (0.005057)

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A1.3a

Mercosur - Specialization (1970-1998) - Joint percentage share of the 3 sectors with highest shares							
Country/year	1971-1974 CR-3	1975-1978 CR-3	1979-1982 CR-3	1983-1986 CR-3	1987-1990 CR-3	1991-1994 CR-3	1995-1998 CR-3
Argentina	35.56	35.29	38.77	39.61	39.22	40.39	41.11
Brazil	29.78	30.27	28.88	28.57	28.75	28.47	31.09
Uruguay	45.09	44.39	41.99	44.83	41.36	44.30	47.92
Paraguay	66.79	61.83	62.59	60.82	64.02	64.59	

Table A1.3b

Mercosur - Specialization (1970-1998) - Sectors with higher shares														
Country/year	1971-1974		1975-1978		1979-1982		1983-1986		1987-1990		1991-1994		1995-1998	
	Sectors	%	Sectors	%	Sectors	%	Sectors	%	Sectors	%	Sectors	%	Sectors	%
Argentina	Petrol. refineries	13.58	Food products	14.17	Petrol. refineries	15.67	Petrol. refineries	16.21	Petrol. refineries	16.82	Petrol. refineries	16.10	Food products	14.90
	Food products	12.92	Petrol. refineries	12.90	Food products	15.31	Food products	15.84	Food products	15.27	Food products	14.19	Petrol. refineries	14.61
	Transp. equipment	9.06	Transp. equipment	8.22	Transp. equipment	7.79	Transp. equipment	7.56	Textiles	7.13	Transp. equipment	10.10	Transp. equipment	11.60
Brazil	Food products	12.20	Food products	12.68	Food products	11.43	Food products	12.40	Food products	12.24	Food products	12.87	Food products	13.37
	Textiles	9.27	Non-electrical mach	10.36	Non-electrical mach	10.28	Non-electrical mach	9.00	Non-electrical mach	9.03	Non-electrical mach	8.20	Electrical machinery	9.23
	Transp. equipment	8.31	Transp. equipment	7.23	Transp. equipment	7.17	Transp. equipment	7.17	Electrical machinery	7.48	Transp. equipment	7.40	Non-electrical mach	8.49
Uruguay	Food products	19.51	Food products	18.68	Food products	19.00	Food products	22.23	Food products	20.57	Food products	23.74	Food products	25.73
	Textiles	12.87	Petrol. refineries	15.02	Petrol. refineries	13.60	Petrol. refineries	12.22	Textiles	10.54	Beverages	11.55	Petrol. refineries	13.41
	Petrol. refineries	12.71	Textiles	10.69	Beverages	9.39	Textiles	10.38	Petrol. refineries	10.25	Textiles	9.01	Beverages	8.78
Paraguay	Food products	53.35	Food products	43.36	Food products	38.10	Food products	38.90	Food products	39.19	Food products	40.20		
	Textiles	7.41	Textiles	10.45	Wood products	14.31	Wood products	11.21	Textiles	13.59	Wood products	13.31		
	Wood products	6.03	Wood products	8.02	Textiles	10.18	Textiles	10.71	Wood products	11.24	Beverages	11.08		

Table A1.4a

<i>Industry characteristic</i>	<i>Definition</i>
Agricultural intensity	$absagint_k = \frac{AI_k}{PV_k}$
Labour intensity	$abslabint_k = \frac{W_k}{VA_k}$
Skill intensity	$abskillint_k = \frac{H_k}{L_k}$
Scale economies	$scale_k = \frac{L_k}{EST_k}$
Intermediate intensity	$wmsint_k = \frac{\sum_{k=1}^M INT_k}{PV_k}$
Sales to industry	$si_k = \frac{CI_k}{TD_k}$
Final demand bias	$fd_k = \frac{FD_k}{TD_k}$
Transport intensity	$transp_k = \frac{TRC_k}{TS_k}$
Nominal tariffs	np_k

where

Industries: $k=1, \dots, M$

L = Employment

VA = Value Added

W = Labour compensation

PV = Production Value

H = Employees with at least secondary school (/who attained high school).

EST = Number of Establishments

INT = Intermediate Inputs

CI =Intermediate consumption

FD = Final demand by households

TD = Total demand

TRC =Transport Costs

TS = Total Supply

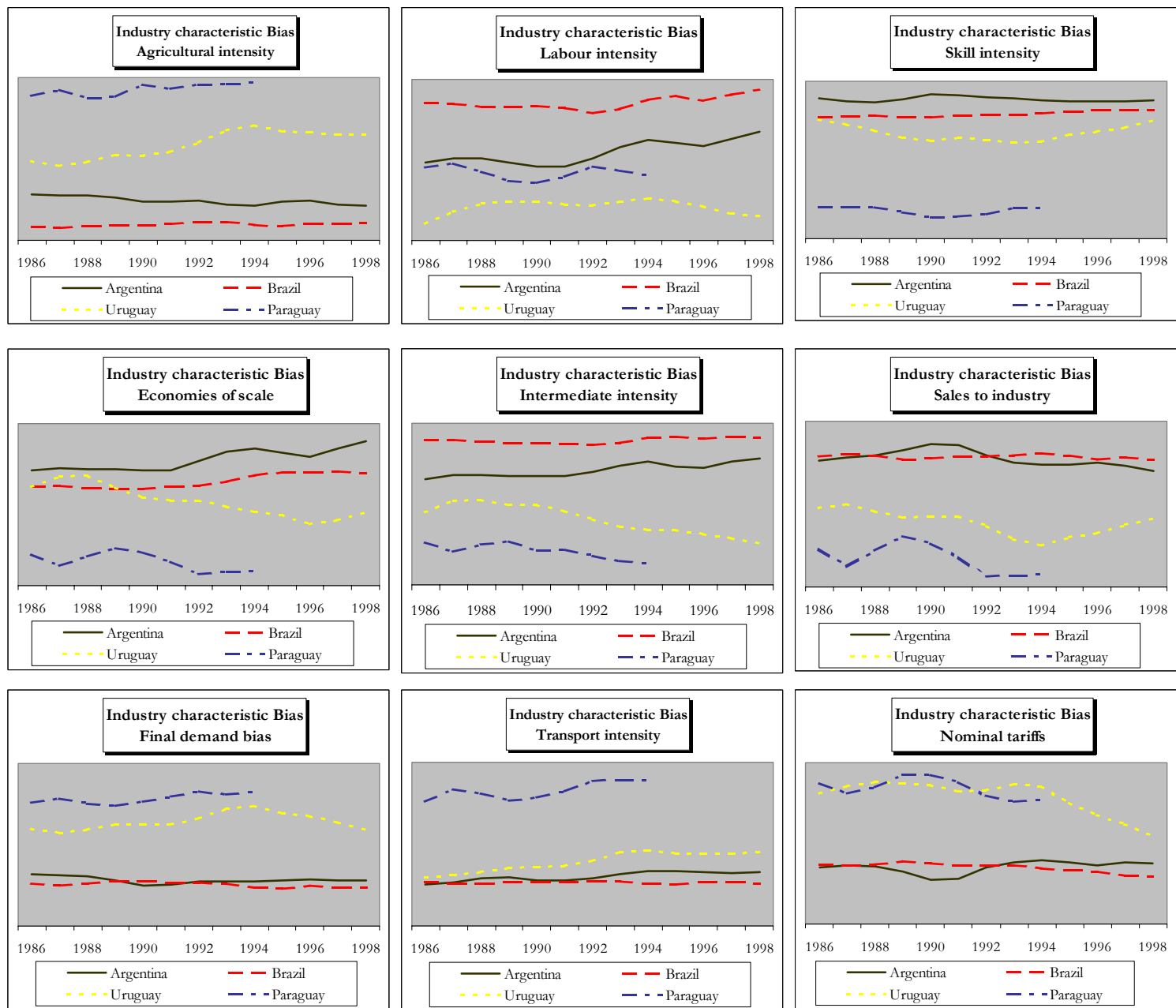
np = MFN Nominal (legal) tariff

Table A1.4b

<i>Data availability</i>		
Variable	Period	Source
Employment	1985-1998	RAIS
Value added	1985, 1990-1998	IBGE
Labour compensation	1985, 1990-1998	IBGE
Production value	1985, 1990-1998	IBGE
Employees with at least secondary school	1985-1998	RAIS
Number of establishments	1985-1998	RAIS
Intermediate inputs/consumption	1985, 1990-1998	IBGE
Final demand/total demand	1985, 1990-1998	IBGE
Transport costs	1985, 1990-1998	IBGE
Total supply	1985, 1990-1998	IBGE
Nominal tariffs	1987-1998	Kume et. al (2000)

Note: Data at sectoral level corresponds to Brazil

Figure A1.1



A1. Specialization Patterns

Table A1.5

<i>Argentina - Spearman correlation between industry shares in total national production value and industry characteristics</i>														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Agriculture intensity			+											
Labour intensity														
Skill intensity								+	+	+	+	+	+	+
Final demand bias														
Industrial inputs intensity														
Total intermediate intensity	+	+	+	+	+	+	+	+		+	+	+	+	
Sales to industry														
Transport intensity	-	-	-			-								
Scale economies	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Tariffs														

<i>Brazil - Spearman correlation between industry shares in total national production value and industry characteristics</i>														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Agriculture intensity														
Labour intensity														
Skill intensity												+	+	+
Final demand bias														
Industrial inputs intensity														
Total intermediate intensity														
Sales to industry														
Transport intensity	-	-	-	-	-	-	-	-	-	-			-	-
Scale economies			+				+			+	+	+	+	+
Tariffs														

Note: + / - indicates the nature of a significant association (at least at 10%), while empty cells correspond to insignificant associations

<i>Uruguay - Spearman correlation between industry shares in total national production value and industry characteristics</i>														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Agriculture intensity														
Labour intensity	-	-												
Skill intensity														
Final demand bias	+	+	+	+	+	+	+	+		+		+		
Industrial inputs intensity														
Total intermediate intensity	+	+	+	+	+	+	+		+	+	+	+	+	
Sales to industry								+						
Transport intensity														
Scale economies	+	+	+	+	+	+	+	+	+	+	+			+
Tariffs														

Note: + / - indicates the nature of a significant association (at least at 10%), while empty cells correspond to insignificant associations

<i>Paraguay - Spearman correlation between industry shares in total national production value and industry characteristics</i>														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Agriculture intensity	+	+	+	+	+	+	+	+	+	+				
Labour intensity														
Skill intensity														
Final demand bias							+	+	+	+				
Industrial inputs intensity														
Total intermediate intensity														
Sales to industry														
Transport intensity														
Scale economies														
Tariffs	+	+												

Note: + / - indicates the nature of a significant association (at least at 10%), while empty cells correspond to insignificant associations

Table A1.6a

<i>Explanatory variable</i>	<i>Definition</i>
Size 1: Population share	$pop_i = \frac{POP_i}{\sum_{i=1}^N POP_i}$
Size 2: Industrial GDP share	$ind_i = \frac{INDGDP_i}{\sum_{i=1}^N INDGDP_i}$
Size 3: GDP share	$gdp_i = \frac{GDP_i}{\sum_{i=1}^N GDP_i}$
Openness	$open_i = \frac{\sum_{k=1}^M (X_k + M_k)_{ki}}{\sum_{k=1}^M PV_k}$
Regional Openness 1	$regopen1_i = pt_i$
Regional Openness 2	$regopen2_i^* = \frac{\sum_{k=1}^M (X_k^{Mer\ cos\ ur} + M_k^{Mer\ cos\ ur})}{\sum_{k=1}^M (X_{ki} + M_{ki})}$ <p>*after regression on country fixed effects</p>

where

Countries: $i=1, \dots, N$

Industries: $k=1, \dots, M$

PV = Production Value

X =Exports

M = Imports

pt = (Average) Preferential Tariffs to Mercosur partners

Table A1.6b

<i>Data availability</i>		
Variable	Period	Source
Population	1985-1998	IMF
Total GDP (1)	1985-1998	PADI
Industrial GDP (1)	1985-1998	PADI
Production value (1)	1985-1998	PADI
Exports (1)	1985-1998	PADI
Imports (1)	1985-1998	PADI

(1) For Argentina, Brazil, and Uruguay /For Paraguay, 1970-1994

Table A1.7a

<i>Absolute specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnabsspec	lnabsspec	lnabsspec
popp	-0.118 (0.021)***		
indsp		-0.135 (0.023)***	
gdpp			-0.135 (0.027)***
open	0.109 (0.023)***	0.087 (0.027)***	0.086 (0.028)***
constant	-2.827 (0.060)***	-2.767 (0.072)***	-2.764 (0.073)***
Adjusted R2	0.63	0.65	0.65
Observations	40	40	40

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Absolute specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnabsspec	lnabsspec	lnabsspec
popp	-0.118 (0.015)***		
indsp		-0.135 (0.017)***	
gdpp			-0.135 (0.017)***
open	0.109 (0.031)***	0.087 (0.030)***	0.086 (0.030)***
constant	-2.827 (0.057)***	-2.767 (0.058)***	-2.764 (0.059)***
Observations	40	40	40

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Absolute specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnabsspec	lnabsspec	lnabsspec
popplag1	-0.119 (0.026)***		
indsplag1		-0.139 (0.033)***	
gdpplag1			-0.139 (0.034)***
openlag1	0.117 (0.035)***	0.088 (0.042)**	0.087 (0.043)**
constant	-2.826 (0.079)***	-2.758 (0.095)***	-2.753 (0.097)***
Adjusted R2	0.59	0.61	0.61
Observations	36	36	36

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Absolute specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnabsspec	lnabsspec	lnabsspec
popplag1	-0.119 (0.017)***		
indsplag1		-0.139 (0.019)***	
gdpplag1			-0.139 (0.019)***
openlag1	0.117 (0.038)***	0.088 (0.037)**	0.087 (0.038)**
constant	-2.826 (0.064)***	-2.758 (0.067)***	-2.753 (0.068)***
Observations	36	36	36

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Absolute specialization (1985-1998, without Paraguay)

	(1) lnabsspec	(2) lnabsspec	(3) lnabsspec
popnp	-0.084 (0.004)***		
indsnp		-0.090 (0.005)***	
gdnpnp			-0.090 (0.005)***
open	0.047 (0.006)***	0.030 (0.006)***	0.030 (0.006)***
constant	-2.860 (0.012)***	-2.812 (0.015)***	-2.809 (0.015)***
Adjusted R2	0.93	0.93	0.93
Observations	42	42	42

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Absolute specialization (1985-1998, without Paraguay)

	(1) lnabsspec	(2) lnabsspec	(3) lnabsspec
popnp	-0.084 (0.003)***		
indsnp		-0.090 (0.004)***	
gdnpnp			-0.090 (0.004)***
open	0.047 (0.006)***	0.030 (0.007)***	0.030 (0.007)***
constant	-2.860 (0.011)***	-2.812 (0.013)***	-2.809 (0.014)***
Observations	42	42	42

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Absolute specialization (1985-1998, without Paraguay)

	(1) lnabsspec	(2) lnabsspec	(3) lnabsspec
popnplag1	-0.079 (0.003)***		
indsnplag1		-0.085 (0.005)***	
gdnpnplag1			-0.085 (0.005)***
openlag1	0.056 (0.005)***	0.040 (0.004)***	0.039 (0.005)***
constant	-2.874 (0.010)***	-2.829 (0.013)***	-2.826 (0.015)***
Adjusted R2	0.95	0.94	0.94
Observations	39	39	39

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Absolute specialization (1985-1998, without Paraguay)

	(1) lnabsspec	(2) lnabsspec	(3) lnabsspec
popnplag1	-0.079 (0.002)***		
indsnplag1		-0.085 (0.004)***	
gdnpnplag1			-0.085 (0.004)***
openlag1	0.056 (0.006)***	0.040 (0.007)***	0.039 (0.007)***
constant	-2.874 (0.010)***	-2.829 (0.011)***	-2.826 (0.012)***
Observations	39	39	39

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table A1.7b

<i>Relative specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnrelspec	lnrelspec	lnrelspec
popp	-0.102 (0.046)**		
indsp		-0.138 (0.056)**	
gdpp			-0.139 (0.057)**
open	0.241 (0.045)***	0.208 (0.051)***	0.207 (0.051)***
constant	-3.592 (0.126)***	-3.503 (0.146)***	-3.497 (0.149)***
Adjusted R2	0.51	0.54	0.54
Observations	40	40	40

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Relative specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnrelspec	lnrelspec	lnrelspec
popp	-0.102 (0.032)***		
indsp		-0.138 (0.037)***	
gdpp			-0.139 (0.038)***
open	0.241 (0.066)***	0.208 (0.065)***	0.207 (0.066)***
constant	-3.592 (0.120)***	-3.503 (0.126)***	-3.497 (0.129)***
Observations	40	40	40

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Relative specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnrelspec	lnrelspec	lnrelspec
popplag1	-0.107 (0.054)*		
indsplag1		-0.144 (0.067)**	
gdpplag1			-0.145 (0.068)**
openlag1	0.272 (0.063)***	0.231 (0.075)***	0.229 (0.076)***
constant	-3.612 (0.155)***	-3.512 (0.186)***	-3.505 (0.190)***
Adjusted R2	0.48	0.51	0.51
Observations	36	36	36

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Relative specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnrelspec	lnrelspec	lnrelspec
popplag1	-0.107 (0.035)***		
indsplag1		-0.144 (0.041)***	
gdpplag1			-0.145 (0.043)***
openlag1	0.272 (0.080)***	0.231 (0.081)***	0.229 (0.082)***
constant	-3.612 (0.134)***	-3.512 (0.144)***	-3.505 (0.148)***
Observations	36	36	36

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Relative specialization (1985-1998, without Paraguay)

	(1) lnrelspec	(2) lnrelspec	(3) lnrelspec
popnp	-0.053 (0.020)**		
indsnp		-0.070 (0.020)***	
gdnpnp			-0.072 (0.019)***
open	0.133 (0.018)***	0.115 (0.018)***	0.113 (0.018)***
constant	-3.663 (0.042)***	-3.606 (0.043)***	-3.601 (0.044)***
Adjusted R2	0.60	0.64	0.65
Observations	42	42	42

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Relative specialization (1985-1998, without Paraguay)

	(1) lnrelspec	(2) lnrelspec	(3) lnrelspec
popnp	-0.053 (0.012)***		
indsnp		-0.070 (0.016)***	
gdnpnp			-0.072 (0.016)***
open	0.133 (0.022)***	0.115 (0.020)***	0.113 (0.020)***
constant	-3.663 (0.040)***	-3.606 (0.040)***	-3.601 (0.040)***
Observations	42	42	42

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Relative specialization (1985-1998, without Paraguay)

	(1) lnrelspec	(2) lnrelspec	(3) lnrelspec
popnplag1	-0.049 (0.020)**		
indsnplag1		-0.065 (0.021)***	
gdnpnplag1			-0.067 (0.020)***
openlag1	0.157 (0.025)***	0.138 (0.023)***	0.136 (0.023)***
constant	-3.695 (0.045)***	-3.641 (0.048)***	-3.635 (0.048)***
Adjusted R2	0.65	0.68	0.69
Observations	39	39	39

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Relative specialization (1985-1998, without Paraguay)

	(1) lnrelspec	(2) lnrelspec	(3) lnrelspec
popnplag1	-0.049 (0.013)***		
indsnplag1		-0.065 (0.017)***	
gdnpnplag1			-0.067 (0.017)***
openlag1	0.157 (0.024)***	0.138 (0.022)***	0.136 (0.022)***
constant	-3.695 (0.039)***	-3.641 (0.040)***	-3.635 (0.040)***
Observations	39	39	39

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table A1.7c

<i>Absolute specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnabsspec	lnabsspec	lnabsspec
popp	-0.111 (0.020)***		
indsp		-0.128 (0.025)***	
gdpp			-0.127 (0.026)***
open	0.102 (0.023)***	0.078 (0.026)***	0.077 (0.027)***
regopen1	0.001 (0.011)	-0.005 (0.011)	-0.006 (0.011)
constant	-2.885 (0.063)***	-2.816 (0.071)***	-2.810 (0.073)***
Adjusted R2	0.62	0.64	0.64
Observations	40	40	40

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Absolute specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnabsspec	lnabsspec	lnabsspec
popp	-0.111 (0.014)***		
indsp		-0.128 (0.016)***	
gdpp			-0.127 (0.016)***
open	0.102 (0.031)***	0.078 (0.030)***	0.077 (0.030)**
regopen1	0.001 (0.014)	-0.005 (0.013)	-0.006 (0.013)
constant	-2.885 (0.069)***	-2.816 (0.070)***	-2.810 (0.072)***
Observations	40	40	40

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Absolute specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnabsspec	lnabsspec	lnabsspec
popp	-0.111 (0.019)***		
indsp		-0.126 (0.023)***	
gdpp			-0.126 (0.024)***
open	0.103 (0.021)***	0.082 (0.025)***	0.082 (0.025)***
regopen2	0.019 (0.030)	0.015 (0.028)	0.014 (0.028)
constant	-2.879 (0.058)***	-2.825 (0.066)***	-2.822 (0.068)***
Adjusted R2	0.62	0.65	0.64
Observations	40	40	36

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Absolute specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnabsspec	lnabsspec	lnabsspec
popp	-0.111 (0.013)***		
indsp		-0.126 (0.014)***	
gdpp			-0.126 (0.014)***
open	0.103 (0.026)***	0.082 (0.025)***	0.082 (0.025)***
regopen2	0.019 (0.034)	0.015 (0.032)	0.014 (0.032)
constant	-2.879 (0.056)***	-2.825 (0.056)***	-2.822 (0.057)***
Observations	40	40	40

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Absolute specialization (1985-1998, without Paraguay)

	(1) lnabsspec	(2) lnabsspec	(3) lnabsspec
popnp	-0.079 (0.003)***		
indsnp		-0.086 (0.004)***	
gdnp			-0.087 (0.004)***
open	0.047 (0.006)***	0.025 (0.006)***	0.024 (0.006)***
regopen1	0.004 (0.004)	-0.005 (0.004)	-0.005 (0.004)
constant	-2.924 (0.014)***	-2.858 (0.013)***	-2.853 (0.013)***
Adjusted R2	0.93	0.93	0.93
Observations	42	42	42

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Absolute specialization (1985-1998, without Paraguay)

	(1) lnabsspec	(2) lnabsspec	(3) lnabsspec
popnp	-0.079 (0.003)***		
indsnp		-0.086 (0.004)***	
gdnp			-0.087 (0.004)***
open	0.047 (0.007)***	0.025 (0.007)***	0.024 (0.007)***
regopen1	0.004 (0.003)	-0.005 (0.003)	-0.005 (0.003)
constant	-2.924 (0.014)***	-2.858 (0.015)***	-2.853 (0.016)***
Observations	42	42	42

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Absolute specialization (1985-1998, without Paraguay)

	(1) lnabsspec	(2) lnabsspec	(3) lnabsspec
popnp	-0.078 (0.003)***		
indsnp		-0.087 (0.004)***	
gdnp			-0.087 (0.004)***
open	0.049 (0.006)***	0.025 (0.006)***	0.025 (0.005)***
regopen2	-0.008 (0.005)	0.004 (0.005)	0.004 (0.005)
constant	-2.924 (0.010)***	-2.863 (0.012)***	-2.861 (0.012)***
Adjusted R2	0.94	0.93	0.93
Observations	42	42	42

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Absolute specialization (1985-1998, without Paraguay)

	(1) lnabsspec	(2) lnabsspec	(3) lnabsspec
popnp	-0.078 (0.003)***		
indsnp		-0.087 (0.004)***	
gdnp			-0.087 (0.004)***
open	0.049 (0.007)***	0.025 (0.008)***	0.025 (0.008)***
regopen2	-0.008 (0.005)	0.004 (0.005)	0.004 (0.005)
constant	-2.924 (0.011)***	-2.863 (0.015)***	-2.861 (0.016)***
Observations	39	39	39

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table A1.7d

<i>Relative specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnrelspec	lnrelspec	lnrelspec
popp	-0.099 (0.044)**		
indsp		-0.131 (0.054)**	
gdpp			-0.132 (0.055)**
open	0.246 (0.046)***	0.213 (0.052)***	0.211 (0.053)***
regopen1	0.041 (0.024)*	0.035 (0.025)	0.034 (0.025)
constant	-3.602 (0.163)***	-3.610 (0.159)***	-3.602 (0.163)***
Adjusted R2	0.50	0.53	0.53
Observations	40	40	40

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Relative specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnrelspec	lnrelspec	lnrelspec
popp	-0.099 (0.030)***		
indsp		-0.131 (0.035)***	
gdpp			-0.132 (0.037)***
open	0.246 (0.067)***	0.213 (0.067)***	0.211 (0.067)***
regopen1	0.041 (0.031)	0.035 (0.029)	0.034 (0.029)
constant	-3.602 (0.158)***	-3.610 (0.154)***	-3.602 (0.158)***
Observations	40	40	40

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Relative specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnrelspec	lnrelspec	lnrelspec
popp	-0.097 (0.043)**		
indsp		-0.131 (0.050)**	
gdpp			-0.131 (0.051)**
open	0.235 (0.041)***	0.203 (0.045)***	0.202 (0.045)***
regopen2	0.042 (0.060)	0.038 (0.055)	0.037 (0.055)
constant	-3.608 (0.124)***	-3.526 (0.138)***	-3.521 (0.140)***
Adjusted R2	0.50	0.53	0.53
Observations	40	40	40

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

<i>Relative specialization (1985-1994, with Paraguay)</i>			
	(1)	(2)	(3)
	lnrelspec	lnrelspec	lnrelspec
popp	-0.097 (0.029)***		
indsp		-0.131 (0.033)***	
gdpp			-0.131 (0.034)***
open	0.235 (0.058)***	0.203 (0.057)***	0.202 (0.058)***
regopen2	0.042 (0.067)	0.038 (0.064)	0.037 (0.064)
constant	-3.608 (0.119)***	-3.526 (0.122)***	-3.521 (0.125)***
Observations	40	40	40

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Relative specialization (1985-1998, without Paraguay)

	(1) lnrelspec	(2) lnrelspec	(3) lnrelspec
popnp	-0.042 (0.015)***		
indsnp		-0.051 (0.016)***	
gdnp			-0.052 (0.016)***
open	0.172 (0.019)***	0.157 (0.019)***	0.156 (0.019)***
regopen1	0.067 (0.010)***	0.062 (0.010)***	0.061 (0.010)***
constant	-3.847 (0.044)***	-3.798 (0.048)***	-3.793 (0.049)***
Adjusted R2	0.73	0.75	0.75
Observations	42	42	42

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Relative specialization (1985-1998, without Paraguay)

	(1) lnrelspec	(2) lnrelspec	(3) lnrelspec
popnp	-0.042 (0.009)***		
indsnp		-0.051 (0.012)***	
gdnp			-0.052 (0.012)***
open	0.172 (0.020)***	0.157 (0.019)***	0.156 (0.019)***
regopen1	0.067 (0.017)***	0.062 (0.016)***	0.061 (0.016)***
constant	-3.847 (0.046)***	-3.798 (0.047)***	-3.793 (0.048)***
Observations	42	42	42

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Relative specialization (1985-1998, without Paraguay)

	(1) lnrelspec	(2) lnrelspec	(3) lnrelspec
popnp	-0.037 (0.017)**		
indsnp		-0.047 (0.020)**	
gdnp			-0.048 (0.019)**
open	0.173 (0.018)***	0.157 (0.019)***	0.156 (0.019)***
regopen2	-0.072 (0.015)***	-0.064 (0.017)***	-0.063 (0.016)***
constant	-3.767 (0.035)***	-3.725 (0.044)***	-3.720 (0.044)***
Adjusted R2	0.70	0.71	0.71
Observations	42	42	42

OLS regressions with robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Relative specialization (1985-1998, without Paraguay)

	(1) lnrelspec	(2) lnrelspec	(3) lnrelspec
popnp	-0.037 (0.013)***		
indsnp		-0.047 (0.016)***	
gdnp			-0.048 (0.016)***
open	0.173 (0.020)***	0.157 (0.021)***	0.156 (0.021)***
regopen2	-0.072 (0.018)***	-0.064 (0.018)***	-0.063 (0.018)***
constant	-3.720 (0.042)***	-3.725 (0.041)***	-3.720 (0.042)***
Observations	42	42	42

OLS regressions with panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

A2. Concentration Patterns

Table A2.1a

<i>Mercosur (with Paraguay) - Absolute Concentration (1970-1994) - Four-year-averages</i>								
Sector/Year	1971-1974	1975-1978	1979-1982	1983-1986	1987-1990	1991-1994	VI-I	VI-V
Other manufacturing industries	0.3778	0.4301	0.4549	0.4586	0.4635	0.4558	0.0781	-0.0077
Professional and scientific instruments	0.3627	0.3886	0.4204	0.4438	0.4477	0.4418	0.0791	-0.0059
Non-electrical machinery	0.3799	0.3965	0.4194	0.4320	0.4507	0.4409	0.0610	-0.0098
Non-ferrous metals	0.3859	0.4075	0.4083	0.4166	0.4287	0.4225	0.0365	-0.0063
Footwear	0.3447	0.3503	0.3877	0.4116	0.4319	0.4191	0.0744	-0.0128
Miscellaneous products of petroleum and coal	0.3548	0.3907	0.4403	0.4354	0.4311	0.4164	0.0616	-0.0147
Electrical machinery	0.3688	0.3911	0.4157	0.4204	0.4279	0.4101	0.0414	-0.0178
Rubber products	0.3722	0.3689	0.3760	0.3858	0.4030	0.3985	0.0263	-0.0045
Iron and steel	0.3831	0.3952	0.3966	0.3996	0.3998	0.3968	0.0137	-0.0031
Plastic products	0.3630	0.3910	0.3944	0.3890	0.4112	0.3960	0.0330	-0.0151
Wearing apparel, except footwear	0.3535	0.3439	0.3712	0.4013	0.4188	0.3949	0.0414	-0.0239
Industrial chemicals	0.3515	0.3721	0.3908	0.3942	0.3935	0.3911	0.0396	-0.0025
Furniture	0.3953	0.4131	0.4084	0.4240	0.4135	0.3875	-0.0078	-0.0259
Manufacture of paper and paper products	0.3623	0.3664	0.3853	0.3865	0.3865	0.3814	0.0191	-0.0050
Manufacture of glass and glass products	0.3507	0.3593	0.3731	0.3786	0.3735	0.3769	0.0262	0.0035
Wood products	0.3678	0.3793	0.3860	0.3760	0.3890	0.3749	0.0071	-0.0141
Other chemicals products	0.3533	0.3660	0.3742	0.3771	0.3844	0.3743	0.0210	-0.0102
Other non-metallic minerals	0.3737	0.3975	0.4050	0.4073	0.3964	0.3666	-0.0071	-0.0299
Transport equipment	0.3552	0.3636	0.3743	0.3778	0.3801	0.3619	0.0067	-0.0182
Fabricated metal products	0.3627	0.3673	0.3699	0.3635	0.3673	0.3610	-0.0016	-0.0063
Textiles	0.3501	0.3491	0.3614	0.3585	0.3627	0.3607	0.0106	-0.0020
Food products	0.3374	0.3478	0.3480	0.3522	0.3577	0.3535	0.0161	-0.0041
Petroleum refineries	0.3765	0.3487	0.3452	0.3460	0.3461	0.3493	-0.0272	0.0031
Printing and publishing	0.3570	0.3681	0.3763	0.3651	0.3720	0.3476	-0.0094	-0.0244
Tobacco	0.3250	0.3252	0.3260	0.3282	0.3272	0.3306	0.0056	0.0035
Pottery, china, and earthenware	0.3403	0.3446	0.3240	0.3185	0.3098	0.3251	-0.0153	0.0153
Manufacture of leather and leather products	0.3306	0.3135	0.3240	0.3244	0.3255	0.3240	-0.0067	-0.0015
Beverages	0.3271	0.3347	0.3199	0.3209	0.3193	0.3196	-0.0075	0.0003

Table A2.1b

<i>Mercosur (without Paraguay) - Absolute Concentration (1970-1994) - Four years average</i>										
Sector/Year	1971-1974	1975-1978	1979-1982	1983-1986	1987-1990	1991-1994	1995-1998	VI-I	VI-V	VII-I
Other manufacturing industries	0.4363	0.4967	0.5253	0.5295	0.5352	0.5264	0.5328	0.0901	-0.0089	0.0966
Professional and scientific instruments	0.4189	0.4488	0.4854	0.5125	0.5170	0.5102	0.5236	0.0912	-0.0068	0.1047
Non-electrical machinery	0.4390	0.4581	0.4848	0.5002	0.5217	0.5099	0.5156	0.0710	-0.0118	0.0767
Footwear	0.4039	0.4101	0.4556	0.4844	0.5082	0.4937	0.4864	0.0899	-0.0144	0.0826
Non-ferrous metals	0.4462	0.4713	0.4723	0.4820	0.4959	0.4885	0.4973	0.0423	-0.0075	0.0511
Miscellaneous products of petroleum and coal	0.4098	0.4514	0.5086	0.5031	0.4981	0.4810	0.4778	0.0712	-0.0171	0.0680
Electrical machinery	0.4259	0.4518	0.4803	0.4856	0.4942	0.4737	0.4942	0.0478	-0.0205	0.0682
Wood products	0.4316	0.4487	0.4701	0.4636	0.4831	0.4683	0.4666	0.0367	-0.0148	0.0350
Rubber products	0.4305	0.4272	0.4361	0.4483	0.4680	0.4620	0.4712	0.0315	-0.0060	0.0408
Iron and steel	0.4437	0.4579	0.4598	0.4636	0.4634	0.4595	0.4495	0.0158	-0.0039	0.0057
Plastic products	0.4192	0.4515	0.4555	0.4496	0.4752	0.4574	0.4613	0.0382	-0.0178	0.0421
Wearing apparel, except footwear	0.4090	0.3979	0.4295	0.4644	0.4846	0.4569	0.4546	0.0479	-0.0278	0.0457
Industrial chemicals	0.4068	0.4307	0.4522	0.4561	0.4553	0.4526	0.4457	0.0458	-0.0027	0.0389
Furniture	0.4580	0.4786	0.4734	0.4930	0.4804	0.4497	0.4487	-0.0083	-0.0307	-0.0093
Manufacture of paper and paper products	0.4185	0.4232	0.4451	0.4465	0.4465	0.4406	0.4192	0.0221	-0.0059	0.0007
Manufacture of glass and glass products	0.4055	0.4156	0.4318	0.4391	0.4328	0.4365	0.4301	0.0311	0.0038	0.0247
Other chemicals products	0.4096	0.4245	0.4338	0.4370	0.4454	0.4333	0.4313	0.0237	-0.0120	0.0217
Other non-metallic minerals	0.4315	0.4590	0.4677	0.4706	0.4580	0.4235	0.4163	-0.0081	-0.0345	-0.0152
Textiles	0.4065	0.4072	0.4227	0.4202	0.4275	0.4213	0.4245	0.0149	-0.0062	0.0180
Transport equipment	0.4102	0.4201	0.4326	0.4370	0.4395	0.4183	0.4192	0.0080	-0.0212	0.0090
Food products	0.4003	0.4105	0.4118	0.4168	0.4247	0.4180	0.4190	0.0177	-0.0068	0.0188
Fabricated metal products	0.4188	0.4242	0.4272	0.4199	0.4243	0.4170	0.4211	-0.0018	-0.0073	0.0023
Printing and publishing	0.4131	0.4260	0.4365	0.4245	0.4324	0.4043	0.4050	-0.0088	-0.0280	-0.0081
Petroleum refineries	0.4364	0.4045	0.4005	0.4005	0.4010	0.4043	0.4009	-0.0321	0.0033	-0.0355
Pottery, china, and earthenware	0.4029	0.4117	0.3959	0.3950	0.3891	0.4001	0.4056	-0.0028	0.0110	0.0027
Tobacco	0.3801	0.3816	0.3803	0.3840	0.3846	0.3860	0.3889	0.0059	0.0014	0.0088
Manufacture of leather and leather products	0.3919	0.3714	0.3825	0.3823	0.3841	0.3857	0.4021	-0.0062	0.0016	0.0102
Beverages	0.3819	0.3940	0.3830	0.3861	0.3839	0.3834	0.3890	0.0015	-0.0005	0.0071

A2. Concentration Patterns

Table A2.1c

<i>Mercosur (with Paraguay) - Relative Concentration (1970-1994) - Four years average</i>								
Sector/Year	1971-1974	1975-1978	1979-1982	1983-1986	1987-1990	1991-1994	VI-I	VI-V
Pottery, china, and earthenware	0.0850	0.0433	0.1365	0.1612	0.1553	0.1891	0.1041	0.0338
Beverages	0.0559	0.0570	0.1049	0.1625	0.1710	0.1803	0.1244	0.0093
Tobacco	0.0687	0.1100	0.1200	0.1646	0.1659	0.1674	0.0987	0.0016
Other manufacturing industries	0.0849	0.1459	0.1519	0.1503	0.1416	0.1638	0.0789	0.0222
Petroleum refineries	0.2159	0.1850	0.1870	0.1562	0.1568	0.1564	-0.0595	-0.0004
Professional and scientific instruments	0.0346	0.0605	0.0910	0.1253	0.1170	0.1417	0.1072	0.0247
Manufacture of leather and leather products	0.1085	0.1653	0.1538	0.0992	0.1033	0.1396	0.0311	0.0363
Non-electrical machinery	0.0828	0.0772	0.0904	0.1066	0.1211	0.1379	0.0551	0.0168
Footwear	0.1085	0.0332	0.0495	0.0830	0.1019	0.1128	0.0043	0.0109
Non-ferrous metals	0.0985	0.0994	0.0703	0.0782	0.0843	0.1059	0.0074	0.0216
Miscellaneous products of petroleum and coal	0.0177	0.0685	0.1247	0.1134	0.0888	0.0941	0.0764	0.0053
Electrical machinery	0.0539	0.0672	0.0856	0.0864	0.0843	0.0830	0.0291	-0.0013
Wood products	0.0634	0.0622	0.0656	0.0523	0.0642	0.0740	0.0105	0.0098
Wearing apparel, except footwear	0.1308	0.0935	0.0354	0.0565	0.0772	0.0681	-0.0627	-0.0090
Rubber products	0.0886	0.0340	0.0283	0.0328	0.0525	0.0664	-0.0222	0.0139
Plastic products	0.0380	0.0687	0.0486	0.0286	0.0614	0.0649	0.0269	0.0035
Printing and publishing	0.0235	0.0185	0.0166	0.0296	0.0166	0.0630	0.0395	0.0464
Iron and steel	0.0939	0.0768	0.0484	0.0478	0.0326	0.0569	-0.0370	0.0243
Transport equipment	0.0221	0.0254	0.0299	0.0151	0.0137	0.0466	0.0245	0.0330
Industrial chemicals	0.0087	0.0219	0.0363	0.0368	0.0211	0.0458	0.0371	0.0247
Fabricated metal products	0.0349	0.0101	0.0190	0.0551	0.0511	0.0417	0.0068	-0.0094
Furniture	0.1287	0.1170	0.0752	0.0959	0.0606	0.0412	-0.0875	-0.0195
Manufacture of glass and glass products	0.0105	0.0214	0.0123	0.0164	0.0188	0.0375	0.0270	0.0187
Other non-metallic minerals	0.0742	0.0847	0.0696	0.0656	0.0274	0.0352	-0.0390	0.0078
Manufacture of paper and paper products	0.0383	0.0107	0.0285	0.0272	0.0125	0.0268	-0.0115	0.0143
Food products	0.0205	0.0229	0.0487	0.0417	0.0385	0.0229	0.0023	-0.0157
Textiles	0.0264	0.0324	0.0189	0.0338	0.0283	0.0164	-0.0100	-0.0119
Other chemicals products	0.0218	0.0133	0.0097	0.0144	0.0096	0.0146	-0.0072	0.0050

Table A2.1d

<i>Mercosur (without Paraguay) - Relative Concentration (1970-1994) - Four years average</i>										
Sector/Year	1971-1974	1975-1978	1979-1982	1983-1986	1987-1990	1991-1994	1995-1998	VI-I	VI-V	VII-I
Pottery, china, and earthenware	0.0986	0.0415	0.1537	0.1811	0.1680	0.2188	0.2269	0.1203	0.0508	0.1284
Beverages	0.0644	0.0632	0.1170	0.1874	0.1970	0.2093	0.1909	0.1449	0.0123	0.1266
Tobacco	0.0793	0.1272	0.1395	0.1917	0.1930	0.1949	0.2241	0.1157	0.0020	0.1448
Other manufacturing industries	0.0975	0.1675	0.1739	0.1719	0.1614	0.1878	0.1962	0.0903	0.0264	0.0988
Petroleum refineries	0.2504	0.2149	0.2175	0.1818	0.1829	0.1819	0.1672	-0.0686	-0.0010	-0.0832
Professional and scientific instruments	0.0388	0.0687	0.1033	0.1430	0.1330	0.1623	0.1822	0.1235	0.0293	0.1434
Manufacture of leather and leather products	0.1257	0.1917	0.1786	0.1136	0.1183	0.1605	0.2609	0.0348	0.0422	0.1352
Non-electrical machinery	0.0950	0.0881	0.1030	0.1222	0.1387	0.1584	0.1658	0.0634	0.0197	0.0709
Footwear	0.1264	0.0376	0.0593	0.0992	0.1215	0.1346	0.1176	0.0082	0.0130	-0.0088
Non-ferrous metals	0.1133	0.1141	0.0800	0.0890	0.0957	0.1212	0.1349	0.0079	0.0256	0.0216
Miscellaneous products of petroleum and coal	0.0194	0.0781	0.1425	0.1293	0.1004	0.1073	0.0993	0.0879	0.0068	0.0799
Electrical machinery	0.0615	0.0765	0.0974	0.0980	0.0952	0.0944	0.1302	0.0330	-0.0008	0.0688
Wood products	0.0751	0.0749	0.0808	0.0584	0.0774	0.0867	0.0799	0.0116	0.0092	0.0048
Wearing apparel, except footwear	0.1516	0.1088	0.0406	0.0642	0.0878	0.0779	0.0676	-0.0737	-0.0099	-0.0840
Rubber products	0.1021	0.0390	0.0328	0.0378	0.0602	0.0762	0.0912	-0.0259	0.0160	-0.0110
Plastic products	0.0428	0.0782	0.0544	0.0305	0.0691	0.0737	0.0775	0.0309	0.0046	0.0347
Printing and publishing	0.0266	0.0206	0.0186	0.0344	0.0200	0.0734	0.0670	0.0468	0.0535	0.0403
Iron and steel	0.1084	0.0884	0.0550	0.0546	0.0360	0.0648	0.0398	-0.0436	0.0288	-0.0686
Transport equipment	0.0244	0.0282	0.0336	0.0165	0.0150	0.0540	0.0602	0.0296	0.0391	0.0357
Industrial chemicals	0.0091	0.0243	0.0404	0.0409	0.0217	0.0517	0.0326	0.0427	0.0300	0.0235
Fabricated metal products	0.0394	0.0100	0.0223	0.0648	0.0604	0.0490	0.0321	0.0096	-0.0114	-0.0074
Furniture	0.1488	0.1351	0.0864	0.1111	0.0696	0.0472	0.0399	-0.1017	-0.0225	-0.1090
Manufacture of glass and glass products	0.0116	0.0247	0.0137	0.0186	0.0226	0.0436	0.0041	0.0320	0.0210	-0.0075
Other non-metallic minerals	0.0851	0.0968	0.0788	0.0741	0.0287	0.0405	0.0550	-0.0446	0.0118	-0.0301
Manufacture of paper and paper products	0.0434	0.0099	0.0310	0.0296	0.0109	0.0292	0.0484	-0.0143	0.0183	0.0050
Food products	0.0149	0.0218	0.0532	0.0445	0.0391	0.0208	0.0231	0.0059	-0.0184	0.0082
Textiles	0.0306	0.0372	0.0208	0.0376	0.0296	0.0182	0.0173	-0.0124	-0.0114	-0.0133
Other chemicals products	0.0251	0.0149	0.0104	0.0164	0.0095	0.0159	0.0045	-0.0092	0.0064	-0.0206

A2. Concentration Patterns

Table A2.2a

<i>Mercosur (with Paraguay) - Absolute concentration</i>				
Sector/Year	1971-1974		1991-1994	
	Index	Rank	Index	Rank
Furniture	0.3953	1	0.3875	13
Non-ferrous metals	0.3859	2	0.4225	4
Iron and steel	0.3831	3	0.3968	9
Non-electrical machinery	0.3799	4	0.4409	3
Other manufacturing industries	0.3778	5	0.4558	1
Petroleum refineries	0.3765	6	0.3493	23
Other non-metallic minerals	0.3737	7	0.3666	18
Rubber products	0.3722	8	0.3985	8
Electrical machinery	0.3688	9	0.4101	7
Wood products	0.3678	10	0.3749	16
Plastic products	0.3630	11	0.3960	10
Professional and scientific instruments	0.3627	12	0.4418	2
Fabricated metal products	0.3627	13	0.3610	20
Manufacture of paper and paper products	0.3623	14	0.3814	14
Printing and publishing	0.3570	15	0.3476	24
Transport equipment	0.3552	16	0.3619	19
Miscellaneous products of petroleum and coal	0.3548	17	0.4164	6
Wearing apparel, except footwear	0.3535	18	0.3949	11
Other chemicals products	0.3533	19	0.3743	17
Industrial chemicals	0.3515	20	0.3911	12
Manufacture of glass and glass products	0.3507	21	0.3769	15
Textiles	0.3501	22	0.3607	21
Footwear	0.3447	23	0.4191	5
Pottery, china, and earthenware	0.3403	24	0.3251	26
Food products	0.3374	25	0.3535	22
Manufacture of leather and leather products	0.3306	26	0.3240	27
Beverages	0.3271	27	0.3196	28
Tobacco	0.3250	28	0.3306	25
Average	0.3594		0.3814	
Standard deviation	0.0179		0.0367	
Coefficient of variation	0.0498		0.0962	
Rank correlation (1971-1974/1991-1994)	0.5857			

Table A2.2b

<i>Mercosur (with Paraguay) - Relative concentration</i>				
Sector/Year	1971-1974		1991-1994	
	Index	Rank	Index	Rank
Petroleum refineries	0.2159	1	0.1564	5
Wearing apparel, except footwear	0.1308	2	0.0681	14
Furniture	0.1287	3	0.0412	22
Footwear	0.1085	4	0.1128	9
Manufacture of leather and leather products	0.1085	5	0.1396	7
Non-ferrous metals	0.0985	6	0.1059	10
Iron and steel	0.0939	7	0.0569	18
Rubber products	0.0886	8	0.0664	15
Pottery, china, and earthenware	0.0850	9	0.1891	1
Other manufacturing industries	0.0849	10	0.1638	4
Non-electrical machinery	0.0828	11	0.1379	8
Other non-metallic minerals	0.0742	12	0.0352	24
Tobacco	0.0687	13	0.1674	3
Wood products	0.0634	14	0.0740	13
Beverages	0.0559	15	0.1803	2
Electrical machinery	0.0539	16	0.0830	12
Manufacture of paper and paper products	0.0383	17	0.0268	25
Plastic products	0.0380	18	0.0649	16
Fabricated metal products	0.0349	19	0.0417	21
Professional and scientific instruments	0.0346	20	0.1417	6
Textiles	0.0264	21	0.0164	27
Printing and publishing	0.0235	22	0.0630	17
Transport equipment	0.0221	23	0.0466	19
Other chemicals products	0.0218	24	0.0146	28
Food products	0.0205	25	0.0229	26
Miscellaneous products of petroleum and coal	0.0177	26	0.0941	11
Manufacture of glass and glass products	0.0105	27	0.0375	23
Industrial chemicals	0.0087	28	0.0458	20
Average	0.0657		0.0855	
Standard deviation	0.0469		0.0542	
Coefficient of variation	0.7140		0.6334	
Rank correlation (1971-1974/1991-1994)	0.4685			

A2. Concentration Patterns

Table A2.2c

Mercosur (without Paraguay) - Absolute concentration						
Sector/Year	1971-1974		1991-1994		1995-1998	
	Index	Rank	Index	Rank	Index	Rank
Furniture	0.4580	1	0.4497	14	0.4487	13
Non-ferrous metals	0.4462	2	0.4885	5	0.4973	4
Iron and steel	0.4437	3	0.4595	10	0.4495	12
Non-electrical machinery	0.4390	4	0.5099	3	0.5156	3
Petroleum refineries	0.4364	5	0.4043	24	0.4009	26
Other manufacturing industries	0.4363	6	0.5264	1	0.5328	1
Wood products	0.4316	7	0.4683	8	0.4666	9
Other non-metallic minerals	0.4315	8	0.4235	18	0.4163	22
Rubber products	0.4305	9	0.4620	9	0.4712	8
Electrical machinery	0.4259	10	0.4737	7	0.4942	5
Plastic products	0.4192	11	0.4574	11	0.4613	10
Professional and scientific instruments	0.4189	12	0.5102	2	0.5236	2
Fabricated metal products	0.4188	13	0.4170	22	0.4211	18
Manufacture of paper and paper products	0.4185	14	0.4406	15	0.4192	19
Printing and publishing	0.4131	15	0.4043	23	0.4050	24
Transport equipment	0.4102	16	0.4183	20	0.4192	20
Miscellaneous products of petroleum and coal	0.4098	17	0.4810	6	0.4778	7
Other chemicals products	0.4096	18	0.4333	17	0.4313	15
Wearing apparel, except footwear	0.4090	19	0.4569	12	0.4546	11
Industrial chemicals	0.4068	20	0.4526	13	0.4457	14
Textiles	0.4065	21	0.4213	19	0.4245	17
Manufacture of glass and glass products	0.4055	22	0.4365	16	0.4301	16
Footwear	0.4039	23	0.4937	4	0.4864	6
Pottery, china, and earthenware	0.4029	24	0.4001	25	0.4056	23
Food products	0.4003	25	0.4180	21	0.4190	21
Manufacture of leather and leather products	0.3919	26	0.3857	27	0.4021	25
Beverages	0.3819	27	0.3834	28	0.3890	27
Tobacco	0.3801	28	0.3860	26	0.3889	28
Average	0.4174		0.4451		0.4463	
Standard deviation	0.0189		0.0397		0.0412	
Coefficient of variation	0.0452		0.0891		0.0922	
Rank correlation						
1971-1974/1991-1994			0.5539			
1971-1974/1995-1998			0.5244			
1991-1994/1995-1998			0.9743			

Table A2.2d

Mercosur (without Paraguay) - Relative concentration						
Sector/Year	1971-1974		1991-1994		1995-1998	
	Index	Rank	Index	Rank	Index	Rank
Petroleum refineries	0.2504	1	0.1819	5	0.1672	7
Wearing apparel, except footwear	0.1516	2	0.0779	14	0.0676	16
Furniture	0.1488	3	0.0472	22	0.0399	21
Footwear	0.1264	4	0.1346	9	0.1176	11
Manufacture of leather and leather products	0.1257	5	0.1605	7	0.2609	1
Non-ferrous metals	0.1133	6	0.1212	10	0.1349	9
Iron and steel	0.1084	7	0.0648	18	0.0398	22
Rubber products	0.1021	8	0.0762	15	0.0912	13
Pottery, china, and earthenware	0.0986	9	0.2188	1	0.2269	2
Other manufacturing industries	0.0975	10	0.1878	4	0.1962	4
Non-electrical machinery	0.0950	11	0.1584	8	0.1658	8
Other non-metallic minerals	0.0851	12	0.0405	24	0.0550	19
Tobacco	0.0793	13	0.1949	3	0.2241	3
Wood products	0.0751	14	0.0867	13	0.0799	14
Beverages	0.0644	15	0.2093	2	0.1909	5
Electrical machinery	0.0615	16	0.0944	12	0.1302	10
Manufacture of paper and paper products	0.0434	17	0.0292	25	0.0484	20
Plastic products	0.0428	18	0.0737	16	0.0775	15
Fabricated metal products	0.0394	19	0.0490	21	0.0321	24
Professional and scientific instruments	0.0388	20	0.1623	6	0.1822	6
Textiles	0.0306	21	0.0182	27	0.0173	26
Printing and publishing	0.0266	22	0.0734	17	0.0670	17
Other chemicals products	0.0251	23	0.0159	28	0.0045	27
Transport equipment	0.0244	24	0.0540	19	0.0602	18
Miscellaneous products of petroleum and coal	0.0194	25	0.1073	11	0.0993	12
Food products	0.0149	26	0.0208	26	0.0231	25
Manufacture of glass and glass products	0.0116	27	0.0436	23	0.0041	28
Industrial chemicals	0.0091	28	0.0517	20	0.0326	23
Average	0.0753		0.0984		0.1013	
Standard deviation	0.0550		0.0631		0.0745	
Coefficient of variation	0.7295		0.6417		0.7352	
Rank correlation						
1971-1974/1991-1994			0.4718			
1971-1974/1995-1998			0.5085			
1991-1994/1995-1998			0.9496			

Table A2.3a

Time trends - Absolute concentration (with Paraguay)			
Sector/period	1971-1994	1971-1984	1985-1994
Food products	0.0023*** (0.0004)	0.0031*** (0.0008)	0.0007 (0.0009)
Beverages	-0.0018*** (0.0004)	-0.0028* (0.0013)	0.0008 (0.0006)
Tobacco	0.0008*** (0.0002)	0.0005 (0.0005)	0.0006 (0.0006)
Textiles	0.0020*** (0.0004)	0.0022* (0.0012)	-0.0016 (0.0016)
Wearing apparel, except footwear	0.0087*** (0.0014)	0.0088*** (0.0028)	-0.0071*** (0.0017)
Leather and leather products	-0.0000 (0.0008)	-0.0011 (0.0017)	0.0022 (0.0014)
Footwear	0.0119*** (0.0013)	0.0142*** (0.0025)	-0.0016 (0.0017)
Wood products	0.0013 (0.0009)	0.0028 (0.0027)	-0.0050*** (0.0014)
Furniture	-0.0002 (0.0014)	0.0050** (0.0017)	-0.0129*** (0.0020)
Manufacture of paper and paper products	0.0031*** (0.0007)	0.0072*** (0.0009)	-0.0023*** (0.0006)
Printing and publishing	-0.0008 (0.0010)	0.0042** (0.0018)	-0.0086** (0.0026)
Industrial chemicals	0.0051*** (0.0008)	0.0108*** (0.0012)	-0.0023* (0.0011)
Other chemicals	0.0031*** (0.0007)	0.0061*** (0.0007)	-0.0023 (0.0016)
Petroleum refineries	-0.0029** (0.0011)	-0.0079*** (0.0021)	0.0021*** (0.0006)
Miscellaneous products of petroleum and coal	0.0078*** (0.0019)	0.0227*** (0.0022)	-0.0042*** (0.0012)
Rubber products	0.0048*** (0.0006)	0.0014 (0.0015)	-0.0008 (0.0011)
Plastic products	0.0043*** (0.0012)	0.0058* (0.0029)	-0.0042 (0.0023)
Pottery, china and earthenware	-0.0039*** (0.0010)	-0.0066*** (0.0011)	0.0052 (0.0031)
Manufacture of glass and glass products	0.0036*** (0.0011)	0.0064*** (0.0014)	-0.0042 (0.0038)
Other non-metallic minerals	-0.0006 (0.0017)	0.0074*** (0.0016)	-0.0179*** (0.0014)
Iron and steel	0.0016*** (0.0005)	0.0023* (0.0012)	-0.0032** (0.0012)
Non-ferrous metals	0.0047*** (0.0007)	0.0049*** (0.0015)	-0.0025* (0.0012)
Fabricated metal products	-0.0001 (0.0004)	0.0003 (0.0013)	-0.0029** (0.0010)
Non-electrical machinery	0.0084*** (0.0009)	0.0106*** (0.0013)	-0.0010 (0.0015)
Electrical machinery	0.0060*** (0.0013)	0.0119*** (0.0018)	-0.0065* (0.0029)
Transport equipment	0.0018* (0.0010)	0.0061*** (0.0013)	-0.0077*** (0.0016)
Professional and scientific instruments	0.0106*** (0.0011)	0.0167*** (0.0013)	-0.0032 (0.0023)
Other manufacturing industries	0.0085*** (0.0018)	0.0186*** (0.0030)	-0.0023** (0.0008)

*, **, *** denote significant at 10%, 5% and 1% respectively
Robust standard errors in parentheses

Time trends - Relative concentration (with Paraguay)			
Sector/period	1971-1994	1971-1984	1985-1994
Food products	0.0169 (0.1220)	0.0754*** (0.0240)	-0.1160*** (0.0287)
Beverages	0.0720*** (0.0084)	0.0936*** (0.0164)	0.0075 (0.0081)
Tobacco	0.0440*** (0.0075)	0.0638*** (0.0143)	-0.0181 (0.0134)
Textiles	-0.0285 (0.0167)	0.0040 (0.0273)	-0.1149 (0.0680)
Wearing apparel, except footwear	-0.0226* (0.0115)	-0.1352*** (0.0296)	-0.0022 (0.0122)
Leather and leather products	-0.0015 (0.0074)	-0.0082 (0.0300)	0.0257 (0.0225)
Footwear	0.0312* (0.0179)	-0.0450 (0.0388)	0.0339*** (0.0066)
Wood products	0.0089 (0.0087)	0.0077 (0.0242)	0.0431** (0.0175)
Furniture	-0.0535*** (0.0068)	-0.0390** (0.0131)	-0.0995*** (0.0247)
Manufacture of paper and paper products	-0.0078 (0.0194)	0.0176 (0.0401)	0.0740* (0.0352)
Printing and publishing	0.0405** (0.0195)	-0.0611 (0.0475)	0.1061 (0.0738)
Industrial chemicals	0.0601*** (0.0158)	0.1500*** (0.0295)	0.0715 (0.0471)
Other chemicals	-0.0222 (0.0201)	-0.0202 (0.0462)	0.0739 (0.0793)
Petroleum refineries	-0.0153*** (0.0027)	-0.0231*** (0.0071)	-0.0015 (0.0081)
Miscellaneous products of petroleum and coal	0.0773*** (0.0247)	0.2245*** (0.0423)	0.0113* (0.0060)
Rubber products	0.0056 (0.0184)	-0.1364*** (0.0319)	0.0409** (0.0149)
Plastic products	0.0212 (0.0161)	-0.0421 (0.0689)	0.0296 (0.0294)
Pottery, china and earthenware	0.0585*** (0.0109)	0.0719** (0.0271)	0.0432*** (0.0088)
Manufacture of glass and glass products	0.0465** (0.0222)	0.0136 (0.0414)	0.0363 (0.0788)
Other non-metallic minerals	-0.0558*** (0.0134)	-0.0126* (0.0068)	-0.0533 (0.0675)
Iron and steel	-0.0370*** (0.0108)	-0.0865*** (0.0178)	0.0331 (0.0325)
Non-ferrous metals	0.0012 (0.0057)	-0.0402*** (0.0096)	0.0272** (0.0107)
Fabricated metal products	0.0474** (0.0172)	0.0320 (0.0524)	-0.0261 (0.0299)
Non-electrical machinery	0.0301*** (0.0046)	0.0175* (0.0094)	0.0295*** (0.0035)
Electrical machinery	0.0215*** (0.0059)	0.0479*** (0.0099)	-0.0077 (0.0211)
Transport equipment	0.0086 (0.0221)	0.0075 (0.0288)	0.1672** (0.0556)
Professional and scientific instruments	0.0684*** (0.0094)	0.1091*** (0.0240)	0.0196 (0.0125)
Other manufacturing industries	0.0244*** (0.0080)	0.0613*** (0.0168)	0.0209*** (0.0047)

*, **, *** denote significant at 10%, 5% and 1% respectively
Robust standard errors in parentheses

Table A2.3b

Time trends - Absolute concentration (without Paraguay)			
Sector/period	1971-1998	1971-1984	1985-1998
Food products	0.0018*** (0.0003)	0.0030*** (0.0007)	-0.0006 (0.0005)
Beverages	0.0001 (0.0004)	0.0002 (0.0011)	0.0009 (0.0006)
Tobacco	0.0009** (0.0001)	0.0003 (0.0005)	0.0008*** (0.0003)
Textiles	0.0020*** (0.0004)	0.0031** (0.0013)	-0.0011* (0.0006)
Wearing apparel, except footwear	0.0064*** (0.0010)	0.0089*** (0.0028)	-0.0059*** (0.0011)
Leather and leather products	0.0013* (0.0008)	-0.0016 (0.0015)	0.0057*** (0.0011)
Footwear	0.0092*** (0.0012)	0.0147*** (0.0026)	-0.0034** (0.0012)
Wood products	0.0032*** (0.0009)	0.0076*** (0.0023)	-0.0031* (0.0014)
Furniture	-0.0015 (0.0012)	0.0053*** (0.0017)	-0.0100*** (0.0017)
Manufacture of paper and paper products	0.0081 (0.0010)	0.0072*** (0.0009)	-0.0066*** (0.0016)
Printing and publishing	-0.0015** (0.0007)	0.0045** (0.0017)	-0.0062*** (0.0012)
Industrial chemicals	0.0034*** (0.0008)	0.0108*** (0.0012)	-0.0029*** (0.0007)
Other chemicals	0.0020*** (0.0006)	0.0061*** (0.0006)	-0.0026*** (0.0008)
Petroleum refineries	-0.0023*** (0.0008)	-0.0079*** (0.0020)	0.0006 (0.0004)
Miscellaneous products of petroleum and coal	0.0051*** (0.0016)	0.0226*** (0.0022)	-0.0037*** (0.0009)
Rubber products	0.0046*** (0.0004)	0.0019 (0.0015)	0.0008 (0.0007)
Plastic products	0.0033*** (0.0009)	0.0059* (0.0029)	-0.0027** (0.0010)
Pottery, china and earthenware	-0.0004 (0.0005)	-0.0024*** (0.0008)	0.0038*** (0.0011)
Manufacture of glass and glass products	0.0025*** (0.0007)	0.0066*** (0.0013)	-0.0033** (0.0013)
Other non-metallic minerals	-0.0025** (0.0012)	0.0074*** (0.0016)	-0.0132*** (0.0010)
Iron and steel	0.0005 (0.0006)	0.0025* (0.0012)	-0.0043*** (0.0010)
Non-ferrous metals	0.0041*** (0.0006)	0.0050*** (0.0015)	-0.0005 (0.0007)
Fabricated metal products	-0.0001 (0.0003)	0.0004 (0.0014)	-0.0014** (0.0005)
Non-electrical machinery	0.0070*** (0.0007)	0.0107*** (0.0013)	-0.0003 (0.0007)
Electrical machinery	0.0052*** (0.0009)	0.0119*** (0.0018)	-0.0014 (0.0012)
Transport equipment	0.0007 (0.0007)	0.0062*** (0.0013)	-0.0057*** (0.0009)
Professional and scientific instruments	0.0089*** (0.0009)	0.0167*** (0.0013)	-0.0001 (0.0010)
Other manufacturing industries	0.0067*** (0.0014)	0.0185*** (0.0030)	-0.006 (0.0004)

*, **, *** denote significant at 10%, 5% and 1% respectively
Robust standard errors in parentheses

Time trends - Relative concentration (without Paraguay)			
Sector/period	1971-1998	1971-1984	1985-1998
Food products	0.0105 (0.0188)	0.1329*** (0.0390)	-0.1084*** (0.0285)
Beverages	0.0592*** (0.0081)	0.0917*** (0.0183)	-0.0010 (0.0050)
Tobacco	0.0394*** (0.0056)	0.0647*** (0.0141)	0.0033 (0.0073)
Textiles	-0.0340*** (0.0108)	-0.0002 (0.0297)	-0.0602* (0.0316)
Wearing apparel, except footwear	-0.0188* (0.0099)	-0.1385*** (0.0304)	-0.0154 (0.0127)
Leather and leather products	0.0146** (0.0066)	-0.0097 (0.0307)	0.0650*** (0.0162)
Footwear	0.0296** (0.0140)	-0.0412 (0.0398)	0.0072 (0.0075)
Wood products	0.0063 (0.0071)	0.0036 (0.0265)	0.0132 (0.0143)
Furniture	-0.0769*** (0.0193)	-0.0392** (0.0133)	-0.1605** (0.0582)
Manufacture of paper and paper products	0.0047 (0.0270)	0.0256 (0.0543)	0.1075 (0.0642)
Printing and publishing	0.0542*** (0.0134)	-0.0658 (0.0516)	0.0847** (0.3335)
Industrial chemicals	0.0485*** (0.0168)	0.1648*** (0.0412)	0.0298 (0.0236)
Other chemicals	-0.0554*** (0.0199)	-0.0265 (0.0483)	-0.0942 (0.0584)
Petroleum refineries	-0.0146*** (0.0019)	-0.0227*** (0.0071)	-0.0090* (0.0044)
Miscellaneous products of petroleum and coal	0.0592*** (0.0221)	0.2368*** (0.0495)	0.0035 (0.0100)
Rubber products	0.0195 (0.0149)	-0.1363*** (0.0318)	0.0456*** (0.0096)
Plastic products	0.0260* (0.0130)	-0.0700 (0.0910)	0.0262** (0.0107)
Pottery, china and earthenware	0.0597*** (0.0150)	0.0723* (0.0377)	0.0384* (0.0059)
Manufacture of glass and glass products	-0.0107 (0.0281)	0.0160 (0.0452)	-0.1685* (0.0574)
Other non-metallic minerals	-0.0391*** (0.0101)	-0.0140* (0.0069)	0.0224 (0.0390)
Iron and steel	-0.0375*** (0.0079)	-0.0884*** (0.0184)	-0.0128 (0.0230)
Non-ferrous metals	0.0084* (0.0048)	-0.0415*** (0.0097)	0.0311*** (0.0066)
Fabricated metal products	0.0317** (0.0145)	0.0378 (0.0551)	-0.0560*** (0.0163)
Non-electrical machinery	0.0290*** (0.0039)	0.0171* (0.0095)	0.0243*** (0.0048)
Electrical machinery	0.0244*** (0.0039)	0.0475*** (0.0099)	0.0237** (0.0089)
Transport equipment	0.0307* (0.0163)	0.0084 (0.0328)	0.1491*** (0.0261)
Professional and scientific instruments	0.0608*** (0.0079)	0.1108*** (0.0236)	0.0265*** (0.0062)
Other manufacturing industries	0.0214*** (0.0061)	0.0609*** (0.0168)	0.0205*** (0.0034)

*, **, *** denote significant at 10%, 5% and 1% respectively
Robust standard errors in parentheses

Table A2.3c

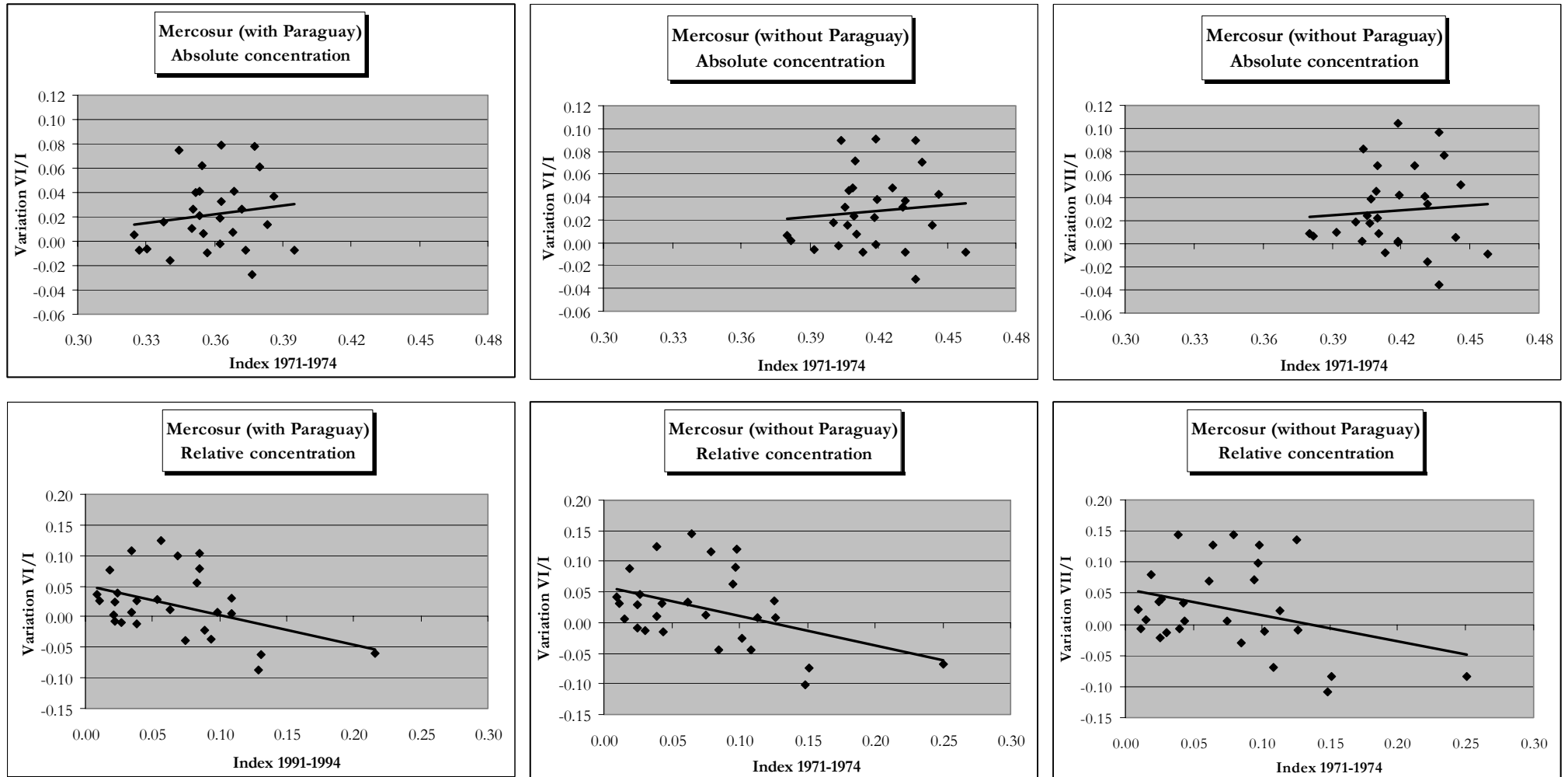
Time Trends – Average Concentration Indices			
Index/Period	1971-1994	1971-1984	1985-1998(1)
Average Absolute Concentration (with Paraguay)	0.0034*** (0.0006)	0.0061*** (0.0008)	-0.0035*** (0.0006)
Average Absolute Concentration (without Paraguay)	0.0027*** (0.0005)	0.0065*** (0.0007)	-0.0024*** (0.0003)
Average Relative Concentration (with Paraguay)	0.0131*** (0.0019)	0.0102*** (0.0032)	0.0160*** (0.0064)
Average Relative Concentration (without Paraguay)	0.0137*** (0.0015)	0.0098*** (0.0033)	0.0162*** (0.0033)

(1) 1985-1994 in those cases including Paraguay

*, **, *** denote significant at 10%, 5% and 1% respectively

Robust standard errors in parentheses

Figure A2.1



A2. Concentration Patterns

Table A2.4a

Manufacturing industries - Country shares in total Mercosur production value																								
Sector/Year-Country	1971-1974				1975-1978				1979-1982				1983-1986				1987-1990				1991-1994			
	AR	BR	URU	PAR	AR	BR	URU	PAR	AR	BR	URU	PAR	AR	BR	URU	PAR	AR	BR	URU	PAR	AR	BR	URU	PAR
Food products	0.405	0.538	0.030	0.027	0.356	0.596	0.025	0.022	0.347	0.602	0.027	0.025	0.327	0.623	0.025	0.025	0.295	0.650	0.027	0.028	0.320	0.629	0.027	0.024
Beverages	0.433	0.483	0.073	0.011	0.383	0.541	0.057	0.019	0.378	0.504	0.080	0.037	0.471	0.430	0.057	0.042	0.455	0.439	0.064	0.042	0.508	0.376	0.077	0.039
Tobacco	0.455	0.457	0.075	0.013	0.457	0.456	0.070	0.016	0.422	0.488	0.081	0.010	0.486	0.435	0.066	0.013	0.461	0.455	0.065	0.018	0.514	0.409	0.065	0.011
Textiles	0.379	0.587	0.028	0.006	0.379	0.584	0.026	0.010	0.314	0.650	0.023	0.013	0.322	0.637	0.025	0.015	0.285	0.666	0.028	0.021	0.318	0.646	0.024	0.012
Wearing apparel, except footwear	0.588	0.384	0.026	0.002	0.465	0.498	0.035	0.002	0.298	0.674	0.026	0.002	0.208	0.774	0.016	0.002	0.151	0.823	0.023	0.002	0.209	0.761	0.028	0.002
Manufacture of leather and leather products	0.526	0.395	0.052	0.027	0.496	0.362	0.116	0.026	0.473	0.436	0.068	0.023	0.352	0.533	0.095	0.020	0.344	0.543	0.091	0.022	0.464	0.444	0.060	0.032
Footwear	0.546	0.406	0.033	0.015	0.351	0.599	0.036	0.014	0.218	0.743	0.021	0.018	0.166	0.805	0.010	0.019	0.114	0.856	0.011	0.019	0.146	0.825	0.009	0.020
Wood products	0.316	0.659	0.008	0.016	0.248	0.716	0.011	0.024	0.190	0.746	0.010	0.054	0.205	0.720	0.008	0.068	0.158	0.758	0.009	0.075	0.192	0.720	0.007	0.081
Furniture	0.227	0.756	0.014	0.003	0.181	0.806	0.011	0.003	0.194	0.793	0.009	0.004	0.157	0.833	0.003	0.007	0.182	0.806	0.005	0.006	0.255	0.731	0.009	0.005
Manufacture of paper and paper products	0.357	0.629	0.014	0.000	0.334	0.651	0.014	0.000	0.260	0.725	0.015	0.000	0.250	0.731	0.019	0.000	0.248	0.732	0.020	0.000	0.277	0.711	0.012	0.000
Printing and publishing	0.376	0.606	0.016	0.002	0.325	0.660	0.013	0.002	0.284	0.695	0.016	0.005	0.328	0.652	0.013	0.007	0.279	0.689	0.025	0.007	0.389	0.573	0.031	0.008
Industrial chemicals	0.418	0.564	0.016	0.002	0.320	0.671	0.007	0.002	0.253	0.738	0.007	0.002	0.243	0.750	0.005	0.002	0.241	0.749	0.008	0.002	0.253	0.740	0.005	0.002
Other chemicals products	0.392	0.588	0.017	0.004	0.324	0.655	0.016	0.004	0.281	0.693	0.022	0.004	0.275	0.702	0.020	0.004	0.251	0.726	0.020	0.003	0.290	0.689	0.018	0.003
Petroleum refineries	0.705	0.260	0.032	0.004	0.593	0.365	0.037	0.005	0.553	0.412	0.030	0.005	0.506	0.471	0.021	0.003	0.483	0.494	0.020	0.003	0.533	0.451	0.014	0.003
Miscellaneous products of petroleum and coal	0.395	0.585	0.019	0.000	0.251	0.738	0.010	0.000	0.129	0.867	0.003	0.000	0.135	0.860	0.004	0.001	0.147	0.850	0.003	0.001	0.187	0.811	0.001	0.000
Rubber products	0.276	0.691	0.032	0.002	0.289	0.677	0.031	0.003	0.262	0.702	0.031	0.005	0.236	0.732	0.026	0.006	0.183	0.784	0.027	0.006	0.219	0.766	0.011	0.004
Plastic products	0.359	0.627	0.014	0.000	0.252	0.739	0.009	0.000	0.231	0.754	0.015	0.000	0.252	0.734	0.014	0.001	0.176	0.803	0.021	0.001	0.218	0.761	0.021	0.000
Pottery, china, and earthenware	0.516	0.443	0.017	0.025	0.381	0.569	0.015	0.035	0.442	0.459	0.039	0.060	0.458	0.428	0.038	0.076	0.408	0.455	0.047	0.090	0.527	0.368	0.038	0.067
Manufacture of glass and glass products	0.392	0.579	0.027	0.001	0.342	0.628	0.029	0.002	0.289	0.687	0.022	0.002	0.277	0.702	0.016	0.004	0.284	0.690	0.022	0.003	0.292	0.690	0.015	0.003
Other non-metallic minerals	0.307	0.681	0.013	0.000	0.228	0.761	0.010	0.000	0.201	0.784	0.015	0.000	0.199	0.789	0.011	0.001	0.231	0.758	0.010	0.001	0.348	0.642	0.010	0.000
Iron and steel	0.283	0.712	0.003	0.003	0.243	0.752	0.002	0.003	0.237	0.757	0.002	0.004	0.227	0.765	0.003	0.005	0.226	0.767	0.004	0.004	0.238	0.757	0.002	0.003
Non-ferrous metals	0.278	0.720	0.001	0.001	0.212	0.785	0.001	0.002	0.207	0.790	0.002	0.002	0.186	0.811	0.001	0.002	0.154	0.844	0.001	0.002	0.169	0.828	0.001	0.001
Fabricated metal products	0.365	0.626	0.009	0.000	0.344	0.649	0.007	0.000	0.326	0.664	0.010	0.000	0.371	0.623	0.006	0.000	0.340	0.651	0.009	0.000	0.374	0.617	0.009	0.000
Non-electrical machinery	0.300	0.697	0.003	0.001	0.244	0.754	0.002	0.001	0.178	0.819	0.002	0.001	0.145	0.851	0.001	0.003	0.101	0.896	0.001	0.003	0.124	0.873	0.002	0.002
Electrical machinery	0.339	0.654	0.007	0.000	0.255	0.738	0.006	0.000	0.183	0.811	0.006	0.000	0.173	0.822	0.004	0.000	0.151	0.842	0.006	0.000	0.201	0.794	0.005	0.000
Transport equipment	0.435	0.561	0.003	0.000	0.377	0.618	0.004	0.000	0.315	0.675	0.008	0.001	0.302	0.692	0.004	0.002	0.282	0.706	0.011	0.001	0.380	0.613	0.006	0.001
Professional and scientific instruments	0.368	0.625	0.007	0.000	0.266	0.729	0.004	0.000	0.178	0.820	0.002	0.000	0.120	0.879	0.001	0.000	0.105	0.889	0.005	0.000	0.115	0.876	0.009	0.000
Other manufacturing industries	0.290	0.694	0.016	0.000	0.141	0.848	0.011	0.000	0.090	0.905	0.005	0.000	0.083	0.913	0.003	0.000	0.071	0.924	0.005	0.000	0.085	0.908	0.008	0.000
Total manufacturing industry	0.404	0.569	0.020	0.007	0.340	0.635	0.018	0.007	0.293	0.680	0.018	0.008	0.285	0.691	0.015	0.009	0.259	0.714	0.017	0.010	0.308	0.668	0.015	0.008

A2. Concentration Patterns

Table A2.4b

Manufacturing industries - Country shares in total Mercosur production value																		
Sector/Year-Country	1971-1974			1975-1978			1979-1982			1983-1986			1987-1990			1991-1994		
	AR	BR	URU	AR	BR	URU	AR	BR	URU	AR	BR	URU	AR	BR	URU	AR	BR	URU
Food products	0.416	0.553	0.030	0.364	0.610	0.026	0.356	0.617	0.027	0.336	0.639	0.026	0.304	0.669	0.027	0.328	0.645	0.025
Beverages	0.438	0.488	0.074	0.390	0.552	0.058	0.393	0.524	0.083	0.492	0.449	0.060	0.474	0.459	0.067	0.529	0.391	0.080
Tobacco	0.461	0.463	0.076	0.465	0.464	0.072	0.426	0.493	0.081	0.492	0.441	0.067	0.470	0.464	0.066	0.520	0.414	0.066
Textiles	0.381	0.590	0.029	0.383	0.590	0.027	0.318	0.659	0.023	0.327	0.647	0.026	0.291	0.680	0.029	0.322	0.654	0.024
Wearing apparel, except footwear	0.590	0.385	0.026	0.466	0.499	0.035	0.299	0.675	0.026	0.209	0.776	0.016	0.152	0.825	0.023	0.210	0.762	0.028
Manufacture of leather and leather products	0.541	0.406	0.054	0.509	0.372	0.119	0.484	0.446	0.070	0.360	0.544	0.097	0.352	0.555	0.093	0.479	0.459	0.062
Footwear	0.554	0.412	0.033	0.356	0.607	0.037	0.222	0.756	0.021	0.169	0.821	0.010	0.116	0.872	0.012	0.149	0.842	0.009
Wood products	0.322	0.670	0.008	0.254	0.734	0.012	0.201	0.788	0.011	0.220	0.772	0.009	0.171	0.819	0.010	0.209	0.784	0.008
Furniture	0.228	0.759	0.014	0.181	0.808	0.011	0.195	0.796	0.009	0.158	0.839	0.003	0.183	0.811	0.005	0.257	0.735	0.009
Manufacture of paper and paper products	0.357	0.629	0.014	0.335	0.651	0.014	0.260	0.726	0.015	0.250	0.731	0.019	0.248	0.732	0.020	0.277	0.711	0.012
Printing and publishing	0.377	0.608	0.016	0.325	0.662	0.013	0.285	0.699	0.016	0.330	0.656	0.013	0.281	0.694	0.025	0.392	0.577	0.031
Industrial chemicals	0.419	0.566	0.016	0.321	0.673	0.007	0.254	0.740	0.007	0.244	0.751	0.005	0.241	0.751	0.008	0.253	0.742	0.005
Other chemicals products	0.393	0.590	0.017	0.326	0.658	0.016	0.282	0.696	0.022	0.276	0.705	0.020	0.252	0.729	0.020	0.291	0.691	0.018
Petroleum refineries	0.707	0.261	0.032	0.596	0.367	0.038	0.556	0.414	0.030	0.507	0.472	0.021	0.485	0.496	0.020	0.534	0.452	0.014
Miscellaneous products of petroleum and coal	0.395	0.586	0.019	0.252	0.739	0.010	0.129	0.868	0.003	0.135	0.861	0.004	0.147	0.850	0.003	0.187	0.812	0.001
Rubber products	0.276	0.692	0.032	0.290	0.679	0.031	0.263	0.706	0.031	0.237	0.736	0.026	0.184	0.789	0.027	0.220	0.769	0.011
Plastic products	0.359	0.627	0.014	0.252	0.739	0.009	0.231	0.754	0.015	0.252	0.734	0.014	0.176	0.804	0.021	0.218	0.761	0.021
Pottery, china, and earthenware	0.529	0.454	0.017	0.395	0.590	0.015	0.471	0.487	0.042	0.495	0.464	0.041	0.449	0.500	0.051	0.565	0.394	0.041
Manufacture of glass and glass products	0.393	0.580	0.027	0.342	0.629	0.029	0.289	0.688	0.022	0.278	0.705	0.016	0.285	0.693	0.022	0.293	0.692	0.015
Other non-metallic minerals	0.307	0.681	0.013	0.228	0.761	0.010	0.201	0.784	0.015	0.199	0.790	0.011	0.231	0.758	0.010	0.348	0.642	0.010
Iron and steel	0.284	0.714	0.003	0.243	0.755	0.002	0.238	0.760	0.002	0.228	0.769	0.003	0.226	0.770	0.004	0.239	0.759	0.002
Non-ferrous metals	0.278	0.720	0.001	0.212	0.787	0.001	0.207	0.791	0.002	0.186	0.812	0.001	0.154	0.845	0.001	0.170	0.829	0.001
Fabricated metal products	0.365	0.626	0.009	0.344	0.649	0.007	0.326	0.664	0.010	0.371	0.623	0.006	0.340	0.651	0.009	0.374	0.618	0.009
Non-electrical machinery	0.300	0.697	0.003	0.244	0.754	0.002	0.179	0.820	0.002	0.146	0.853	0.001	0.101	0.898	0.001	0.124	0.874	0.002
Electrical machinery	0.339	0.654	0.007	0.256	0.738	0.006	0.183	0.811	0.006	0.173	0.822	0.004	0.151	0.842	0.006	0.201	0.794	0.005
Transport equipment	0.436	0.561	0.003	0.378	0.619	0.004	0.315	0.676	0.008	0.303	0.693	0.004	0.282	0.707	0.011	0.381	0.613	0.006
Professional and scientific instruments	0.368	0.625	0.007	0.266	0.729	0.004	0.178	0.820	0.002	0.120	0.879	0.001	0.105	0.889	0.005	0.115	0.876	0.009
Other manufacturing industries	0.290	0.694	0.016	0.141	0.848	0.011	0.090	0.905	0.005	0.083	0.913	0.003	0.071	0.924	0.005	0.085	0.908	0.008
Total manufacturing industry	0.407	0.573	0.020	0.342	0.639	0.018	0.296	0.686	0.018	0.287	0.697	0.016	0.262	0.721	0.017	0.311	0.674	0.016

Table A2.5

<i>Absolute concentration (with Paraguay)</i>			
	1987-1990	1991-1994	1995-1998
abslabint	0.0730	0.0510	
absskillintah	-0.1267	0.0858	
absskillintsc	0.0592	0.0962	
scale	-0.2353	-0.2816	
absexpconc	0.9425***	0.9288***	
osint	-0.2036	-0.1641	
wmsint	0.0829	0.0604	
transp	-0.2530	-0.2761	
fd	-0.1202	-0.2333	
agint	-0.4429**	-0.4462**	
np	0.1103	0.2086	

* significant at 10%; ** significant at 5%; *** significant at 1%

<i>Absolute concentration (without Paraguay)</i>			
	1987-1990	1991-1994	1995-1998
abslabint	0.0700	0.0834	0.1795
absskillintah	-0.1903	0.0140	0.0236
absskillintsc	0.0055	0.0162	0.0795
scale	-0.2852	-0.3491*	-0.3000
absexpconc	0.9475***	0.9354***	0.5479***
osint	-0.2204	-0.1959	-0.1921
wmsint	0.0508	0.0132	0.0917
transp	-0.2209	-0.2278	-0.3046
fd	-0.0952	-0.1740	-0.1372
agint	-0.4212**	-0.3968**	-0.3858**
np	0.1035	0.1795	0.2442

* significant at 10%; ** significant at 5%; *** significant at 1%

<i>Relative concentration (with Paraguay)</i>			
	1987-1990	1991-1994	1995-1998
rellabint	0.3169	0.2091	
relskillintah	0.2572	0.0502	
relskillintsc	0.0768	0.0781	
technology	0.2102	0.1609	
scale	0.0016	-0.0140	
relexpconc	0.9354***	0.8675***	
osint	-0.4314**	-0.3911**	
wmsint	-0.3886**	-0.3351*	
transp	0.0703	0.0113	
fd	0.1663	0.1040	
agint	0.0818	-0.0656	
np	0.0845	0.2599	

* significant at 10%; ** significant at 5%; *** significant at 1%

<i>Relative concentration (without Paraguay)</i>			
	1987-1990	1991-1994	1995-1998
rellabint	0.3300*	0.2091	0.1516
relskillintah	0.2257	0.0502	0.0491
relskillintsc	0.0600	0.0781	0.1829
technology	0.2277	0.1609	0.2917
scale	-0.0282	-0.0140	0.0200
relexpconc	0.9414***	0.8675***	0.9108***
osint	-0.4229**	-0.3911**	-0.3913**
wmsint	-0.3883**	-0.3351*	-0.2064
transp	0.0941	0.0113	-0.0181
fd	0.1638	0.1040	0.1740
agint	0.0969	-0.0656	-0.1015
np	0.0667	0.2599	0.2607

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure A2.2a. Absolute concentration with Paraguay (1986-1994)

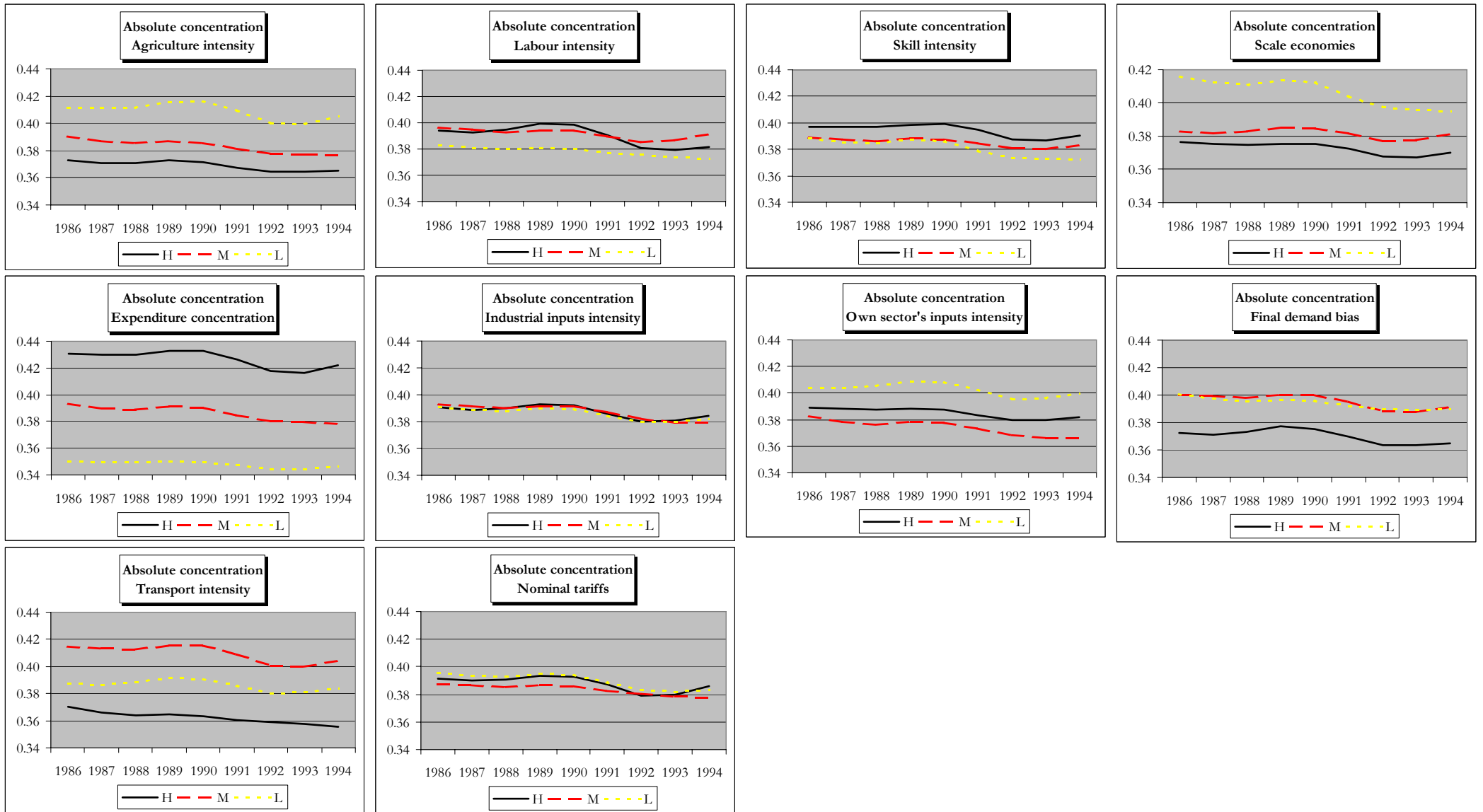


Figure A2.2b. Absolute concentration without Paraguay (1986-1998)

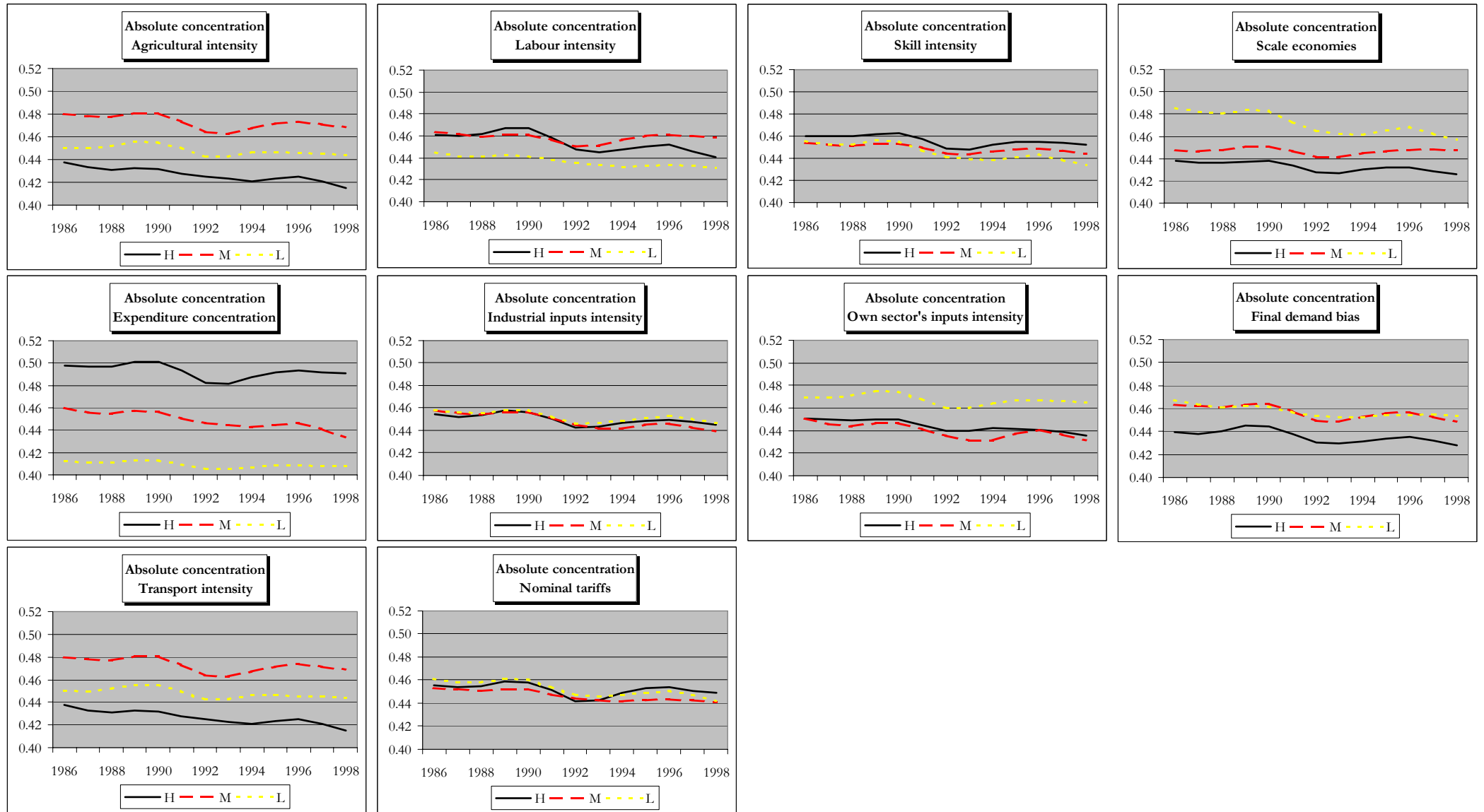


Figure A2.2c. Relative concentration with Paraguay (1986-1994)

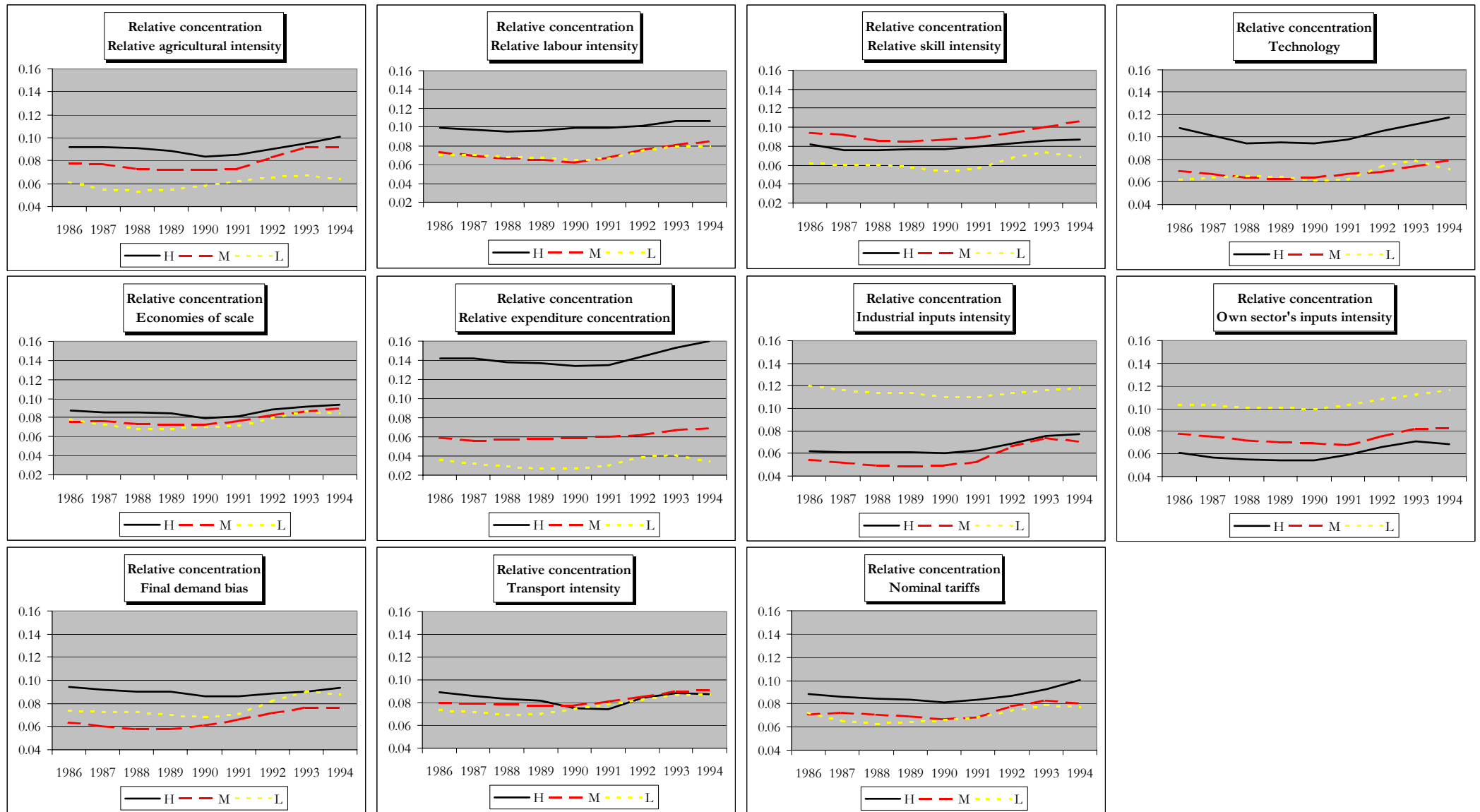


Figure A2.2d. Relative concentration without Paraguay (1986-1998)

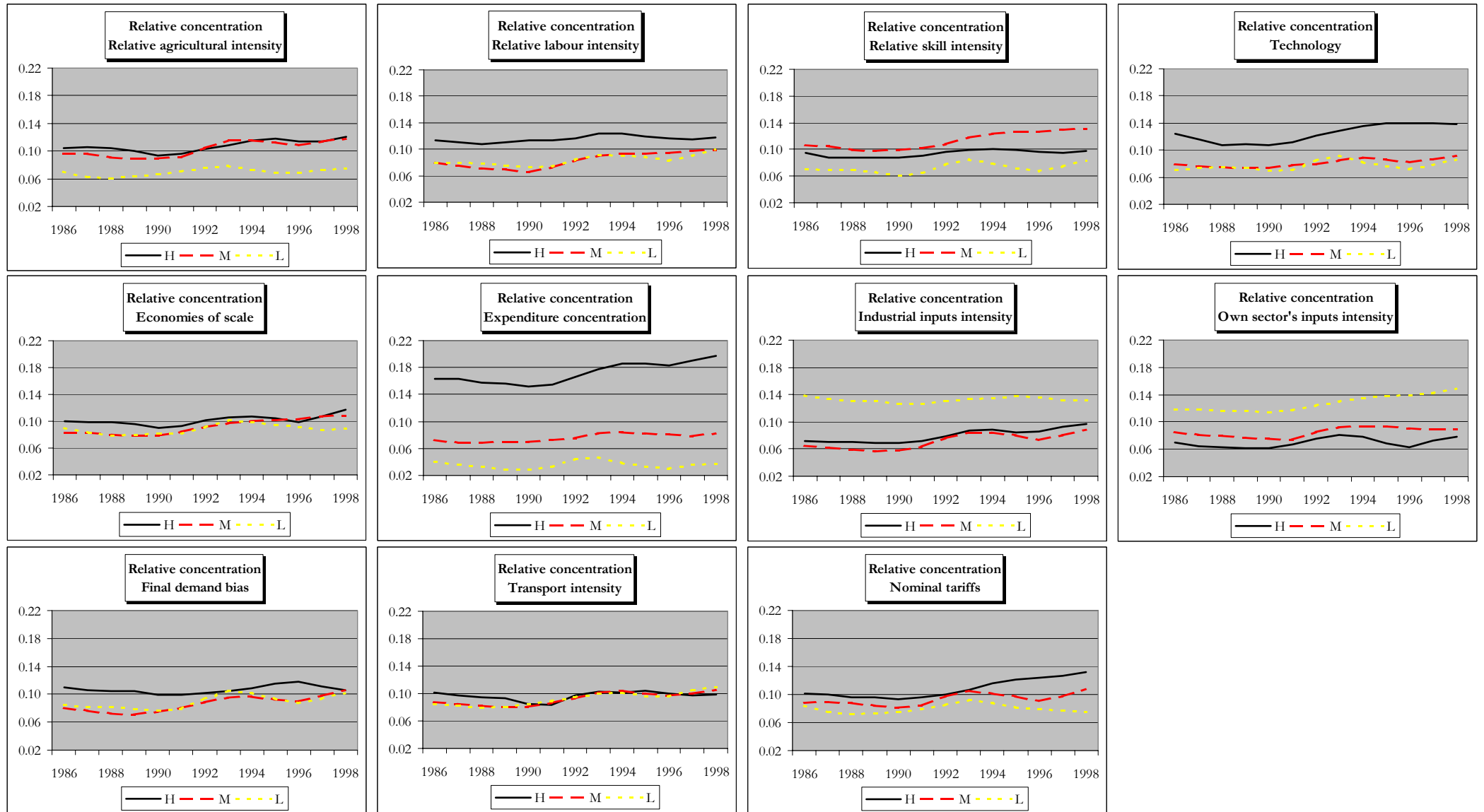


Table A2.6a

Relative concentration

<i>Explanatory variable</i>	<i>Definition</i>
Relative labour intensity	$rellabint_k = \left \frac{\sum_{i=1}^N L_{ik}}{\sum_{i=1}^N VA_{ik}} - \frac{\sum_{i=1}^N \sum_{k=1}^M L_{ik}}{\sum_{i=1}^N \sum_{k=1}^M VA_{ik}} \right $
Relative human capital intensity	$relskillint_k = \left \frac{H_k}{L_k} - \frac{\sum_{k=1}^M H_k}{\sum_{k=1}^M L_k} \right $
Technology	$technology_k = \sqrt{\frac{1}{N} \sum_{i=1}^N \left[\frac{VA_{ik}/L_{ik}}{\left(\frac{1}{N}\right) \sum_{i=1}^N VA_{ik}/L_{ik}} - \frac{\sum_{k=1}^M VA_{ik}/L_{ik}}{\left(\frac{1}{N}\right) \sum_{i=1}^N \sum_{k=1}^M VA_{ik}/L_{ik}} \right]^2}$
Scale economies	$scale_k = \frac{L_k}{EST_k}$
Relative expenditure concentration	$relexpconc_k = \sqrt{\frac{1}{N} \sum_{i=1}^N \left(\frac{E_{ik}}{\sum_{i=1}^N E_{ik}} - \frac{\sum_{k=1}^M E_{ik}}{\sum_{i=1}^N \sum_{k=1}^M E_{ik}} \right)^2}$
Inputs from own industry	$osint_k = \frac{INT_k}{PV_k}$
Inputs from the whole manufacturing sector	$wmsint_k = \frac{\sum_{k=1}^M INT_k}{PV_k}$
Transport intensity	$transp_k = \frac{TRC_k}{TS_k}$
Trade costs	np_k

where

Countries: $i=1,\dots,N$

Industries: $k=1,\dots,M$

L = Employment

VA = Value Added

PV = Production Value

H = Employees with at least secondary school (/who attained high school).

E = Expenditure=Production Value + Imports – Exports

INT = Intermediate Inputs

EST = Number of Establishments

TRC =Transport Costs

TS = Total Supply

τ = MFN Nominal (legal) tariff

Table A2.6b

<i>Data availability</i>		
Variable	Period	Source
Employment (1)	1985-1998	PADI
Employees with at least secondary school (2)	1985-1998	RAIS-Ministry of Works
Value added (1) , (2)	1985-1998/1985, 1990-1998	PADI/IBGE
Production value (1)	1985-1998	PADI
Exports (1)	1985-1998	PADI
Imports (1)	1985-1998	PADI
Tariffs (2)	1987-1998	Kume et al. (2000)
Average establishment size (2)	1985-1998	RAIS-Ministry of Works
Intermediate inputs (2)	1985, 1990-1998	IBGE

(1) For each industry in Argentina, Brazil, and Uruguay/1985-1994: for each industry in Paraguay

(2) For each industry in Brazil

A2. Concentration Patterns

Table A2.7a

<i>Determinants of relative concentration - Regressions including Paraguay (1985-1994)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	0.124 (0.081)	0.117 (0.080)	0.102 (0.083)	0.097 (0.083)	0.109 (0.084)	0.110 (0.084)	0.097 (0.085)	0.094 (0.085)
relskillint	0.253 (0.133)*	0.248 (0.132)*	0.264 (0.134)**	0.257 (0.134)*	0.359 (0.151)**	0.357 (0.153)**	0.356 (0.153)**	0.360 (0.156)**
technology	0.047 (0.034)	0.052 (0.034)	0.045 (0.034)	0.048 (0.035)	0.157 (0.070)**	0.167 (0.069)**	0.165 (0.069)**	0.176 (0.068)**
scale	-0.060 (0.079)	-0.064 (0.080)	-0.057 (0.079)	-0.058 (0.078)	-0.096 (0.092)	-0.101 (0.091)	-0.084 (0.091)	-0.085 (0.089)
relexpconc	0.655 (0.067)***	0.651 (0.066)***	0.659 (0.067)***	0.657 (0.066)***	0.702 (0.074)***	0.701 (0.074)***	0.704 (0.074)***	0.707 (0.074)***
osint	-0.199 (0.178)		-0.202 (0.178)		-0.301 (0.193)		-0.289 (0.196)	
wmsint		-0.021 (0.139)		-0.076 (0.149)		-0.174 (0.176)		-0.233 (0.181)
transp			0.240 (0.209)	0.276 (0.223)			0.214 (0.231)	0.319 (0.234)
np	0.037 (0.036)	0.042 (0.036)	0.028 (0.037)	0.028 (0.038)	0.026 (0.060)	0.019 (0.061)	0.024 (0.060)	0.007 (0.061)
Obs.	280	280	280	280	280	280	280	280
Adj. R2	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

<i>Determinants of relative concentration - Regressions including Paraguay (1985-1994)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	0.124 (0.049)**	0.117 (0.051)**	0.102 (0.056)*	0.097 (0.057)*	0.109 (0.052)**	0.110 (0.052)**	0.097 (0.058)*	0.094 (0.057)*
relskillint	0.253 (0.115)**	0.248 (0.119)**	0.264 (0.114)**	0.257 (0.117)**	0.359 (0.127)***	0.357 (0.128)***	0.356 (0.125)***	0.360 (0.124)***
technology	0.047 (0.020)**	0.052 (0.020)***	0.045 (0.020)**	0.048 (0.020)**	0.157 (0.066)**	0.167 (0.064)***	0.165 (0.064)**	0.176 (0.062)***
scale	-0.060 (0.041)	-0.064 (0.043)	-0.057 (0.039)	-0.058 (0.041)	-0.096 (0.051)*	-0.101 (0.051)**	-0.084 (0.049)*	-0.085 (0.048)*
relexpconc	0.655 (0.047)***	0.651 (0.047)***	0.659 (0.047)***	0.657 (0.046)***	0.702 (0.051)***	0.701 (0.050)***	0.704 (0.050)***	0.707 (0.049)***
osint	-0.199 (0.164)		-0.202 (0.165)		-0.301 (0.170)*		-0.289 (0.172)*	
wmsint		-0.021 (0.125)		-0.076 (0.136)		-0.174 (0.142)		-0.233 (0.149)
transp			0.240 (0.138)*	0.276 (0.160)*			0.214 (0.138)	0.319 (0.157)**
np	0.037 (0.032)	0.042 (0.034)	0.028 (0.031)	0.028 (0.035)	0.026 (0.052)	0.019 (0.059)	0.024 (0.053)	0.007 (0.061)
Obs.	280	280	280	280	280	280	280	280
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Panel corrected standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

A2. Concentration Patterns

<i>Determinants of relative concentration - Regressions excluding Paraguay (1985-1998)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	0.276 (0.124)**	0.257 (0.123)**	0.223 (0.129)*	0.223 (0.129)*	0.209 (0.130)	0.207 (0.130)	0.179 (0.133)	0.184 (0.135)
relskillint	0.245 (0.081)***	0.255 (0.081)***	0.264 (0.078)***	0.267 (0.078)***	0.309 (0.089)***	0.301 (0.089)***	0.309 (0.092)***	0.305 (0.090)***
technology	0.139 (0.031)***	0.137 (0.030)***	0.130 (0.029)***	0.130 (0.029)***	0.120 (0.055)**	0.124 (0.055)**	0.131 (0.060)**	0.130 (0.058)**
scale	-0.167 (0.055)***	-0.179 (0.055)***	-0.160 (0.054)***	-0.169 (0.053)***	-0.226 (0.066)***	-0.220 (0.067)***	-0.197 (0.064)***	-0.199 (0.064)***
relexpconc	0.374 (0.062)***	0.372 (0.062)***	0.372 (0.063)***	0.371 (0.063)***	0.391 (0.068)***	0.386 (0.068)***	0.384 (0.069)***	0.382 (0.069)***
osint	0.205 (0.160)		0.171 (0.157)		0.152 (0.173)		0.153 (0.174)	
wmsint		0.207 (0.146)		0.137 (0.163)		0.187 (0.173)		0.135 (0.185)
transp			0.273 (0.248)	0.222 (0.270)			0.257 (0.273)	0.216 (0.286)
np	0.113 (0.038)***	0.112 (0.038)***	0.096 (0.037)***	0.099 (0.037)***	0.123 (0.069)*	0.143 (0.075)*	0.127 (0.069)*	0.139 (0.074)*
Obs.	392	392	392	392	392	392	392	392
Adj. R2	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

<i>Determinants of relative concentration - Regressions excluding Paraguay (1985-1998)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	0.276 (0.087)***	0.257 (0.087)***	0.223 (0.105)**	0.223 (0.105)**	0.209 (0.099)**	0.207 (0.099)**	0.179 (0.109)*	0.184 (0.111)*
relskillint	0.245 (0.076)***	0.255 (0.079)***	0.264 (0.076)***	0.267 (0.077)***	0.309 (0.083)***	0.301 (0.083)***	0.309 (0.083)***	0.305 (0.083)***
technology	0.139 (0.022)***	0.137 (0.021)***	0.130 (0.021)***	0.130 (0.020)***	0.120 (0.050)**	0.124 (0.049)**	0.131 (0.052)**	0.130 (0.050)***
scale	-0.167 (0.044)***	-0.179 (0.047)***	-0.160 (0.042)***	-0.169 (0.047)***	-0.226 (0.051)***	-0.220 (0.051)***	-0.197 (0.048)***	-0.199 (0.049)***
relexpconc	0.374 (0.040)***	0.372 (0.040)***	0.372 (0.041)***	0.371 (0.041)***	0.391 (0.044)***	0.386 (0.044)***	0.384 (0.045)***	0.382 (0.046)***
osint	0.205 (0.199)		0.171 (0.203)		0.152 (0.215)		0.153 (0.216)	
wmsint		0.207 (0.130)		0.137 (0.147)		0.187 (0.160)		0.135 (0.173)
transp			0.273 (0.153)*	0.222 (0.173)			0.257 (0.163)	0.216 (0.177)
np	0.113 (0.037)***	0.112 (0.035)***	0.096 (0.035)***	0.099 (0.036)***	0.123 (0.065)*	0.143 (0.073)*	0.127 (0.065)*	0.139 (0.073)*
Obs.	392	392	392	392	392	392	392	392
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Panel corrected standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

A2. Concentration Patterns

Table A2.7b

<i>Determinants of relative concentration - Regressions including Paraguay (1985-1990)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	-0.047 (0.175)	-0.049 (0.189)	-0.043 (0.173)	-0.032 (0.179)	0.047 (0.207)	0.058 (0.225)	0.055 (0.204)	0.089 (0.211)
relskillint	-0.160 (0.257)	-0.083 (0.242)	-0.173 (0.257)	-0.037 (0.230)	-0.190 (0.262)	-0.080 (0.245)	-0.205 (0.265)	-0.026 (0.232)
technology	0.086 (0.028)***	0.093 (0.028)***	0.086 (0.028)***	0.093 (0.027)***	0.169 (0.043)***	0.177 (0.042)***	0.166 (0.044)***	0.167 (0.041)***
scale	0.142 (0.109)	0.136 (0.099)	0.140 (0.109)	0.117 (0.101)	0.180 (0.122)	0.131 (0.115)	0.185 (0.122)	0.107 (0.111)
relexpconc	0.535 (0.073)***	0.543 (0.075)***	0.524 (0.071)***	0.525 (0.069)***	0.616 (0.075)***	0.616 (0.078)***	0.607 (0.073)***	0.595 (0.072)***
osint	-0.779 (0.409)*		-0.720 (0.416)*		-0.696 (0.399)*		-0.650 (0.406)	
wmsint		-0.743 (0.266)***		-0.936 (0.263)***		-0.712 (0.279)**		-0.926 (0.272)***
transp			0.394 (0.352)	0.841 (0.357)**			0.315 (0.343)	0.766 (0.362)**
np	-0.044 (0.031)	-0.072 (0.035)**	-0.051 (0.031)*	-0.101 (0.034)***	0.024 (0.047)	-0.036 (0.056)	0.020 (0.046)	-0.079 (0.053)
Obs.	168	168	168	168	168	168	168	168
Adj. R2	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

<i>Determinants of relative concentration - Regressions including Paraguay (1985-1990)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	-0.047 (0.134)	-0.049 (0.135)	-0.043 (0.134)	-0.032 (0.135)	0.047 (0.125)	0.058 (0.123)	0.055 (0.130)	0.089 (0.133)
relskillint	-0.160 (0.273)	-0.083 (0.269)	-0.173 (0.272)	-0.037 (0.252)	-0.190 (0.272)	-0.080 (0.261)	-0.205 (0.273)	-0.026 (0.242)
technology	0.086 (0.021)***	0.093 (0.022)***	0.086 (0.020)***	0.093 (0.021)***	0.169 (0.031)***	0.177 (0.030)***	0.166 (0.031)***	0.167 (0.031)***
scale	0.142 (0.099)	0.136 (0.097)	0.140 (0.098)	0.117 (0.098)	0.180 (0.122)	0.131 (0.105)	0.185 (0.121)	0.107 (0.103)
relexpconc	0.535 (0.076)***	0.543 (0.079)***	0.524 (0.074)***	0.525 (0.073)***	0.616 (0.079)***	0.616 (0.080)***	0.607 (0.077)***	0.595 (0.074)***
osint	-0.779 (0.262)***		-0.720 (0.256)***		-0.696 (0.202)***		-0.650 (0.198)***	
wmsint		-0.743 (0.215)***		-0.936 (0.240)***		-0.712 (0.188)***		-0.926 (0.226)***
transp			0.394 (0.196)**	0.841 (0.246)***			0.315 (0.188)*	0.766 (0.237)***
np	-0.044 (0.023)*	-0.072 (0.028)**	-0.051 (0.023)**	-0.101 (0.031)***	0.024 (0.051)	-0.036 (0.057)	0.020 (0.051)	-0.079 (0.063)
Obs.	168	168	168	168	168	168	168	168
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Panel corrected standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

A2. Concentration Patterns

<i>Determinants of relative concentration - Regressions including Paraguay (1991-1994)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	0.162 (0.189)	0.135 (0.186)	0.164 (0.193)	0.134 (0.191)	0.120 (0.190)	0.102 (0.189)	0.054 (0.196)	0.028 (0.196)
relskillint	0.333 (0.197)*	0.359 (0.210)*	0.309 (0.192)	0.348 (0.202)*	0.440 (0.224)*	0.446 (0.233)*	0.461 (0.220)**	0.485 (0.231)**
technology	0.057 (0.039)	0.062 (0.039)	0.074 (0.041)*	0.080 (0.042)*	0.160 (0.110)	0.167 (0.109)	0.129 (0.113)	0.133 (0.113)
scale	-0.050 (0.130)	-0.054 (0.129)	-0.045 (0.141)	-0.050 (0.141)	-0.023 (0.130)	-0.024 (0.130)	-0.014 (0.141)	-0.020 (0.142)
relexpconc	0.648 (0.121)***	0.634 (0.127)***	0.650 (0.120)***	0.627 (0.127)***	0.647 (0.121)***	0.639 (0.128)***	0.661 (0.118)***	0.642 (0.124)***
osint	-0.314 (0.329)		-0.273 (0.334)		-0.386 (0.335)		-0.387 (0.339)	
wmsint		0.048 (0.317)		0.150 (0.323)		-0.060 (0.346)		0.072 (0.355)
transp			-0.521 (0.325)	-0.605 (0.371)			-0.795 (0.381)**	-0.834 (0.444)*
np	0.058 (0.063)	0.054 (0.065)	0.077 (0.070)	0.071 (0.070)	-0.054 (0.128)	-0.043 (0.125)	-0.102 (0.131)	-0.095 (0.127)
Obs.	112	112	112	112	112	112	112	112
Adj. R2	0.88	0.88	0.88	0.88	0.88	0.88	0.89	0.89
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

<i>Determinants of relative concentration - Regressions including Paraguay (1991-1994)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	0.162 (0.076)**	0.135 (0.074)*	0.164 (0.092)*	0.134 (0.082)	0.120 (0.080)	0.102 (0.079)	0.054 (0.091)	0.028 (0.085)
relskillint	0.333 (0.149)**	0.359 (0.158)**	0.309 (0.149)**	0.348 (0.160)**	0.440 (0.138)***	0.446 (0.150)***	0.461 (0.138)***	0.485 (0.156)***
technology	0.057 (0.025)**	0.062 (0.025)**	0.074 (0.025)***	0.080 (0.024)***	0.160 (0.072)**	0.167 (0.072)**	0.129 (0.081)	0.133 (0.084)
scale	-0.050 (0.107)	-0.054 (0.109)	-0.045 (0.107)	-0.050 (0.111)	-0.023 (0.108)	-0.024 (0.108)	-0.014 (0.107)	-0.020 (0.110)
relexpconc	0.648 (0.049)***	0.634 (0.048)***	0.650 (0.048)***	0.627 (0.047)***	0.647 (0.052)***	0.639 (0.057)***	0.661 (0.046)***	0.642 (0.048)***
osint	-0.314 (0.121)***		-0.273 (0.161)*		-0.386 (0.131)***		-0.387 (0.157)**	
wmsint		0.048 (0.152)		0.150 (0.146)		-0.060 (0.182)		0.072 (0.161)
transp			-0.521 (0.150)***	-0.605 (0.200)***			-0.795 (0.183)***	-0.834 (0.192)***
np	0.058 (0.032)*	0.054 (0.035)	0.077 (0.032)**	0.071 (0.032)**	-0.054 (0.033)	-0.043 (0.034)	-0.102 (0.024)***	-0.095 (0.020)***
Obs.	112	112	112	112	112	112	112	112
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Panel corrected standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

A2. Concentration Patterns

<i>Determinants of relative concentration - Regressions excluding Paraguay (1985-1990)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	-0.071 (0.187)	-0.077 (0.207)	-0.067 (0.187)	-0.058 (0.201)	0.110 (0.219)	0.123 (0.241)	0.117 (0.221)	0.160 (0.237)
relskillint	0.026 (0.308)	0.115 (0.297)	0.015 (0.308)	0.166 (0.296)	-0.065 (0.303)	0.074 (0.292)	-0.078 (0.306)	0.138 (0.291)
technology	0.113 (0.039)***	0.123 (0.042)***	0.112 (0.040)***	0.123 (0.041)***	0.212 (0.057)***	0.224 (0.058)***	0.209 (0.059)***	0.212 (0.056)***
scale	0.220 (0.150)	0.215 (0.137)	0.218 (0.150)	0.194 (0.139)	0.301 (0.186)	0.238 (0.168)	0.305 (0.186)	0.209 (0.165)
relexpconc	0.567 (0.084)***	0.578 (0.086)***	0.558 (0.081)***	0.557 (0.080)***	0.624 (0.099)***	0.624 (0.103)***	0.617 (0.097)***	0.599 (0.100)***
osint	-1.182 (0.690)*		-1.134 (0.704)		-1.079 (0.679)		-1.040 (0.689)	
wmsint		-1.025 (0.442)**		-1.241 (0.462)***		-1.011 (0.467)**		-1.266 (0.500)**
transp			0.327 (0.398)	0.942 (0.419)**			0.272 (0.396)	0.906 (0.452)**
np	-0.010 (0.038)	-0.046 (0.039)	-0.016 (0.039)	-0.079 (0.038)**	0.056 (0.057)	-0.025 (0.065)	0.052 (0.056)	-0.077 (0.062)
Obs.	168	168	168	168	168	168	168	168
Adj. R2	0.91	0.91	0.91	0.92	0.91	0.91	0.91	0.91
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

<i>Determinants of relative concentration - Regressions excluding Paraguay (1985-1990)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	-0.071 (0.121)	-0.077 (0.126)	-0.067 (0.122)	-0.058 (0.131)	0.110 (0.147)	0.123 (0.150)	0.117 (0.151)	0.160 (0.164)
relskillint	0.026 (0.392)	0.115 (0.391)	0.015 (0.392)	0.166 (0.373)	-0.065 (0.410)	0.074 (0.407)	-0.078 (0.412)	0.138 (0.386)
technology	0.113 (0.019)***	0.123 (0.021)***	0.112 (0.019)***	0.123 (0.022)***	0.212 (0.038)***	0.224 (0.036)***	0.209 (0.038)***	0.212 (0.039)***
scale	0.220 (0.161)	0.215 (0.158)	0.218 (0.161)	0.194 (0.159)	0.301 (0.211)	0.238 (0.203)	0.305 (0.211)	0.209 (0.201)
relexpconc	0.567 (0.082)***	0.578 (0.084)***	0.558 (0.081)***	0.557 (0.079)***	0.624 (0.089)***	0.624 (0.091)***	0.617 (0.088)***	0.599 (0.085)***
osint	-1.182 (0.513)**		-1.134 (0.517)**		-1.079 (0.455)**		-1.040 (0.460)**	
wmsint		-1.025 (0.395)***		-1.241 (0.433)***		-1.011 (0.363)***		-1.266 (0.421)***
transp			0.327 (0.193)*	0.942 (0.288)***			0.272 (0.184)	0.906 (0.292)***
np	-0.010 (0.031)	-0.046 (0.037)	-0.016 (0.032)	-0.079 (0.042)*	0.056 (0.062)	-0.025 (0.065)	0.052 (0.063)	-0.077 (0.075)
Obs.	168	168	168	168	168	168	168	168
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Panel corrected standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

A2. Concentration Patterns

<i>Determinants of relative concentration - Regressions excluding Paraguay (1991-1994)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	0.178	0.150	0.180	0.149	0.139	0.121	0.074	0.047
	(0.203)	(0.200)	(0.207)	(0.205)	(0.202)	(0.201)	(0.207)	(0.207)
relskillint	0.375	0.406	0.352	0.394	0.489	0.497	0.510	0.536
	(0.215)*	(0.230)*	(0.209)*	(0.221)*	(0.247)*	(0.258)*	(0.244)**	(0.256)**
technology	0.064	0.068	0.081	0.088	0.191	0.198	0.161	0.164
	(0.043)	(0.042)	(0.045)*	(0.045)*	(0.117)	(0.116)*	(0.119)	(0.119)
scale	-0.058	-0.063	-0.052	-0.058	-0.027	-0.029	-0.018	-0.025
	(0.141)	(0.140)	(0.152)	(0.152)	(0.141)	(0.141)	(0.152)	(0.152)
relexpconc	0.680	0.664	0.682	0.657	0.677	0.669	0.692	0.672
	(0.121)***	(0.128)***	(0.120)***	(0.128)***	(0.121)***	(0.128)***	(0.118)***	(0.125)***
osint	-0.312		-0.270		-0.389		-0.390	
	(0.344)		(0.348)		(0.351)		(0.352)	
wmsint		0.069		0.173		-0.048		0.083
		(0.338)		(0.348)		(0.367)		(0.381)
transp			-0.520	-0.615			-0.781	-0.826
			(0.336)	(0.389)			(0.391)**	(0.467)*
np	0.064	0.059	0.083	0.075	-0.057	-0.046	-0.104	-0.098
	(0.069)	(0.070)	(0.076)	(0.075)	(0.136)	(0.134)	(0.139)	(0.135)
Obs.	112	112	112	112	112	112	112	112
Adj. R2	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

<i>Determinants of relative concentration - Regressions excluding Paraguay (1991-1994)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	0.178	0.150	0.180	0.149	0.139	0.121	0.074	0.047
	(0.084)**	(0.081)*	(0.101)*	(0.090)*	(0.093)	(0.091)	(0.104)	(0.097)
relskillint	0.375	0.406	0.352	0.394	0.489	0.497	0.510	0.536
	(0.160)**	(0.170)**	(0.159)**	(0.171)**	(0.148)***	(0.162)***	(0.148)***	(0.170)***
technology	0.064	0.068	0.081	0.088	0.191	0.198	0.161	0.164
	(0.027)**	(0.027)**	(0.028)***	(0.026)***	(0.074)***	(0.074)***	(0.082)*	(0.086)*
scale	-0.058	-0.063	-0.052	-0.058	-0.027	-0.029	-0.018	-0.025
	(0.120)	(0.123)	(0.120)	(0.125)	(0.119)	(0.120)	(0.119)	(0.122)
relexpconc	0.680	0.664	0.682	0.657	0.677	0.669	0.692	0.672
	(0.045)***	(0.044)***	(0.043)***	(0.042)***	(0.048)***	(0.054)***	(0.042)***	(0.045)***
osint	-0.312		-0.270		-0.389		-0.390	
	(0.134)**		(0.169)		(0.144)***		(0.164)**	
wmsint		0.069		0.173		-0.048		0.083
		(0.174)		(0.170)		(0.203)		(0.187)
transp			-0.520	-0.615			-0.781	-0.826
			(0.153)***	(0.211)***			(0.200)***	(0.214)***
np	0.064	0.059	0.083	0.075	-0.057	-0.046	-0.104	-0.098
	(0.035)*	(0.038)	(0.035)**	(0.035)**	(0.036)	(0.038)	(0.023)***	(0.025)***
Obs.	112	112	112	112	112	112	112	112
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Panel corrected standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

A2. Concentration Patterns

<i>Determinants of relative concentration - Regressions excluding Paraguay (1995-1998)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	0.819	0.925	0.772	0.822	0.928	0.991	0.878	0.866
	(0.260)***	(0.258)***	(0.264)***	(0.267)***	(0.277)***	(0.277)***	(0.275)***	(0.278)***
relskillint	0.166	0.016	0.220	0.083	0.200	0.079	0.242	0.110
	(0.142)	(0.132)	(0.153)	(0.126)	(0.154)	(0.137)	(0.156)	(0.128)
technology	-0.100	-0.093	-0.055	-0.010	-0.192	-0.204	-0.159	-0.145
	(0.095)	(0.095)	(0.095)	(0.091)	(0.108)*	(0.109)*	(0.107)	(0.107)
scale	-0.035	0.085	-0.130	-0.144	0.123	0.162	0.038	-0.067
	(0.252)	(0.244)	(0.287)	(0.282)	(0.313)	(0.338)	(0.334)	(0.372)
relexpconc	0.644	0.634	0.646	0.614	0.668	0.667	0.668	0.645
	(0.224)***	(0.199)***	(0.235)***	(0.199)***	(0.261)**	(0.230)***	(0.270)**	(0.222)***
osint	2.474		2.181		2.065		1.839	
	(1.497)		(1.547)		(1.513)		(1.579)	
wmsint		2.302		3.103		2.255		3.150
		(0.922)**		(0.875)***		(0.940)**		(0.876)***
transp			-2.915	-5.598			-3.031	-5.816
			(2.622)	(2.568)**			(2.719)	(2.679)**
np	0.070	0.142	0.082	0.190	-0.033	0.081	-0.052	0.079
	(0.107)	(0.109)	(0.109)	(0.110)*	(0.131)	(0.154)	(0.132)	(0.143)
Obs.	112	112	112	112	112	112	112	112
Adj. R2	0.88	0.88	0.88	0.89	0.87	0.88	0.88	0.89
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

<i>Determinants of relative concentration - Regressions excluding Paraguay (1995-1998)</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	0.819	0.925	0.772	0.822	0.928	0.991	0.878	0.866
	(0.298)***	(0.302)***	(0.244)***	(0.196)***	(0.358)***	(0.348)***	(0.295)***	(0.226)***
relskillint	0.166	0.016	0.220	0.083	0.200	0.079	0.242	0.110
	(0.088)*	(0.101)	(0.090)**	(0.118)	(0.098)**	(0.122)	(0.098)**	(0.136)
technology	-0.100	-0.093	-0.055	-0.010	-0.192	-0.204	-0.159	-0.145
	(0.068)	(0.074)	(0.068)	(0.056)	(0.085)**	(0.087)**	(0.072)**	(0.056)***
scale	-0.035	0.085	-0.130	-0.144	0.123	0.162	0.038	-0.067
	(0.149)	(0.176)	(0.127)	(0.142)	(0.219)	(0.235)	(0.193)	(0.213)
relexpconc	0.644	0.634	0.646	0.614	0.668	0.667	0.668	0.645
	(0.145)***	(0.139)***	(0.144)***	(0.121)***	(0.152)***	(0.142)***	(0.149)***	(0.124)***
osint	2.474		2.181		2.065		1.839	
	(0.677)***		(0.788)***		(0.819)**		(0.929)**	
wmsint		2.302		3.103		2.255		3.150
		(0.707)***		(0.801)***		(0.720)***		(0.790)***
transp			-2.915	-5.598			-3.031	-5.816
			(1.887)	(1.747)***			(1.756)*	(1.587)***
np	0.070	0.142	0.082	0.190	-0.033	0.081	-0.052	0.079
	(0.115)	(0.127)	(0.113)	(0.121)	(0.101)	(0.077)	(0.102)	(0.104)
Obs.	112	112	112	112	112	112	112	112
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Panel corrected standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

A2. Concentration Patterns

Table A7.2c

Determinants of relative concentration - Regressions excluding Paraguay (1995-1998)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	1.107 (0.284)***	1.168 (0.277)***	1.044 (0.287)***	1.021 (0.289)***	1.188 (0.313)***	1.256 (0.314)***	1.119 (0.307)***	1.104 (0.311)***
relskillint	0.053 (0.118)	-0.057 (0.122)	0.103 (0.128)	0.004 (0.123)	0.110 (0.136)	0.005 (0.129)	0.153 (0.141)	0.039 (0.127)
technology	-0.104 (0.130)	-0.087 (0.128)	-0.037 (0.130)	0.025 (0.125)	-0.248 (0.145)*	-0.267 (0.142)*	-0.199 (0.143)	-0.192 (0.138)
scale	0.037 (0.409)	0.032 (0.362)	-0.132 (0.452)	-0.390 (0.417)	0.171 (0.475)	0.220 (0.525)	0.030 (0.494)	-0.116 (0.561)
relexpconc	0.466 (0.157)***	0.467 (0.148)***	0.466 (0.166)***	0.457 (0.152)***	0.496 (0.181)***	0.494 (0.167)***	0.496 (0.187)***	0.48 (0.163)***
osint	1.809 (1.449)		1.480 (1.511)		1.383 (1.429)		1.117 (1.510)	
wmsint		1.853 (0.910)**		2.567 (0.845)***		1.895 (0.864)**		2.788 (0.796)***
transp			-3.809 (3.152)	-6.399 (3.105)**			-3.959 (3.281)	-6.968 (3.284)**
pt	-1.557 (0.666)**	-1.389 (0.639)**	-1.631 (0.662)**	-1.314 (0.648)**	-1.608 (0.779)**	-1.353 (0.733)*	-1.678 (0.775)**	-1.233 (0.738)*
Obs.	112	112	112	112	112	112	112	112
Adj. R2	0.88	0.89	0.88	0.90	0.88	0.89	0.88	0.90
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Determinants of relative concentration - Regressions excluding Paraguay (1995-1998)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
rellabint	1.107 (0.307)***	1.168 (0.291)***	1.044 (0.241)***	1.021 (0.169)***	1.188 (0.443)***	1.256 (0.438)***	1.119 (0.362)***	1.104 (0.294)***
relskillint	0.053 (0.080)	-0.057 (0.095)	0.103 (0.090)	0.004 (0.120)	0.110 (0.109)	0.005 (0.120)	0.153 (0.109)	0.039 (0.133)
technology	-0.104 (0.083)	-0.087 (0.088)	-0.037 (0.087)	0.025 (0.080)	-0.248 (0.117)**	-0.267 (0.127)**	-0.199 (0.098)**	-0.192 (0.086)**
scale	0.037 (0.186)	0.032 (0.186)	-0.132 (0.188)	-0.390 (0.201)*	0.171 -0.346	0.220 -0.376	0.030 -0.302	-0.116 -0.339
relexpconc	0.466 (0.122)***	0.467 (0.122)***	0.466 (0.120)***	0.457 (0.113)***	0.496 (0.120)***	0.494 (0.116)***	0.496 (0.116)***	0.48 (0.101)***
osint	1.809 (0.642)***		1.480 (0.734)**		1.383 (0.711)*		1.117 (0.795)	
wmsint		1.853 (0.591)***		2.567 (0.618)***		1.895 (0.658)***		2.788 (0.719)***
transp			-3.809 (2.246)*	-6.399 (2.062)***			-3.959 (2.110)*	-6.968 (1.918)***
pt	-1.557 (0.323)***	-1.389 (0.309)***	-1.631 (0.327)***	-1.314 (0.379)***	-1.608 (0.493)***	-1.353 (0.533)**	-1.678 (0.509)***	-1.233 (0.592)**
Obs.	112	112	112	112	112	112	112	112
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

Panel corrected standard errors in parentheses

* significant at 1%; ** significant at 5%; significant at 10%.

A3. Locational Patterns

Table A3.1

<i>Regressions</i>		
<i>Explanatory variables</i>		
Variable	Definition	Source
Country's share in industrial production value	Ln of country's shares in each industry production value (log. transf.)	Own elaboration on ECLAC
<i>Explanatory variables</i>		
State characteristics	Definition	Source
Agriculture abundance	Agriculture as a share of state GDP	ECLAC
Human capital abundance	Share of population older than 25 years with at least (secondary school/high school attainment	Barro and Lee (2000)
Market potential	Measure of market access, based on GDP and distances (own distance=1/3)	Own elaboration on ECLAC and CEPPI
Industrial market potential	Measure of market access, based on GDP and distances (own distance=1/6)	Own elaboration on ECLAC and CEPPI
Infrastructure	Kilometers of paved routes per 100 km2	Own elaboration on World Bank
Industry characteristics	Definition	Source
Agriculture intensity	Agriculture inputs as a share of production value	Own elaboration on IBGE
Human capital intensity	Workers with at least secondary school as a share of total labour force	Own elaboration on MW
Economies of scale	Number of workers per establishment	Own elaboration on MW
Industrial intermediate consumption	Industrial intermediates as a share of production value	Own elaboration on IBGE
Sales to industry	Sales to industry as a share of total demand	Own elaboration on IBGE
Transport intensity	Transport margin as a share of total supply	Own elaboration on IBGE
<i>Interactions</i>		

Abbreviations:

ECLAC	Economic Commission for Latin America and Caribbean
IBGE	Brazilian Institute of Geography and Statistics
MW	Brazilian Ministry of Works

Note: The market potential of a state is captured through the index proposed by Keeble et al. (1986). Formally,

$$MP_i(t) \equiv \sum_{j \neq i} \frac{Y_j(t)}{d_{ij}} + \frac{Y_i(t)}{d_{ii}}$$

where i is the focal state, j corresponds to remaining states in the country, Y_i is the GDP of state i , d_{ij} measures the distance between the capitals of states i and j and d_{ii} is the intra-state distance, given by 1/3 of the radius of a circle with the same area as the state i (Leamer, 1997). The value of the measure is higher, the higher the own GDP, viewed as a proxy for own market size, and the lower the distance to the main markets of other states. Thus, central states are those that have a large market and a favourable location in terms of access to the markets of other locations. A similar measure has been calculated to measure industrial market potential by using industrial GDP instead of total GDP in the sum.

Table A3.2a

<i>Determinants of locational patterns (with Paraguay)</i>			
	1985-1994	1985-1994	1985-1994
	lnts	lnts	lnts
agsi	0.805 (0.088)***	0.802 (0.087)***	0.803 (0.089)***
edusiah	0.329 (0.105)***	0.363 (0.103)***	0.361 (0.103)***
mpscn	0.639 (0.123)***	0.636 (0.121)***	0.686 (0.122)***
mpiici	-0.886 (0.286)***	-0.854 (0.282)***	-0.840 (0.284)***
mpisi	0.628 (0.127)***	0.634 (0.123)***	0.639 (0.123)***
infransp	-0.019 (0.079)	-0.013 (0.078)	0.002 (0.078)
Adj. R2	0.88	0.89	0.89
Obs.	1080	1080	1080
I. Effects	Yes	Yes	Yes
C. Effects	No	Yes	Yes
T. Effects	No	No	Yes

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

<i>Determinants of locational patterns (with Paraguay)</i>			
	1985-1994	1985-1994	1985-1994
	lnts	lnts	lnts
agsi	0.805 (0.042)***	0.802 (0.040)***	0.803 (0.041)***
edusiah	0.329 (0.105)***	0.363 (0.102)***	0.361 (0.103)***
mpscn	0.639 (0.075)***	0.636 (0.069)***	0.686 (0.059)***
mpiici	-0.886 (0.073)***	-0.854 (0.074)***	-0.840 (0.077)***
mpisi	0.628 (0.068)***	0.634 (0.066)***	0.639 (0.066)***
infransp	-0.019 (0.030)	-0.013 (0.027)	0.002 (0.023)
Obs.	1080	1080	1080
I. Effects	Yes	Yes	Yes
C. Effects	No	Yes	Yes
T. Effects	No	No	Yes

Panel corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

<i>Determinants of locational patterns (with Paraguay)</i>				
	(1)		(2)	
	1986-1994 CV	1986-1994 LV	1986-1994 CV	1986-1994 LV
agsi	0.832 (0.095)***	0.829 (0.092)***	0.832 (0.043)***	0.829 (0.034)***
edusiah	0.343 (0.111)***	0.324 (0.124)***	0.343 (0.102)***	0.324 (0.119)***
mpscn	0.670 (0.129)***	0.704 (0.127)***	0.670 (0.077)***	0.704 (0.059)***
mpiici	-0.892 (0.303)***	-0.944 (0.306)***	-0.892 (0.075)***	-0.944 (0.068)***
mpisi	0.621 (0.134)***	0.702 (0.136)***	0.621 (0.073)***	0.702 (0.073)***
infransp	-0.007 (0.084)	0.018 (0.084)	-0.007 (0.029)	0.018 (0.023)
Adj. R2	0.88	0.88		
Obs.	972	972	972	972
I. Effects	Yes	Yes	Yes	Yes
C. Effects	No	No	No	No
T. Effects	No	No	No	No

(1) Robust standard errors in parentheses

(2) Panel-corrected standard errors in parentheses

CV=Contemporaneous values/LV=Lagged values (1 year)

* significant at 10%; ** significant at 5%; *** significant at 1%

<i>Determinants of locational patterns (without Paraguay)</i>			
	1985-1998	1985-1998	1985-1998
	lnts	lnts	lnts
agsi	0.240 (0.090)***	0.275 (0.092)***	0.267 (0.093)***
edusiah	0.145 (0.077)*	0.159 (0.076)**	0.155 (0.077)**
mpscn	0.408 (0.144)***	0.557 (0.132)***	0.591 (0.134)***
mpiici	0.621 (0.316)**	0.609 (0.305)**	0.600 (0.305)**
mpisi	0.735 (0.232)***	0.754 (0.223)***	0.758 (0.225)***
infransp	0.290 (0.072)***	0.333 (0.069)***	0.344 (0.069)***
Adj. R2	0.88	0.89	0.89
Obs.	1134	1134	1134
I. Effects	Yes	Yes	Yes
C. Effects	No	Yes	Yes
T. Effects	No	No	Yes

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

<i>Determinants of locational patterns (without Paraguay)</i>			
	1985-1998	1985-1998	1985-1998
	lnts	lnts	lnts
agsi	0.240 (0.168)	0.275 (0.155)*	0.267 (0.155)*
edusiah	0.145 (0.051)***	0.159 (0.051)***	0.155 (0.052)***
mpscn	0.408 (0.119)***	0.557 (0.099)***	0.591 (0.103)***
mpiici	0.621 (0.146)***	0.609 (0.139)***	0.600 (0.139)***
mpisi	0.735 (0.192)***	0.754 (0.191)***	0.758 (0.191)***
infransp	0.290 (0.035)***	0.333 (0.028)***	0.344 (0.030)***
Obs.	1134	1134	1134
I. Effects	Yes	Yes	Yes
C. Effects	No	Yes	Yes
T. Effects	No	No	Yes

Panel corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

<i>Determinants of locational patterns (without Paraguay)</i>				
	(1)		(2)	
	1986-1998 CV	1986-1998 LV	1986-1998 CV	1986-1998 LV
agsi	0.213 (0.100)**	0.265 (0.089)***	0.213 (0.195)	0.265 (0.168)
edusiah	0.147 (0.079)*	0.153 (0.088)*	0.147 (0.050)***	0.153 (0.062)**
mpscn	0.414 (0.150)***	0.427 (0.148)***	0.414 (0.127)***	0.427 (0.121)***
mpiici	0.690 (0.339)**	0.586 (0.331)*	0.69 (0.159)***	0.586 (0.150)***
mpisi	0.818 (0.253)***	0.852 (0.248)***	0.818 (0.208)***	0.852 (0.187)***
infransp	0.299 (0.074)***	0.317 (0.076)***	0.299 (0.034)***	0.317 (0.033)***
Adj. R2	0.88	0.88		
Obs.	1053	1053	1053	1053
I. Effects	Yes	Yes	Yes	Yes
C. Effects	No	No	No	No
T. Effects	No	No	No	No

(1) Robust standard errors in parentheses

(2) Panel-corrected standard errors in parentheses

CV=Contemporaneous values/LV=Lagged values (1 year)

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A3.2b

<i>Determinants of locational patterns (with Paraguay)</i>						
	1985-1990	1991-1994	1985-1990	1991-1994	1985-1990	1991-1994
	lnts	lnts	lnts	lnts	lnts	lnts
agsi	0.777 (0.105)***	0.902 (0.170)***	0.786 (0.105)***	0.904 (0.171)***	0.785 (0.105)***	0.902 (0.172)***
edusiah	0.622 (0.188)***	0.294 (0.141)**	0.652 (0.186)***	0.291 (0.141)**	0.654 (0.187)***	0.291 (0.143)**
mpscn	0.730 (0.165)***	0.667 (0.198)***	0.733 (0.161)***	0.710 (0.198)***	0.732 (0.161)***	0.723 (0.201)***
mpiici	-0.862 (0.375)**	-0.901 (0.481)*	-0.884 (0.366)**	-0.866 (0.482)*	-0.883 (0.368)**	-0.846 (0.486)*
mpisi	0.679 (0.162)***	0.635 (0.212)***	0.674 (0.157)***	0.642 (0.209)***	0.673 (0.158)***	0.646 (0.209)***
infransp	0.040 (0.103)	-0.020 (0.129)	0.042 (0.102)	-0.002 (0.128)	0.042 (0.103)	0.005 (0.129)
Adj. R2	0.89	0.88	0.90	0.88	0.90	0.88
Obs.	648	432	648	432	648	432
I. Effects	Yes	Yes	Yes	Yes	Yes	Yes
C. Effects	No	No	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

<i>Determinants of locational patterns (with Paraguay)</i>						
	1985-1990	1991-1994	1985-1990	1991-1994	1985-1990	1991-1994
	lnts	lnts	lnts	lnts	lnts	lnts
agsi	0.777 (0.035)***	0.902 (0.065)***	0.786 (0.034)***	0.904 (0.062)***	0.785 (0.034)***	0.902 (0.062)***
edusiah	0.622 (0.168)***	0.294 (0.073)***	0.652 (0.165)***	0.291 (0.073)***	0.654 (0.166)***	0.291 (0.073)***
mpscn	0.730 (0.045)***	0.667 (0.124)***	0.733 (0.044)***	0.710 (0.110)***	0.732 (0.044)***	0.723 (0.107)***
mpiici	-0.862 (0.065)***	-0.901 (0.141)***	-0.884 (0.062)***	-0.866 (0.144)***	-0.883 (0.062)***	-0.846 (0.147)***
mpisi	0.679 (0.038)***	0.635 (0.065)***	0.674 (0.038)***	0.642 (0.063)***	0.673 (0.038)***	0.646 (0.063)***
infransp	0.040 (0.023)*	-0.020 (0.045)	0.042 (0.022)*	-0.002 (0.040)	0.042 (0.022)*	0.005 (0.038)
Obs.	648	432	648	432	648	432
I. Effects	Yes	Yes	Yes	Yes	Yes	Yes
C. Effects	No	No	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	Yes	Yes

Panel corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

<i>Determinants of locational patterns (without Paraguay)</i>									
	1985-1990	1991-1994	1995-1998	1985-1990	1991-1994	1995-1998	1985-1990	1991-1994	1995-1998
	lnts	lnts	lnts	lnts	lnts	lnts	lnts	lnts	lnts
agsi	0.656 (0.119)***	-0.224 (0.316)	-0.590 (0.302)*	0.698 (0.121)***	-0.207 (0.316)	-0.619 (0.310)**	0.697 (0.123)***	-0.207 (0.314)	-0.619 (0.312)**
edusiah	0.622 (0.320)*	0.248 (0.178)	0.066 (0.107)	0.684 (0.316)**	0.248 (0.178)	0.074 (0.105)	0.679 (0.319)**	0.246 (0.180)	0.076 (0.106)
mpscn	0.326 (0.182)*	0.708 (0.246)***	0.880 (0.396)**	0.316 (0.168)*	0.693 (0.250)***	0.945 (0.393)**	0.319 (0.167)*	0.699 (0.252)***	0.952 (0.393)**
mpiici	0.338 (0.490)	0.768 (0.855)	1.152 (0.878)	0.259 (0.480)	0.749 (0.862)	1.075 (0.882)	0.264 (0.484)	0.746 (0.865)	1.080 (0.889)
mpisi	0.842 (0.355)**	1.798 (0.739)**	1.209 (0.709)*	0.808 (0.348)**	1.799 (0.739)**	1.315 (0.711)*	0.807 (0.350)**	1.820 (0.743)**	1.311 (0.715)*
inftransp	0.214 (0.129)*	0.444 (0.133)***	0.399 (0.135)***	0.218 (0.126)*	0.439 (0.134)***	0.406 (0.134)***	0.218 (0.126)*	0.441 (0.134)***	0.407 (0.134)***
Adj. R2	0.89	0.88	0.88	0.90	0.88	0.88	0.90	0.88	0.88
Obs.	486	324	324	486	324	324	486	324	324
I. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
C. Effects	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	No	No	Yes	Yes	Yes

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

<i>Determinants of locational patterns (without Paraguay)</i>									
	1985-1990	1991-1994	1995-1998	1985-1990	1991-1994	1995-1998	1985-1990	1991-1994	1995-1998
	lnts	lnts	lnts	lnts	lnts	lnts	lnts	lnts	lnts
agsi	0.656 (0.158)***	-0.224 (0.395)	-0.590 (0.141)***	0.698 (0.151)***	-0.207 (0.402)	-0.619 (0.135)***	0.697 (0.152)***	-0.207 (0.402)	-0.619 (0.135)***
edusiah	0.622 (0.265)**	0.248 (0.078)***	0.066 (0.036)*	0.684 (0.260)***	0.248 (0.078)***	0.074 (0.037)**	0.679 (0.262)***	0.246 (0.078)***	0.076 (0.037)**
mpscn	0.326 (0.110)***	0.708 (0.137)***	0.880 (0.114)***	0.316 (0.107)***	0.693 (0.142)***	0.945 (0.108)***	0.319 (0.107)***	0.699 (0.141)***	0.952 (0.109)***
mpiici	0.338 (0.295)	0.768 (0.208)***	1.152 (0.205)***	0.259 (0.278)	0.749 (0.211)***	1.075 (0.215)***	0.264 (0.280)	0.746 (0.208)***	1.080 (0.214)***
mpisi	0.842 (0.118)***	1.798 (0.739)**	1.209 (0.316)***	0.808 (0.125)***	1.799 (0.738)**	1.315 (0.277)***	0.807 (0.125)***	1.820 (0.733)**	1.311 (0.278)***
inftransp	0.214 (0.050)***	0.444 (0.044)***	0.399 (0.026)***	0.218 (0.051)***	0.439 (0.044)***	0.406 (0.027)***	0.218 (0.050)***	0.441 (0.044)***	0.407 (0.028)***
Obs.	486	324	324	486	324	324	486	324	324
I. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
C. Effects	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
T. Effects	No	No	No	No	No	No	Yes	Yes	Yes

Panel corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A3.2c

<i>Regressions with preferential tariffs</i>		
	1985-1998	1985-1998
	lnts	lnts
agsi	-0.019 (0.203)	-0.019 (0.292)
edusiah	0.054 (0.092)	0.054 (0.038)
mpscn	0.634 (0.216)***	0.634 (0.197)***
mpiici	0.701 (0.585)	0.701 (0.293)**
mpisi	1.431 (0.437)***	1.431 (0.304)***
inftransp	0.389 (0.097)***	0.389 (0.056)***
ptagsi	0.471 (0.163)***	0.471 (0.208)**
ptedusiah	0.710 (0.204)***	0.710 (0.246)***
ptmpscn	-0.592 (0.271)**	-0.592 (0.339)*
ptmpiici	-0.225 (1.311)	-0.225 (0.868)
ptmpisi	-0.998 (0.431)**	-0.998 (0.349)***
ptinftransp	-0.148 (0.118)	-0.148 (0.064)**
Obs.	1134	1134
I. Effects	Yes	Yes
C. Effects	No	No
T. Effects	No	No

(1) Robust standard errors in parentheses

(2) Panel corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

A4. Intra-industry Trade Patterns

Table A4.1a

Argentina - Distribution of IIT indices					
Year	Statistics	IITRW	IITBRA	IITUR	IITPA
1986	Mean	0.29	0.19	0.31	0.08
	Std. Dev.	0.26	0.27	0.32	0.21
	Min	0.00	0.00	0.00	0.00
	Max	0.94	0.94	0.99	0.97
	Obs	129	119	122	103
1990	Mean	0.38	0.37	0.31	0.09
	Std. Dev.	0.29	0.32	0.32	0.19
	Min	0.00	0.00	0.00	0.00
	Max	1.00	0.99	0.98	0.86
	Obs	130	123	128	112
1998	Mean	0.31	0.40	0.28	0.14
	Std. Dev.	0.28	0.32	0.31	0.26
	Min	0.00	0.00	0.00	0.00
	Max	0.99	0.98	0.98	0.92
	Obs	143	140	138	132
2001	Mean	0.38	0.38	0.30	0.11
	Std. Dev.	0.28	0.32	0.32	0.21
	Min	0.00	0.00	0.00	0.00
	Max	1.00	1.00	1.00	0.95
	Obs	143	140	139	132

Table A4.1b

Brazil - Distribution of IIT indices					
Year	Statistics	IITRW	IITAR	IITUR	IITPA
1986	Mean	0.40	0.24	0.20	0.09
	Std. Dev.	0.32	0.31	0.28	0.19
	Min	0.00	0.00	0.00	0.00
	Max	0.99	0.98	0.98	0.79
	Obs	128	123	119	121
1990	Mean	0.40	0.38	0.27	0.05
	Std. Dev.	0.32	0.33	0.29	0.15
	Min	0.00	0.00	0.00	0.00
	Max	0.99	0.99	1.00	0.99
	Obs	135	130	126	124
1998	Mean	0.37	0.39	0.29	0.09
	Std. Dev.	0.29	0.32	0.30	0.18
	Min	0.00	0.00	0.00	0.00
	Max	0.99	0.99	0.97	0.79
	Obs	144	139	132	130
2001	Mean	0.42	0.34	0.24	0.08
	Std. Dev.	0.31	0.31	0.31	0.18
	Min	0.00	0.00	0.00	0.00
	Max	0.99	0.99	0.94	0.98
	Obs	144	138	132	135

Table A4.1c

Paraguay - Distribution of IIT indices					
Year	Statistics	IITRW	IITAR	IITBRA	IITUR
1986	Mean	0.05	0.04	0.02	0.03
	Std. Dev.	0.18	0.13	0.13	0.11
	Min	0.00	0.00	0.00	0.00
	Max	0.97	0.87	0.95	0.54
	Obs	121	98	114	67
1990	Mean	0.09	0.06	0.06	0.03
	Std. Dev.	0.22	0.17	0.17	0.11
	Min	0.00	0.00	0.00	0.00
	Max	0.98	1.00	0.83	0.63
	Obs	129	122	121	87
1998	Mean	0.10	0.15	0.10	0.11
	Std. Dev.	0.22	0.27	0.19	0.23
	Min	0.00	0.00	0.00	0.00
	Max	0.98	0.99	0.92	0.88
	Obs	135	131	134	96
2001	Mean	0.10	0.12	0.11	0.02
	Std. Dev.	0.20	0.23	0.22	0.13
	Min	0.00	0.00	0.00	0.00
	Max	0.94	0.93	0.96	0.95
	Obs	133	133	133	114

Table A4.1d

Uruguay - Distribution of IIT indices					
Year	Statistics	IITRW	IITAR	IITBRA	IITPA
1986	Mean	0.13	0.27	0.14	0.05
	Std. Dev.	0.22	0.33	0.27	0.16
	Min	0.00	0.00	0.00	0.00
	Max	0.93	1.00	1.00	0.80
	Obs	121	125	118	58
1990	Mean	0.15	0.23	0.22	0.11
	Std. Dev.	0.24	0.30	0.27	0.24
	Min	0.00	0.00	0.00	0.00
	Max	0.98	0.95	0.92	0.89
	Obs	129	128	124	66
1998	Mean	0.17	0.30	0.24	0.17
	Std. Dev.	0.27	0.31	0.30	0.29
	Min	0.00	0.00	0.00	0.00
	Max	0.98	0.99	0.99	1.00
	Obs	141	136	131	93
2001	Mean	0.17	0.31	0.21	0.12
	Std. Dev.	0.22	0.31	0.28	0.23
	Min	0.00	0.00	0.00	0.00
	Max	0.88	1.00	0.93	0.99
	Obs	139	137	129	92

A4. Intra-industry Trade Patterns

Table A4.2a

Argentina - Aggregate IIT Indices by trade partner (1986-2001)																
Country/year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
IIT Brazil	0.288	0.348	0.387	0.446	0.396	0.381	0.300	0.417	0.421	0.466	0.443	0.479	0.514	0.499	0.461	0.463
IIT Paraguay	0.106	0.072	0.093	0.056	0.090	0.173	0.181	0.176	0.113	0.135	0.125	0.110	0.133	0.132	0.123	0.115
IIT Uruguay	0.384	0.354	0.351	0.323	0.413	0.398	0.376	0.391	0.468	0.493	0.354	0.425	0.444	0.438	0.426	0.427
IIT Mercosur	0.288	0.329	0.361	0.406	0.377	0.371	0.302	0.400	0.408	0.446	0.418	0.456	0.487	0.470	0.439	0.439
IIT ROW	0.229	0.260	0.276	0.287	0.248	0.277	0.241	0.247	0.248	0.278	0.238	0.240	0.246	0.257	0.284	0.286

Table A4.2b

Brazil - Aggregate IIT Indices by trade partner (1986-2001)																
Country/year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
IIT Argentina	0.333	0.365	0.392	0.426	0.383	0.420	0.331	0.380	0.424	0.468	0.454	0.501	0.510	0.495	0.460	0.457
IIT Paraguay	0.063	0.085	0.034	0.055	0.051	0.042	0.039	0.039	0.063	0.062	0.077	0.078	0.107	0.106	0.116	0.087
IIT Uruguay	0.175	0.235	0.265	0.219	0.224	0.280	0.275	0.247	0.274	0.322	0.349	0.343	0.334	0.375	0.368	0.359
IIT Mercosur	0.248	0.280	0.305	0.301	0.279	0.337	0.290	0.315	0.358	0.394	0.397	0.442	0.457	0.454	0.426	0.420
IIT ROW	0.348	0.317	0.287	0.317	0.326	0.350	0.350	0.398	0.380	0.385	0.380	0.379	0.408	0.384	0.400	0.401

Table A4.2c

Paraguay - Aggregate IIT Indices by trade partner (1986-2001)																
Country/year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
IIT Argentina	0.103	0.036	0.087	0.041	0.070	0.142	0.166	0.190	0.161	0.111	0.160	0.124	0.167	0.117	0.158	0.097
IIT Brazil	0.038	0.027	0.015	0.061	0.031	0.038	0.048	0.050	0.054	0.050	0.078	0.065	0.111	0.119	0.142	0.098
IIT Uruguay	0.024	0.004	0.002	0.047	0.038	0.048	0.080	0.098	0.167	0.049	0.117	0.098	0.083	0.187	0.072	0.054
IIT Mercosur	0.057	0.028	0.033	0.057	0.042	0.070	0.092	0.097	0.090	0.070	0.104	0.086	0.128	0.123	0.140	0.091
IIT ROW	0.039	0.039	0.027	0.037	0.045	0.041	0.057	0.042	0.034	0.023	0.039	0.039	0.049	0.070	0.073	0.101

Table A4.2d

Uruguay - Aggregate IIT Indices by trade partner (1986-2001)																
Country/year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
IIT Argentina	0.360	0.384	0.378	0.348	0.309	0.332	0.308	0.338	0.435	0.409	0.347	0.439	0.450	0.430	0.415	0.425
IIT Brazil	0.131	0.236	0.241	0.246	0.213	0.242	0.258	0.261	0.262	0.315	0.346	0.310	0.320	0.337	0.336	0.332
IIT Paraguay	0.010	0.015	0.023	0.025	0.054	0.061	0.056	0.043	0.047	0.093	0.086	0.080	0.076	0.069	0.072	0.089
IIT Mercosur	0.196	0.282	0.281	0.268	0.236	0.271	0.276	0.301	0.334	0.347	0.339	0.353	0.367	0.370	0.365	0.364
IIT ROW	0.178	0.210	0.182	0.180	0.185	0.211	0.226	0.274	0.338	0.323	0.308	0.306	0.328	0.305	0.312	0.339

A4. Intra-industry Trade Patterns

Table A4.3a

Argentina - IIT Index with Mercosur countries (selected years)													
Sector/year	Description	1986			1991			1995			1998		
		IIT	% trade	rank	IIT	% trade	rank	IIT	% trade	rank	IIT	% trade	rank
24	Other chemicals products	0.65	0.14	8	0.87	0.13	3.00	0.87	0.12	6	0.95	0.12	1
34	Motor vehicles, trailers, and semi-trailers	0.89	0.03	2	0.79	0.04	8.00	0.87	0.09	5	0.91	0.15	2
25	Rubber products	0.86	0.00	4	0.70	0.01	9.00	0.93	0.02	3	0.90	0.02	3
31	Electrical machinery	0.55	0.02	9	0.79	0.02	6.00	0.51	0.03	14	0.87	0.04	4
19	Footwear	0.01	0.03	22	0.10	0.03	21.00	0.28	0.03	21	0.77	0.02	5
36	Furniture	0.51	0.00	11	0.45	0.01	15.00	0.84	0.01	7	0.69	0.02	6
21	Paper and paper products	0.30	0.01	18	0.39	0.02	17.00	0.62	0.03	12	0.65	0.02	7
29	Machinery and equipment, not elsewhere classified	0.86	0.07	5	0.65	0.07	11.00	0.75	0.09	9	0.61	0.09	8
33	Medical, precision, and optical instruments, watches, and clocks	0.40	0.02	16	0.96	0.02	2.00	0.45	0.02	16	0.60	0.01	9
17	Textiles	0.47	0.01	13	0.67	0.02	10.00	0.99	0.02	1	0.56	0.02	10
20	Wood products	0.06	0.00	20	0.29	0.00	18.00	0.47	0.00	15	0.54	0.00	11
26	Other non-metallic mineral products	0.88	0.01	3	0.80	0.01	5.00	0.80	0.01	8	0.54	0.01	12
28	Fabricated metal products	0.77	0.01	7	0.79	0.01	7.00	0.52	0.02	13	0.53	0.02	13
15	Food and beverages	0.77	0.24	6	0.64	0.23	12.00	0.43	0.18	18	0.48	0.16	14
27	Iron and steel	0.43	0.07	15	0.40	0.07	16.00	0.44	0.05	17	0.47	0.04	15
32	Radio, television, and communication equipment	0.15	0.03	19	0.14	0.03	20.00	0.74	0.03	10	0.45	0.03	16
35	Other transport equipment	0.38	0.01	17	0.99	0.01	1.00	0.97	0.01	2	0.43	0.01	17
22	Printing y Publishing	0.48	0.00	12	0.81	0.00	4.00	0.43	0.01	19	0.40	0.01	18
18	Wearing apparel, except footwear	0.46	0.00	14	0.26	0.01	19.00	0.71	0.01	11	0.39	0.01	19
23	Petroleum refineries	0.02	0.01	21	0.09	0.04	22.00	0.38	0.03	20	0.12	0.02	20
30	Office, accounting, and computing machinery	0.53	0.02	10	0.61	0.02	14.00	0.90	0.02	4	0.11	0.02	21
16	Tobacco	0.94	0.00	1	0.62	0.00	13.00	0.01	0.00	22	0.04	0.00	22
	Share trade/Rank itt correlations	0.22			0.07			0.07			0.40		
	Spearman Rank correlations (year base:1986)	1.00			0.49			0.25			0.17		

A4. Intra-industry Trade Patterns

Table A4.3b.

Brazil - IIT Index with Mercosur countries (selected years)													
Sector/year	Description	1986			1991			1995			1998		
		IIT	% trade	rank	IIT	% trade	rank	IIT	% trade	rank	IIT	% trade	rank
18	Wearing apparel, except footwear	0.55	0.00	7	0.60	0.00	8.00	0.78	0.01	5	0.99	0.00	1
19	Footwear	0.15	0.04	18	0.32	0.03	17.00	0.54	0.03	12	0.96	0.02	2
34	Motor vehicles, trailers, and semi-trailers	0.62	0.04	5	0.55	0.06	9.00	1.00	0.10	1	0.93	0.11	3
24	Other chemicals products	0.60	0.10	6	0.85	0.10	2.00	0.66	0.12	11	0.77	0.12	4
25	Rubber products	0.35	0.01	11	0.45	0.01	13.00	0.74	0.02	7	0.75	0.02	5
20	Wood products	0.65	0.01	4	0.62	0.01	7.00	0.96	0.01	2	0.72	0.01	6
31	Electrical machinery	0.35	0.02	10	0.41	0.02	15.00	0.28	0.03	18	0.67	0.03	7
17	Textiles	0.14	0.02	19	0.63	0.02	6.00	0.91	0.02	3	0.57	0.02	8
21	Paper and paper products	0.31	0.02	13	0.31	0.03	18.00	0.42	0.04	15	0.51	0.03	9
36	Furniture	0.18	0.01	17	0.40	0.01	16.00	0.90	0.02	4	0.50	0.02	10
15	Food and beverages	0.24	0.16	16	0.27	0.13	19.00	0.35	0.14	17	0.46	0.11	11
33	Medical, precision, and optical instruments, watches, and clocks	0.28	0.02	14	0.77	0.02	3.00	0.37	0.02	16	0.45	0.02	12
22	Printing y Publishing	0.79	0.00	3	0.95	0.00	1.00	0.69	0.00	9	0.44	0.00	13
29	Machinery and equipment, not elsewhere classified	0.54	0.08	8	0.50	0.08	11.00	0.46	0.10	14	0.44	0.10	14
27	Iron and steel	0.03	0.09	21	0.25	0.12	20.00	0.27	0.09	19	0.38	0.07	15
28	Fabricated metal products	0.33	0.01	12	0.48	0.01	12.00	0.24	0.01	20	0.36	0.02	16
32	Radio, television, and communication equipment	0.08	0.04	20	0.08	0.03	21.00	0.72	0.04	8	0.35	0.04	17
26	Other non-metallic mineral products	0.25	0.01	15	0.43	0.01	14.00	0.47	0.01	13	0.29	0.01	18
35	Other transport equipment	0.82	0.03	2	0.64	0.02	5.00	0.11	0.02	21	0.23	0.03	19
23	Petroleum refineries	0.85	0.02	1	0.74	0.02	4.00	0.68	0.03	10	0.19	0.03	20
30	Office, accounting, and computing machinery	0.47	0.01	9	0.54	0.01	10.00	0.78	0.02	6	0.08	0.02	21
16	Tobacco	0.00	0.00	22	0.00	0.00	22.00	0.00	0.00	22	0.00	0.01	22
	Share trade/rank itt correlations	-0.09			-0.12			-0.02			0.22		
	Spearman Rank correlations (year base:1986)	1.00			0.76			0.24			0.12		

A4. Intra-industry Trade Patterns

Table A4.3c.

Paraguay - IIT Index with Mercosur countries (selected years)													
Sector/year	Description	1986			1991			1995			1998		
		IIT	% trade	rank	IIT	% trade	rank	IIT	% trade	rank	IIT	% trade	rank
15	Food and beverages	0.33	0.12	2	0.56	0.11	3.00	0.88	0.13	2	0.90	0.13	1
17	Textiles	0.27	0.01	3	0.88	0.02	1.00	0.88	0.02	1	0.82	0.02	2
19	Footwear	0.86	0.02	1	0.53	0.02	4.00	0.62	0.02	4	0.63	0.02	3
18	Wearing apparel, except footwear	0.20	0.00	4	0.16	0.01	7.00	0.83	0.00	3	0.50	0.01	4
36	Furniture	0.00	0.01	7	0.02	0.03	14.00	0.31	0.03	5	0.35	0.03	5
27	Iron and steel	0.00	0.02	7	0.58	0.02	2.00	0.26	0.02	6	0.21	0.02	6
22	Printing y Publishing	0.00	0.00	7	0.52	0.00	5.00	0.21	0.00	7	0.20	0.01	7
28	Fabricated metal products	0.00	0.03	7	0.00	0.02	20.00	0.02	0.02	14	0.19	0.02	8
25	Rubber products	0.00	0.01	7	0.00	0.02	17.00	0.04	0.03	9	0.09	0.03	9
21	Paper and paper products	0.00	0.01	7	0.02	0.01	15.00	0.03	0.02	13	0.09	0.02	10
24	Other chemicals products	0.15	0.08	5	0.29	0.09	6.00	0.05	0.08	8	0.08	0.10	11
29	Machinery and equipment, not elsewhere classified	0.00	0.11	7	0.01	0.07	16.00	0.03	0.08	11	0.07	0.07	12
31	Electrical machinery	0.00	0.03	7	0.00	0.02	18.00	0.00	0.02	19	0.05	0.02	13
26	Other non-metallic mineral products	0.00	0.01	7	0.03	0.01	9.00	0.03	0.01	12	0.05	0.01	14
20	Wood products	0.02	0.02	6	0.02	0.02	12.00	0.04	0.02	10	0.03	0.02	15
32	Radio, television, and communication equipment	0.00	0.08	7	0.03	0.11	10.00	0.00	0.10	20	0.02	0.04	16
35	Other transport equipment	0.00	0.00	7	0.02	0.01	13.00	0.00	0.01	20	0.02	0.01	17
30	Office, accounting, and computing machinery	0.00	0.01	7	0.04	0.02	8.00	0.02	0.04	15	0.01	0.02	18
33	Medical, precision, and optical instruments, watches, and clocks	0.00	0.03	7	0.00	0.02	21.00	0.01	0.01	16	0.01	0.01	19
34	Motor vehicles, trailers, and semi-trailers	0.00	0.03	7	0.00	0.06	19.00	0.01	0.08	17	0.00	0.08	20
16	Tobacco	0.00	0.01	7	0.00	0.02	21.00	0.00	0.05	20	0.00	0.09	21
23	Petroleum refineries	0.00	0.08	7	0.02	0.04	11.00	0.01	0.04	18	0.00	0.05	22
	Share trade/rank itt correlations	0.06			0.05			0.06			0.16		
	Spearman Rank correlations (year base:1986)	1.00			0.61			0.69			0.59		

A4. Intra-industry Trade Patterns

Table A4.3d

Uruguay - IIT Index with Mercosur countries (selected years)													
Sector/year	Description	1986			1991			1995			1998		
		IIT	% trade	rank	IIT	% trade	rank	IIT	% trade	rank	IIT	% trade	rank
22	Printing y Publishing	0.75	0.00	6	0.23	0.00	14.00	0.90	0.00	4	0.92	0.00	1
17	Textiles	0.92	0.11	2	0.87	0.12	2.00	0.91	0.09	3	0.91	0.06	2
25	Rubber products	0.67	0.01	7	0.64	0.01	6.00	0.95	0.03	2	0.91	0.03	3
26	Other non-metallic mineral products	0.46	0.01	10	0.77	0.02	5.00	0.60	0.02	9	0.82	0.02	4
21	Paper and paper products	0.62	0.02	9	0.79	0.02	4.00	0.62	0.02	8	0.78	0.03	5
34	Motor vehicles, trailers, and semi-trailers	0.39	0.02	11	0.35	0.04	11.00	0.68	0.09	7	0.77	0.10	6
24	Other chemicals products	0.96	0.12	1	0.91	0.11	1.00	0.73	0.12	6	0.71	0.13	7
31	Electrical machinery	0.87	0.01	3	0.22	0.01	15.00	0.36	0.02	16	0.66	0.03	8
36	Furniture	0.81	0.01	4	0.81	0.01	3.00	0.96	0.02	1	0.65	0.02	9
35	Other transport equipment	0.20	0.00	17	0.42	0.00	9.00	0.76	0.01	5	0.60	0.01	10
15	Food and beverages	0.10	0.32	19	0.25	0.27	13.00	0.58	0.19	10	0.52	0.22	11
33	Medical, precision, and optical instruments, watches, and clocks	0.25	0.01	15	0.29	0.01	12.00	0.57	0.01	12	0.52	0.01	12
27	Iron and steel	0.33	0.01	13	0.46	0.01	7.00	0.40	0.02	15	0.52	0.03	13
23	Petroleum refineries	0.00	0.00	22	0.05	0.00	18.00	0.44	0.03	13	0.49	0.01	14
19	Footwear	0.65	0.06	8	0.43	0.06	8.00	0.57	0.05	11	0.43	0.04	15
18	Wearing apparel, except footwear	0.22	0.08	16	0.09	0.07	17.00	0.32	0.03	18	0.34	0.03	16
28	Fabricated metal products	0.81	0.01	5	0.37	0.01	10.00	0.36	0.01	17	0.30	0.01	17
29	Machinery and equipment, not elsewhere classified	0.35	0.04	12	0.21	0.05	16.00	0.25	0.07	19	0.28	0.08	18
16	Tobacco	0.11	0.00	18	0.01	0.00	22.00	0.42	0.00	14	0.19	0.01	19
32	Radio, television, and communication equipment	0.02	0.02	21	0.04	0.02	19.00	0.03	0.02	21	0.11	0.02	20
20	Wood products	0.03	0.00	20	0.02	0.00	21.00	0.10	0.01	20	0.10	0.01	21
30	Office, accounting, and computing machinery	0.27	0.01	14	0.03	0.01	20.00	0.03	0.01	22	0.03	0.02	22
	Share trade/rank itt correlations	-0.01			0.18			0.19			0.16		
	Spearman Rank correlations (year base:1986)	1.00			0.71			0.52			0.61		

Table A4.4

Mercosur - ISIC 4-digit industries IIT Mercosur> IIT Rest of the World (en más de un 10%)																
Country	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Argentina	100	99	102	101	94	96	99	103	101	100	100	97	107	98	95	94
Brasil	66	66	67	72	76	75	55	47	57	77	76	79	74	72	64	65
Paraguay	134	128	129	126	119	123	128	126	125	133	128	122	108	118	119	110
Uruguay	85	83	74	71	73	78	79	83	113	107	113	111	113	121	118	107

Argentina - ISIC 4-digit industries IIT Mercosur> IIT Rest of the World																
Country	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Brazil	66	78	76	84	91	82	77	79	86	91	88	92	96	80	81	79
Uruguay	76	77	73	64	67	87	93	93	80	91	69	74	67	68	62	59
Paraguay	60	59	48	51	47	51	56	53	37	46	38	34	42	39	31	33

Brazil - ISIC 4-digit industries IIT Mercosur> IIT Rest of the World																
Country	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Argentina	59	68	71	74	73	76	51	46	55	84	77	78	71	72	67	56
Uruguay	55	63	65	56	62	59	50	45	44	58	54	62	59	61	59	50
Paraguay	39	37	38	35	34	32	30	28	30	27	25	27	38	29	30	28

Paraguay - ISIC 4-digit industries IIT Mercosur> IIT Rest of the World																
Country	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Brazil	132	127	126	120	113	110	112	115	108	129	114	107	104	109	104	97
Uruguay	137	128	135	124	115	115	119	121	115	126	117	108	104	113	112	102
Argentina	137	130	133	125	115	122	127	125	122	132	126	117	103	115	111	106

Uruguay - ISIC 4-digit industries IIT Mercosur> IIT Rest of the World																
Country	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Brazil	72	74	66	68	63	70	67		91	94	99	96	94	94	88	84
Argentina	81	80	72	70	72	73	72		109	105	104	112	112	120	117	109
Paraguay	104	94	101	98	97	93	84		89	79	92	89	89	97	84	79

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Table A4.5a

Argentina - 2-digit ISIC industries with largest IIT Mercosur member/IIT RW ratio. Average 1996/98		
Brazil		
Code	Description	IIT ratio
32	Radio, television, and communication equipment	6.016
33	Medical, precision, and optical instruments, watches, and clocks	3.204
31	Electrical machinery	3.059
16	Tobacco	2.978
29	Machinery and equipment, not elsewhere classified	2.211
15	Food and beverages	2.141
25	Rubber products	1.694
19	Footwear	1.637
24	Other chemicals products	1.482
28	Fabricated metal products	1.354
34	Motor vehicles, trailers, and semi-trailers	1.264
35	Other transport equipment	1.234
20	Wood products	1.223
Uruguay		
Code	Description	IIT ratio
33	Medical, precision, and optical instruments, watches, and clocks	3.602
15	Food and beverages	3.417
35	Other transport equipment	2.704
30	Office, accounting, and computing machinery	2.361
21	Paper and paper products	1.989
31	Electrical machinery	1.977
25	Rubber products	1.718
26	Other non-metallic mineral products	1.711
29	Machinery and equipment, not elsewhere classified	1.533
28	Fabricated metal products	1.432
17	Textiles	1.397
19	Footwear	1.331
34	Motor vehicles, trailers, and semi-trailers	1.073
Paraguay		
Code	Description	IIT ratio
19	Footwear	1.671
17	Textiles	1.619

Table A4.5b

Brazil - 2-digit ISIC industries with largest IIT Mercosur member/IIT RW ratio. Average 1996/98		
Argentina		
Code	Description	IIT ratio
20	Wood products	4.703
33	Medical, precision, and optical instruments, watches, and clocks	2.424
19	Footwear	2.073
22	Printing y Publishing	1.769
32	Radio, television, and communication equipment	1.708
24	Other chemicals products	1.459
31	Electrical machinery	1.297
25	Rubber products	1.007
Uruguay		
Code	Description	IIT ratio
19	Footwear	2.781
33	Medical, precision, and optical instruments, watches, and clocks	2.388
23	Petroleum refineries	2.385
22	Printing y Publishing	2.188
24	Other chemicals products	1.628
27	Iron and steel	1.505
32	Radio, television, and communication equipment	1.349
31	Electrical machinery	1.337
36	Furniture	1.151
21	Paper and paper products	1.105
Paraguay		
Code	Description	IIT ratio
15	Food and beverages	1.684
20	Wood products	1.206
22	Printing y Publishing	1.044

Table A4.5c

Paraguay - 2-digit ISIC industries with largest IIT Mercosur member/IIT RW ratio. Average 1996/98		
Argentina		
Code	Description	IIT ratio
34	Motor vehicles, trailers, and semi-trailers	13.757
35	Other transport equipment	11.101
36	Furniture	5.979
26	Other non-metallic mineral products	4.997
31	Electrical machinery	3.950
33	Medical, precision, and optical instruments, watches, and clocks	2.485
29	Machinery and equipment, not elsewhere classified	2.037
25	Rubber products	1.873
21	Paper and paper products	1.483
27	Iron and steel	1.228
17	Textiles	1.103
Brazil		
Code	Description	IIT ratio
22	Printing y Publishing	7.073
32	Radio, television, and communication equipment	2.607
23	Petroleum refineries	2.433
20	Wood products	2.163
36	Furniture	1.768
28	Fabricated metal products	1.674
29	Machinery and equipment, not elsewhere classified	1.375
17	Textiles	1.283
21	Paper and paper products	1.234
25	Rubber products	1.002
Uruguay		
Code	Description	IIT ratio
34	Motor vehicles, trailers, and semi-trailers	124.695
31	Electrical machinery	30.910
32	Radio, television, and communication equipment	23.020
33	Medical, precision, and optical instruments, watches, and clocks	17.705
23	Petroleum refineries	17.131
29	Machinery and equipment, not elsewhere classified	14.093
36	Furniture	7.455
22	Printing y Publishing	6.391
25	Rubber products	3.402
24	Other chemicals products	1.852
27	Iron and steel	1.561
21	Paper and paper products	1.551
17	Textiles	1.453
26	Other non-metallic mineral products	1.132

Table A4.5d

Uruguay - 2-digit ISIC industries with largest IIT Mercosur member/IIT RW ratio. Average 1996/98		
Argentina		
Code	Description	IIT ratio
30	Office, accounting, and computing machinery	5.725
33	Medical, precision, and optical instruments, watches, and clocks	3.983
32	Radio, television, and communication equipment	3.508
29	Machinery and equipment, not elsewhere classified	3.276
28	Fabricated metal products	2.643
34	Motor vehicles, trailers, and semi-trailers	2.346
31	Electrical machinery	2.037
35	Other transport equipment	1.788
15	Food and beverages	1.638
21	Paper and paper products	1.488
17	Textiles	1.479
36	Furniture	1.471
26	Other non-metallic mineral products	1.281
18	Wearing apparel, except footwear	1.226
23	Petroleum refineries	1.141
22	Printing y Publishing	1.085
Brazil		
Code	Description	IIT ratio
32	Radio, television, and communication equipment	3.785
33	Medical, precision, and optical instruments, watches, and clocks	2.758
24	Other chemicals products	2.286
36	Furniture	2.211
31	Electrical machinery	2.104
29	Machinery and equipment, not elsewhere classified	2.014
23	Petroleum refineries	1.792
35	Other transport equipment	1.702
17	Textiles	1.528
25	Rubber products	1.364
19	Footwear	1.243
27	Iron and steel	1.146
21	Paper and paper products	1.092
Paraguay		
Code	Description	IIT ratio
30	Office, accounting, and computing machinery	23.251
32	Radio, television, and communication equipment	21.372
31	Electrical machinery	5.321
29	Machinery and equipment, not elsewhere classified	1.996
17	Textiles	1.612
23	Petroleum refineries	1.173

Table A4.6a

Argentina - Determinants of intra-industry trade patterns (1986-1998)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
labint	0.120 (0.098)	-0.001 (0.006)			0.084 (0.099)	-0.003 (0.006)		
skillint	-0.182 (0.100)*	0.000 (0.006)			-0.072 (0.101)	0.005 (0.006)		
scale	-0.327 (0.117)***	-0.015 (0.006)***			-0.450 (0.109)***	-0.021 (0.005)***		
intint	0.412 (0.110)***	0.022 (0.006)***			0.394 (0.110)***	0.021 (0.006)***		
partnergdp	0.678 (0.088)***	0.033 (0.005)***			0.676 (0.090)***	0.032 (0.006)***		
partnerdif	-1.026 (0.102)***	-0.055 (0.005)***			-1.010 (0.105)***	-0.055 (0.005)***		
nt	2.190 (0.349)***	0.112 (0.024)***	0.145 (0.350)	0.011 (0.021)				
pt	-3.187 (0.350)***	-0.158 (0.025)***	-0.938 (0.328)***	-0.044 (0.020)**				
pm					1.032 (0.095)***	0.051 (0.006)***	0.591 (0.076)***	0.026 (0.004)***
constant	1.184 (0.72)	0.425 (0.042)***	-2.474 (0.365)***	0.176 (0.021)***	-16.865 (1.761)***	-0.456 (0.117)***	-13.761 (1.422)***	-0.309 (0.081)***
Adj R2	0.23	0.17	0.42	0.34	0.21	0.16	0.39	0.32
Observations	959	959	1071	1071	959	959	1071	1071
I. Effects	No	No	YES	YES	No	No	YES	YES
C. Effects	No	No	YES	YES	No	No	YES	YES

(1),(3),(5),(7): IIT1; (2); (4); (6); (8): IIT2

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Argentina - Determinants of intra-industry trade patterns (1986-1998)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
labint	0.120 (0.092)	-0.001 (0.005)			0.084 (0.1)	-0.003 (0.005)		
skillint	-0.182 (0.084)**	0.000 (0.005)			-0.072 (0.082)	0.005 (0.005)		
scale	-0.327 (0.067)***	-0.015 (0.004)***			-0.450 (0.079)***	-0.021 (0.004)***		
intint	0.412 (0.091)***	0.022 (0.005)***			0.394 (0.095)***	0.021 (0.005)***		
partnergdp	0.678 (0.136)***	0.033 (0.010)***			0.676 (0.135)***	0.032 (0.010)***		
partnerdif	-1.026 (0.235)***	-0.055 (0.009)***			-1.010 (0.254)***	-0.055 (0.009)***		
nt	2.190 (0.678)***	0.112 (0.031)***	0.145 (0.396)	0.011 (0.02)				
pt	-3.187 (0.718)***	-0.158 (0.031)***	-0.938 (0.395)**	-0.044 (0.019)**				
pm					1.032 (0.195)***	0.051 (0.008)***	0.591 (0.159)***	0.026 (0.006)***
constant	1.184 (1.072)	0.425 (0.051)***	-2.474 (0.380)***	0.176 (0.015)***	-16.865 (2.837)***	-0.456 (0.125)***	-13.761 (2.883)***	-0.309 (0.111)***
Observations	959	959	1071	1071	959	959	1071	1071
I. Effects	No	No	YES	YES	No	No	YES	YES
C. Effects	No	No	YES	YES	No	No	YES	YES

(1),(3),(5),(7): IIT1; (2); (4); (6); (8): IIT2

Panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A4.6b

Brazil - Determinants of intra-industry trade patterns (1986-1998)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
labint	-0.112 (0.125)	-0.017 (0.007)**			-0.131 (0.125)	-0.017 (0.007)***		
skillint	0.245 (0.123)**	0.023 (0.007)***			0.302 (0.122)**	0.024 (0.006)***		
scale	-0.701 (0.128)***	-0.026 (0.004)***			-0.764 (0.120)***	-0.026 (0.004)***		
intint	0.964 (0.124)***	0.038 (0.005)***			0.955 (0.123)***	0.038 (0.005)***		
partnergdp	5.210 (0.628)***	0.218 (0.027)***			5.082 (0.609)***	0.218 (0.027)***		
partnerdif	-4.286 (0.653)***	-0.173 (0.028)***			-4.150 (0.625)***	-0.174 (0.028)***		
nt	3.174 (0.452)***	0.138 (0.026)***	1.025 (0.381)***	0.054 (0.019)***				
pt	-4.111 (0.486)***	-0.169 (0.028)***	-1.789 (0.355)***	-0.077 (0.018)***				
pm					1.210 (0.134)***	0.048 (0.007)***	0.741 (0.079)***	0.026 (0.004)***
constant	-4.983 (0.813)***	0.134 (0.037)***	-5.229 (0.430)***	0.039 (0.017)**	-25.754 (2.366)***	-0.678 (0.128)***	-18.702 (1.495)***	-0.420 (0.072)***
Adj R2	0.25	0.21	0.53	0.48	0.25	0.21	0.53	0.48
Observations	978	978	1090	1090	978	978	1090	1090
I. Effects	No	No	YES	YES	No	No	YES	YES
C. Effects	No	No	YES	YES	No	No	YES	YES

(1),(3),(5),(7): IIT1; (2); (4); (6); (8): IIT2

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Brazil - Determinants of intra-industry trade patterns (1986-1998)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
labint	-0.112 (0.128)	-0.017 (0.008)**			-0.131 (0.128)	-0.017 (0.008)**		
skillint	0.245 (0.121)**	0.023 (0.005)***			0.302 (0.110)***	0.024 (0.005)***		
scale	-0.701 (0.126)***	-0.026 (0.005)***			-0.764 (0.123)***	-0.026 (0.005)***		
intint	0.964 (0.097)***	0.038 (0.004)***			0.955 (0.098)***	0.038 (0.004)***		
partnergdp	5.210 (1.999)***	0.218 (0.084)***			5.082 (1.987)**	0.218 (0.083)***		
partnerdif	-4.286 (2.053)**	-0.173 (0.087)**			-4.150 (2.036)**	-0.174 (0.086)**		
nt	3.174 (0.920)***	0.138 (0.042)***	1.025 (0.632)	0.054 (0.037)				
pt	-4.111 (1.084)***	-0.169 (0.049)***	-1.789 (0.647)***	-0.077 (0.038)**				
pm					1.210 (0.305)***	0.048 (0.014)***	0.741 (0.168)***	0.026 (0.009)***
constant	-4.983 (1.320)***	0.134 (0.057)**	-5.229 (0.536)***	0.039 (0.024)	-25.754 (4.632)***	-0.678 (0.209)***	-18.702 (3.030)***	-0.420 (0.161)***
Observations	978	978	1090	1090	978	978	1090	1090
I. Effects	No	No	YES	YES	No	No	YES	YES
C. Effects	No	No	YES	YES	No	No	YES	YES

(1),(3),(5),(7): IIT1; (2); (4); (6); (8): IIT2

Panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A4.6c

Paraguay - Determinants of intra-industry trade patterns (1986-1998)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
labint	0.197 (0.201)	0.013 (0.005)**			0.132 (0.207)	0.012 (0.005)**		
skillint	0.677 (0.221)***	0.015 (0.006)**			0.976 (0.213)***	0.019 (0.006)***		
scale	-0.618 (0.143)***	-0.019 (0.003)***			-0.931 (0.140)***	-0.024 (0.003)***		
intint	0.732 (0.168)***	0.017 (0.004)***			0.696 (0.172)***	0.016 (0.004)***		
partnergdp	0.634 (0.170)***	-0.002 (0.004)			0.668 (0.174)***	-0.002 (0.004)		
partnerdif	1.111 (0.157)***	0.027 (0.005)***			1.156 (0.162)***	0.028 (0.005)***		
nt	0.853 (0.818)	-0.017 (0.023)	0.954 (0.538)*	0.003 (-0.016)				
pt	-2.448 (0.875)***	-0.001 (0.024)	-3.207 (0.522)***	-0.037 (0.015)**				
pm					1.197 (0.228)***	0.009 (0.006)	1.777 (0.118)***	0.024 (0.003)***
constant	-11.553 (1.086)***	-0.039 (0.028)	-4.908 (0.702)***	0.070 (0.014)***	-33.550 (4.176)***	-0.212 (0.115)*	-38.491 (2.250)***	-0.399 (0.057)***
Adj R2	0.18	0.11	0.47	0.34	0.14	0.10	0.40	0.31
Observations	843	843	1067	1067	843	843	1067	1067
I. Effects	No	No	YES	YES	No	No	YES	YES
C. Effects	No	No	YES	YES	No	No	YES	YES

(1),(3),(5),(7): IIT1; (2); (4); (6); (8): IIT2

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Paraguay - Determinants of intra-industry trade patterns (1986-1998)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
labint	0.197 (0.286)	0.013 (0.006)**			0.132 (0.282)	0.012 (0.006)**		
skillint	0.677 (0.144)***	0.015 (0.003)***			0.976 (0.176)***	0.019 (0.004)***		
scale	-0.618 (0.108)***	-0.019 (0.003)***			-0.931 (0.165)***	-0.024 (0.003)***		
intint	0.732 (0.150)***	0.017 (0.003)***			0.696 (0.167)***	0.016 (0.003)***		
partnergdp	0.634 (0.209)***	-0.002 (0.004)			0.668 (0.216)***	-0.002 (0.004)		
partnerdif	1.111 (0.155)***	0.027 (0.005)***			1.156 (0.164)***	0.028 (0.005)***		
nt	0.853 (1.142)	-0.017 (0.029)	0.954 (1.022)	0.003 (0.021)				
pt	-2.448 (1.180)**	-0.001 (0.03)	-3.207 (1.047)***	-0.037 (0.021)*				
pm					1.197 (0.367)***	0.009 (0.008)	1.777 (0.430)***	0.024 (0.007)***
constant	-11.553 (1.375)***	-0.039 (0.022)*	-4.908 (0.924)***	0.070 (0.015)***	-33.550 (6.455)***	-0.212 (0.143)	-38.491 (7.758)***	-0.399 (0.121)***
Observations	843	843	1067	1067	843	843	1067	1067
I. Effects	No	No	YES	YES	No	No	YES	YES
C. Effects	No	No	YES	YES	No	No	YES	YES

(1),(3),(5),(7): IIT1; (2); (4); (6); (8): IIT2

Panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A4.6d

Uruguay - Determinants of intra-industry trade patterns (1986-1998)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
labint	-0.323 (0.099)***	-0.025 (0.007)***			-0.317 (0.099)***	-0.025 (0.007)***		
skillint	0.052 (0.121)	0.007 (0.007)			0.021 (0.118)	0.007 (0.007)		
scale	-0.274 (0.116)**	-0.021 (0.006)***			-0.236 (0.110)**	-0.021 (0.005)***		
intint	0.416 (0.105)***	0.033 (0.006)***			0.422 (0.105)***	0.033 (0.006)***		
partnergdp	1.458 (0.112)***	0.055 (0.006)***			1.432 (0.112)***	0.055 (0.006)***		
partnerdif	1.472 (0.086)***	0.063 (0.005)***			1.450 (0.086)***	0.063 (0.005)***		
nt	-0.902 (0.367)**	-0.073 (0.023)***	-1.623 (0.402)***	-0.059 (0.022)***				
pt	1.252 (0.387)***	0.086 (0.023)***	1.418 (0.409)***	0.049 (0.022)**				
pm					-0.391 (0.010)***	-0.022 (0.006)***	-0.138 (0.096)***	-0.003 (0.005)
constant	-6.439 (0.673)***	0.069 (0.041)*	0.939 (0.498)*	0.352 (0.030)***	0.431 (1.918)	0.434 (0.113)***	2.316 (1.722)	0.363 (0.096)***
Adj R2	0.36	0.23	0.38	0.33	0.36	0.23	0.37	0.33
Observations	878	878	987	988	878	878	987	988
I. Effects	No	No	YES	YES	No	No	YES	YES
C. Effects	No	No	YES	YES	No	No	YES	YES

(1),(3),(5),(7): IIT1; (2); (4); (6); (8): IIT2

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Uruguay - Determinants of intra-industry trade patterns (1986-1998)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
labint	-0.323 (0.094)***	-0.025 (0.008)***			-0.317 (0.094)***	-0.025 (0.008)***		
skillint	0.052 (0.069)	0.007 (0.003)**			0.021 (0.068)	0.007 (0.003)**		
scale	-0.274 (0.093)***	-0.021 (0.004)***			-0.236 (0.094)**	-0.021 (0.004)***		
intint	0.416 (0.125)***	0.033 (0.005)***			0.422 (0.128)***	0.033 (0.005)***		
partnergdp	1.458 (0.105)***	0.055 (0.004)***			1.432 (0.104)***	0.055 (0.004)***		
partnerdif	1.472 (0.067)***	0.063 (0.003)***			1.450 (0.061)***	0.063 (0.003)***		
nt	-0.902 (0.291)***	-0.073 (0.021)***	-1.623 (0.390)***	-0.059 (0.015)***				
pt	1.252 (0.260)***	0.086 (0.021)***	1.418 (0.396)***	0.049 (0.014)***				
pm					-0.391 (0.053)***	-0.022 (0.005)***	-0.138 (0.135)	-0.003 (0.004)
constant	-6.439 (0.415)***	0.069 (0.026)***	0.939 (0.397)**	0.352 (0.030)***	0.431 (0.960)	0.434 (0.085)***	2.316 (2.414)	0.363 (0.081)***
Observations	878	878	987	988	878	878	987	988
I. Effects	No	No	YES	YES	No	No	YES	YES
C. Effects	No	No	YES	YES	No	No	YES	YES

(1),(3),(5),(7): IIT1; (2); (4); (6); (8): IIT2

Panel-corrected standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

A5. Descriptive Evidence on Border Regions

Table A5.1

Mercosur – Border regions				
Country	Argentina	Paraguay	Brasil	Uruguay
Argentina		Chaco Formosa Corrientes Misiones	Misiones Corrientes	Entre Rios Buenos Aires Capital Federal
Paraguay	Boquerón Presidente Hayes Central Ñembucuc Misiones Itapúa		Alto Paraguay Concepción Canindeyú Amanbay Alto Paraná	
Brazil	Santa Catarina Rio Grande do Sul Paraná	Mato Grosso do Sul Santa Catarina Paraná		Rio Grande do Sul
Uruguay	Colonia Soriano Paysandú Rio Negro Salto Artigas		Treinta y Tres Rivera Cerro Largo Artigas	

Table A5.2

Specialization indices	
Sectoral level	
Absolute specialization (Share)	Relative specialization (Hoover-Balassa Index)
$AS_{ik} = \frac{x_{ik}}{\sum_{k=1}^M x_{ik}}$	$RS_{ik} = \frac{x_{ik}}{\sum_{k=1}^M x_{ik}} \bigg/ \frac{\sum_{i=1}^N x_{ik}}{\sum_{i=1}^N \sum_{k=1}^M x_{ik}}$
Overall	
Absolute specialization	Relative specialization
$AS_i = \sqrt{\left(\frac{1}{M} \right) \sum_{k=1}^M \left(\frac{x_{ik}}{\sum_{k=1}^M x_{ik}} \right)^2}$	$RS_i = \sqrt{\left(\frac{1}{M} \right) \sum_{k=1}^M \left(\frac{x_{ik}}{\sum_{k=1}^M x_{ik}} - \frac{\sum_{i=1}^N x_{ik}}{\sum_{i=1}^N \sum_{k=1}^M x_{ik}} \right)^2}$

where x_{ik} is the level of activity (employment, production, etc) in industry k ($1, \dots, M$) in region i ($1, \dots, N$).

Data and sources

Paraguay

Specialization indices for the agriculture and farming of animals were calculated using:

- Tons in agriculture sector from 1998 to 2001. The data was provided by *Ministerio de Agricultura y Ganadería. Dirección de Censos y Estadísticas Agropecuarias*. The analysis discriminates in temporary and permanent crops as a total respectively.⁵⁷ Temporal crops included are: cotton, garlic, dry rice, irrigated rice, sweet potato, vetch, onion, sugar cane, sunflower, strawberry, habilla, corn, locote, peanut, potato, mint, sorghum, soy, caper spurge, tobacco, wheat, tomato, and carrot. Permanent crops included are: banana, coffee, lemon, mandarin, sweet orange, citrus orange, pine nut, grapefruit, tung, grape, and yerba mate.
- Number of heads in farming of animals. The data was provided by *Producción Agropecuaria 1998/99/00/01. Síntesis Estadística. Ministerio de Agricultura y Ganadería*. In animal sector we differentiated in “herd” and “poultry” as total production, the former goes from 1996 to 2001 and the latter goes from 1994 to 2001. This difference is due to the bias produced by the disparity in the numbers of heads in the two groups. Herd is formed by cattle, pigs, sheep, horses, and goats; and poultry is formed by cocks and chickens, chickens in posture, ducks, peacock, goose, and guineas.

To study manufacturing we use the preliminary data included in the first *Encuesta industrial nacional 2002*. These are aggregated data. We could not calculate indices by departments because data is not yet available.

Brasil

Data on agricultural sector were taken from “*Censo Agropecuario 1995/1996, Instituto Brasileiro de Geografia e Estadística*”. In particular, we have production value data for agricultural and number of heads for farming of animals. In the first case, we discriminate again between temporary and permanent crops. Temporary crops are: wheat, soy, corn, manioc, tobacco, dry bean (third harrost time), dry bean (second harrost time), dry bean (first harrost time), sugar cane, British sweet potato (second harrost time), British sweet potato (first harrost time), rice, and cotton. Permanent crops are: grape (for wine), grape (for table), peper, maracujá, manga, mamao, maca, orange, yerba mate, coconut, caju-fruto, cajú-castanha, coffe, cacao, and banana. Animals are cattle and poultry.

Manufacturing indices were calculated with Brazil state employment data from 1991 to 1999. The data were provided by the *Brazilian Ministry of Works* from its database *RAIS*. FUNCEX gave us trade data at state level.

Argentina

Agricultural data were provided by *Instituto Nacional de Estadísticas y Censos*. More specifically, we have used 1988 and 2002 censuses (in the last case, data are preliminary). Indices were estimated

⁵⁷ Temporary crops are those plants which only live one production cycle, while permanent crops are those plants which live two or more production cycles.

only for crops in 2002 because 1988 data were not similarly reported. We have identified four crops: oleaginous, cereals, industrial, and others crops.⁵⁸ The measurement unit is total used area. In farming of animals we have identified four categories: cattle, sheep, goat, and pigs. The measurement unit is number of heads.

For the analysis of manufacturing we have used provincial employment from industrial censuses 1985 and 1994.

Uruguay

Indices for agriculture were calculated with data taken from “*Censo general agropecuario 2000 datos definitivos*”. The unit of measurement is total cultivated area. Crops are wheat, barley, rice, corn, sunflower, sorghum, vineyard, horticultural products, citrus fruits, and fruits with not perennial petal. In the case of farming of animals, we have identified four categories: cattle, pigs, and poultry. The measurement unit is number of heads.

Manufacturing analysis is based on aggregated data at departmental level provided by *Cámara de Industrias del Uruguay*.

⁵⁸ *Oleaginous*: sunflower and soy. *Cereals*: rice, wheat, sorghum, corn, and barley. *Industrials*: cotton, sugar cane, tobacco, and yerba mate.

Table A5.3a

Paraguay

Paraguay - Permanent crops - Absolute specialization			
Department\year	1998-1999	2000-2001	Vatiation
Concepción	0.0987	0.1170	0.0182
Itapúa	0.3464	0.3387	-0.0077
Misiones	0.0311	0.0159	-0.0151
Alto Paraná	0.0584	0.0487	-0.0097
Central	0.0421	0.0403	-0.0017
Ñeembucú	0.0265	0.0471	0.0206
Amambay	0.0242	0.0132	-0.0110
Canindeyú	0.1770	0.1709	-0.0061
Presidente Hayes	0.0044	0.0171	0.0127
Boquerón	0.0025	0.0047	0.0023
Alto Paraguay	0.0017	0.0001	-0.0016

Paraguay - Permanents crops - Relative specialization				
Province	Crop\year	Relative Specialization		
		1998-1999	2000-2001	Variation
Concepción	Coffee	8.7084	12.3542	3.6458
	Pine nut	3.7636	6.0936	2.3300
	Banana	2.7558	2.2998	-0.4561
Itapúa	Tung	4.9212	4.6208	-0.3003
	Sweet orange	1.2246	1.2686	0.0439
	Yerba Mate	2.2180	1.3699	-0.8481
Misiones	Banana	2.5199	2.6376	0.1178
	Grape fruit	1.3234	2.2888	0.9654
	Sweet orange	1.7069	1.1317	-0.5751
Alto Paraná	Sweet orange	1.7645	1.7237	-0.0408
	Mandarin	2.3802	2.7936	0.4134
	Banana	1.4443	1.4617	0.0173
Central	Grape Fruit	4.4632	4.3369	-0.1263
	Mandarin	4.1630	4.8280	0.6650
	Lemon	6.3392	7.3279	0.9887
Ñeembucú	Grape fruit	2.8761	3.2311	0.3550
	Sweet orange	1.8711	1.9653	0.0942
	Mandarin	0.9139	0.9355	0.0215
Amambay	Coffee	0.8182	1.8480	1.0299
	Banana	1.5214	2.3064	0.7850
	Yerba Mate	4.7353	1.7835	-2.9517
Canindeyú	Yerba Mate	3.5135	1.4753	-2.0382
	Coffee	19.9306	12.8862	-7.0444
	Banana	1.2848	1.7991	0.5143
Pdte. Hayes	Mandarin	2.1078	1.3754	-0.7323
	Yerba Mate	0.0000	3.4961	3.4961
	Grape fruit	3.4031	2.2391	-1.1640
Boquerón	Grape (wine)	1.7538	1.2879	-0.4659
	Grape fruit	3.8382	9.2735	5.4354
	Mandarin	3.7130	1.5739	-2.1391
Alto Paraguay	Grapefruit	7.7189	6.0732	-1.6457
	Sweet orange	0.8607	1.3213	0.4606
	Banana	0.4549	0.9617	0.5068

Paraguay - Temporary crops - Absolute specialization			
Department\year	1998-1999	2000-2001	Vatiation
Concepción	0.1593	0.1710	0.0117
Itapúa	0.2339	0.2670	0.0331
Misiones	0.0882	0.0758	-0.0124
Alto Paraná	0.2012	0.1753	-0.0259
Central	0.1347	0.0928	-0.0419
Ñeembucú	0.0132	0.0154	0.0022
Amambay	0.0579	0.0568	-0.0011
Canindeyú	0.1327	0.1295	-0.0032
Presidente Hayes	0.0215	0.0467	0.0252
Boquerón	0.1246	0.1207	-0.0039
Alto Paraguay	0.0027	0.0013	-0.0014

Paraguay - Temporary crops - Relative specialization				
Province	Crop\year	Relative Specialization		
		1998-1999	2000-2001	Variation
Concepción	Tártago	47.8763	31.8849	-15.9914
	Locote	15.5923	17.8413	2.2490
	Habilla	29.3946	22.3676	-7.0271
Itapúa	Irrigated Rice	1.9153	0.9532	-0.9621
	Carrot	3.1523	3.4290	0.2766
	Wheat	1.4304	2.0956	0.6652
Misiones	Dry Bean	2.2520	2.1317	-0.1204
	Potato	17.3990	4.5935	-12.8055
	Irrigated Rice	33.6126	28.0672	-5.5454
Alto Paraná	Soya	1.8968	1.8328	-0.0640
	Mint	2.9335	2.6710	-0.2625
	Sunflower	1.8538	1.0307	-0.8231
Central	Tomato	6.1054	5.7546	-0.3508
	Locote	3.0283	2.8181	-0.2103
	Strawberry	17.4250	14.7904	-2.6346
Ñeembucú	Sweet Potato	19.2088	13.4106	-5.7982
	Dry Bean	5.1937	8.3826	3.1889
	Cotton	6.5891	4.5039	-2.0852
Amambay	Dry Rice	8.8589	10.2747	1.4158
	Wheat	2.5968	2.1798	-0.4170
	Tártago	3.0421	5.3693	2.3273
Canindeyú	Tobacco	5.1255	4.2358	-0.8897
	Dry Rice	3.7630	4.1155	0.3524
	Soya	1.6348	1.4377	-0.1971
Pdte. Hayes	Sorghum	6.2906	23.7100	17.4194
	Penaut	6.5169	7.6382	1.1212
	Sugar Cane	2.4880	2.3300	-0.1579
Boquerón	Tártago	26.7271	30.7840	4.0569
	Sorghum	183.1811	134.7386	-48.4425
	Penaut	49.4030	39.0331	-10.3699
Alto Paraguay	Cotton	32.6255	23.8977	-8.7278
	Sorghum	20.6877	15.7089	-4.9789
	Dry Bean	1.4391	2.3085	0.8694

Paraguay - Herd - Absolute specialization			
Department\year	1996-1998	1999-2001	Variation
Concepción	0.05481	0.05533	0.00052
Itapúa	0.09924	0.09969	0.00045
Misiones	0.04713	0.0476	0.00047
Alto Paraná	0.06275	0.06205	-0.0007
Central	0.01593	0.01628	0.00035
Ñeembucú	0.06428	0.06487	0.0006
Amambay	0.03505	0.03462	-0.00043
Canindeyú	0.04176	0.03844	-0.00332

Paraguay - Herd - Relative specialization				
Department	Animal	1996-1998	1999-2001	Variation
Concepción	Cattle	1.04743	1.06397	0.01654
	Sheeps	1.06635	1.06804	0.00169
Itapúa	Pigs	2.34972	2.34617	-0.00354
	Horses	1.28843	1.26676	-0.02167
Misiones	Horses	1.48987	1.57625	0.08638
	Sheeps	1.85089	1.89307	0.04218
Alto Paraná	Pigs	2.52492	2.44633	-0.07859
	Goat	0.95982	0.9073	-0.05252
Central	Pigs	1.87294	1.75615	-0.11678
	Goat	0.99543	0.96863	-0.0268
Ñeembucú	Sheeps	2.34096	2.39187	0.05091
	Horses	2.11796	2.12854	0.01058
Amambay	Cattle	1.14502	1.14468	-0.00034
	Sheeps	0.61012	0.6337	0.02358
Canindeyú	Sheeps	0.88817	0.55097	-0.3372
	Cattle	1.06873	1.12289	0.05416
Pte Hayes	Goat	-	1.2707	-
	Cattle	-	0.77677	-
Boquerón	Goat	-	1.96995	-
	Cattle	-	1.18539	-
Alto Paraguay	Cattle	-	0.79338	-
	Goat	-	0.63569	-

Paraguay - Poultry - Absolute specialization			
Province\year	1994-1997	1998-2001	Variation
Concepción	0.06113	0.05899	-0.00214
Itapúa	0.13573	0.13725	0.00152
Misiones	0.03669	0.03707	0.00038
Alto Paraná	0.07698	0.07725	0.00028
Central	0.10624	0.11122	0.00499
Ñeembucú	0.03114	0.03045	-0.00069
Amambay	0.02524	0.02545	0.00021
Canindeyú	0.04124	0.04072	-0.00052
Presidente Hayes	0.02467	0.02425	-0.00042
Boquerón	0.00425	0.00403	-0.00022
Alto Paraguay	0.00118	0.00086	-0.00032

Paraguay - Poultry - Relative specialization				
Department	Animal	1994-1997	1998-2001	Variation
Concepción	Peacock	2.0710	2.0906	0.0195
	Goose	2.0637	1.9996	-0.0641
Itapúa	Cocks and Chickens	1.0280	1.0286	0.0006
	Ducks	1.4808	1.5105	0.0297
Misiones	Peacock	2.1548	2.2207	0.0660
	Goose	2.4249	2.4843	0.0594
Alto Paraná	Ducks	1.1672	1.2010	0.0339
	Cocks and Chickens	1.0136	1.0123	-0.0014
Central	Chickens in posture	1.2011	1.2133	0.0122
	Cocks and Chickens	0.9755	0.9659	-0.0096
Ñeembucú	Goose	2.6547	2.7517	0.0971
	Guineas	2.7779	2.6857	-0.0922
Amambay	Peacock	1.8978	1.8442	-0.0536
	Guineas	2.0917	2.2251	0.1334
Canindeyú	Guineas	1.2630	1.2764	0.0134
	Ducks	1.2424	1.2551	0.0127
Presidente Hayes	Peacock	7.1569	7.3033	0.1465
	Goose	4.1535	4.3570	0.2035
Boquerón	Peacock	2.1317	2.1195	-0.0122
	Chickens in posture	1.1269	1.1023	-0.0247
Alto Paraguay	Peacock	7.2073	1.9856	-5.2217
	Guineas	4.1963	2.2783	-1.9180

Table A5.3b

Brazil

Brazil - Permanent crops			
State	Absolute Specialization	Relative Specialization	
		Crop	Index
Mato Grosso do Sul	0.0036	Yerba Mate	6.09
		Manga	4.55
		Banana	3.75
Paraná	0.0644	Coffee	1.19
		Yerba Mate	6.64
		Grape (for table)	3.06
Santa Catarina	0.1511	Maca	14.90
		Yerba Mate	5.02
		Banana	2.30
Rio grande do Sul	0.2914	Grape (for wine)	19.53
		Yerba Mate	13.37
		Maca	9.36

Brazil - Temporary crops			
State	Absolute Specialization	Relative Specialization	
		Crop	Index
Mato Grosso do Sul	0.0370	Cotton	2.38
		Soya	2.25
		Corn	1.23
Paraná	0.3622	Tobacco	4.71
		Wheat	2.83
		Cotton	1.50
Santa Catarina	0.0722	Cotton	2.51
		Dry Bean (2nd)	2.52
		British sweet potato (1st)	2.40
Rio grande do Sul	0.2386	Rice	3.64
		Tobacco	2.43
		Wheat	1.85

Brazil - Animals			
State	Absolute Specialization	Relative Specialization	
		Animal	Index
Mato Grosso do Sul	0.0758	Cattle	3.72
		Suinos	0.53
		Poultry	0.44
Paraná	0.1189	Cattle	0.54
		Suinos	1.20
		Poultry	1.09
Santa Catarina	0.1172	Cattle	0.20
		Suinos	1.57
		Poultry	1.15
Rio grande do Sul	0.1249	Cattle	0.66
		Suinos	1.09
		Poultry	1.07

Brazil - Manufacturing - Absolute Specialization			
State	1999	1991	1999-1991
Parana	0.0803	0.0699	0.0104
Santa Catarina	0.0793	0.0711	0.0082
Rio Grande do Sul	0.1438	0.1399	0.0039
Mato Grosso do Sul	0.0076	0.0045	0.0031

Brazil - Manufacturing - Relative specialization			
State	Sector	1999	1999-1991
Parana	Wood	2.9706	-0.8798
	Paper	1.6053	-0.7902
	Food	1.1592	-0.1596
Santa Catarina	Wood	2.3140	-1.0120
	Paper	1.3721	0.0251
	Textil	1.8678	-0.3719
Rio Grande do Sul	Wearing apparel and footwear	1.9053	-0.4284
	Tobacco	3.4434	-0.1591
	Leathers and hides	3.4884	-0.8189
Mato Grosso do Sul	Leathers and hides	2.1363	0.8110
	Food	2.6880	0.0697
	Beverages	3.7285	0.8429

Table A5.3c

Argentina

Argentina - Crops			
Province	Absolute specialization	Relative specialization	
Buenos Aires	0.3022	cereals	1.2615
		others crops	0.9597
Chaco	0.1608	oleaginous	1.7696
		industrials	10.8724
Corrientes	0.0231	industrials	2.7812
		others crops	2.0230
Entre Ríos	0.0475	cereals	1.2208
		oleaginous	1.1916
Formosa	0.0119	industrials	6.8104
		others crops	1.7420
Misiones	0.1740	industrials	16.6432
		others crops	1.6415

Argentina - Animals - Absolute specialization			
Province\year	1988	2002	Variation
Buenos Aires	0.2425	0.2202	-0.0223
Chaco	0.0266	0.0447	0.0181
Corrientes	0.0543	0.0509	-0.0034
Entre Ríos	0.0454	0.0426	-0.0028
Formosa	0.0196	0.0312	0.0115
Misiones	0.0183	0.0316	0.0133

Argentina - Animals - Relative specialization				
Province	Animal	1988	2002	Variation
Buenos Aires	Cattle	1.2313	1.2455	0.0142
	Pigs	0.8874	0.9028	0.0153
Chaco	Cattle	1.3656	1.1353	-0.2303
	Goat	1.2897	1.6106	0.3209
Corrientes	Cattle	1.0916	1.1107	0.0191
	Sheep	1.1045	1.0284	-0.0761
Entre Ríos	Cattle	1.3332	1.2573	-0.0760
	Sheep	0.5588	0.4330	-0.1257
Formosa	Cattle	1.3679	1.1226	-0.2453
	Goat	1.2554	1.5137	0.2583
Misiones	Pigs	7.9858	9.1837	1.1979
	Cattle	1.0340	0.9566	-0.0774

Argentina - Manufacturing - Relative specialization			
Province	Industry	1994	1994-1985
Capital Federal	Clothes	2.4560	-0.2245
	Edition, recording and printing activities	3.0063	0.0198
	Medicine instruments	2.1201	0.2493
Buenos Aires	Miscellaneous products of petroleum and coal	1.7258	-0.0354
	Plastic and rubber products	1.4074	0.0003
	Basic metal	1.4664	0.0592
Corrientes	Tobacco	16.6617	-2.8621
	Textiles	4.3567	3.3261
	Paper	2.4077	0.0000
Chaco	Tobacco	10.6396	7.6214
	Textiles	3.8910	-0.0638
	Wood products	3.8818	-0.7226
Entre Ríos	Food and Beverages	2.0000	-0.1487
	Tobacco	5.1547	1.1005
	Wood products	2.6114	0.2857
Formosa	Wood products	2.1308	-3.5339
	No metal products	6.7702	4.3837
	Furniture	6.0938	1.8997
Misiones	Tobacco	13.6759	13.2840
	Wood products	10.6288	1.9860
	Paper products	5.1188	3.0941

Table A5.3d

Uruguay

Uruguay - Crops			
Department	Absolute specialization	Crop	Relative specialization
Artigas	0.0494	Rice	3.2350
Cerro Largo	0.0399	Rice	3.5262
Colonia	0.8075	Sorghum	1.3407
		Barley	2.6439
		Corn	1.6767
Paysandú	0.2624	Wheat	1.5414
		Barley	1.7620
		Citricos	4.4189
Río Negro	0.1548	Wheat	1.9800
		Barley	1.2829
		Sunflower	1.2589
Rivera	0.0052	Rice	3.0373
		Huerta	1.6263
Salto	0.2041	Huerta	2.7120
		Citrus fruits	16.7869
		Rice	1.6843
Soriano	0.9477	Wheat	1.5187
		Barley	1.2379
		Sunflower	2.2238
Treinta y Tres	0.0805	Rice	3.8278

Uruguay - Animals			
Department	Absolute specialization	Animal	Relative specialization
Colonia	0.0822	Cattle	1.5647
		Pigs	4.6005
Soriano	0.0475	Cattle	1.8233
		Pigs	1.6629
Río Negro	0.0343	Cattle	1.9375
		Pigs	0.6272
Paisandú	0.0410	Cattle	1.8570
		Pigs	0.6874
Salto	0.0470	Cattle	1.8761
		Pigs	1.6629
Artigas	0.0348	Cattle	1.7093
		Pigs	0.6125
Rivera	0.0325	Cattle	1.9595
		Pigs	0.3079
Cerro Largo	0.0514	Cattle	1.8968
		Pigs	0.6365
Treinta y Tres	0.0306	Cattle	1.9510
		Pigs	0.3474

Uruguay - Department shares in manufacturing value added							
	1985	1987	1989	1991	1993	1995	1995-1985
MONTEVIDEO	75.57	75.57	75.57	76.46	75.57	75.61	0.04
FLORIDA	0.81	0.81	0.81	0.76	0.81	0.79	-0.02
COLONIA	4.57	4.57	4.57	4.26	4.57	4.47	-0.10
PAYSANDU	2.48	2.48	2.48	2.28	2.48	2.48	0.00
FLORES	0.58	0.58	0.58	0.58	0.58	0.56	-0.02
SORIANO	1.39	1.39	1.39	1.25	1.39	1.36	-0.03
RIO NEGRO	0.11	0.11	0.11	0.11	0.11	0.11	0.00
TREINTA Y TRES	0.50	0.50	0.50	0.46	0.50	0.50	0.00
ROCHA	0.42	0.42	0.42	0.39	0.42	0.42	0.00
TACUAREMBO	0.64	0.64	0.64	0.59	0.64	0.63	-0.01
DURAZNO	0.46	0.46	0.46	0.46	0.46	0.45	-0.01
MALDONADO	1.20	1.20	1.20	1.28	1.20	1.31	0.11
LAVALLEJA	0.90	0.90	0.90	0.87	0.90	0.94	0.04
SAN JOSE	1.97	1.97	1.97	2.21	1.97	2.01	0.04
CERRO LARGO	0.20	0.20	0.20	0.18	0.20	0.19	-0.01
ARTIGAS	0.63	0.63	0.63	0.59	0.63	0.62	-0.01
SALTO	0.84	0.84	0.84	0.80	0.84	0.86	0.02
CANELONES	6.60	6.60	6.60	6.36	6.60	6.54	-0.06
RIVERA	0.15	0.15	0.15	0.14	0.15	0.15	0.00