

Regional trade arrangements and intra-industry trade: The case of Mercosur

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- ? . Introduction
- ? . Regional Trade Agreements and Intra- Industry Trade
- ? . Intra- Industry Trade in Mercosur
- ? . Conclusion

I. Introduction

The scope of intra-industry trade has been steadily increasing in international trade after the establishment of the General Agreements on Tariffs and Trade (GATT). Especially, the intra-industry trade within regional trade arrangements (RTAs) among developed countries, for example the intra-industry trade among members of the European Economic Community (EEC), has shown a dramatic increase.

The studies on intra-industry trade first arose from economists paying attention to changes in international trade patterns after the formation of EEC. For this reason, the studies on intra-industry trade have been related to regional trade agreements from the beginning. In this regard, arguments were brought upon whether regional trade agreements and intra-industry trade have positive relationship, and whether regional trade agreements

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stimulate intra-industry trade or vice versa.

However, most of the studies until now were concentrated on the regional trade agreements among developed countries. This may be because the regional trade agreements among developing countries had only limited effect in stimulating trade, be it intra-industry or inter-industry trade. This paper investigates whether regional trade agreements among developing countries, stimulate intra-industry trade. If intra-industry increases with an establishment of a regional trade arrangement, this would imply that the regional trade arrangement lead not only to the integration of the economies but also to the integration of the industries within the economies.

We adopt the Grubel-Lloyd index to show the changes of intra-industry trade level before and after establishing Southern Cone Common Market (*Mercado Común del Sur*; Mercosur), a regional trade agreement among developing countries. By comparing the level of Grubel-Lloyd index before and after the establishment of Mercosur, we found strong evidence that intra-industry trade has increased after the establishment of the regional trade agreement.

Grubel and Lloyd (1975) and Greenaway (1986,1989) argue that intra-industry trade would have greater effect in the case of regional trade agreements among developed countries. This is because intra-industry trade would increase more, the larger is the economies of scale, the higher is the per capita income, and the more diversified is the demand. There are considerably less studies written on the relationship between regional trade agreements among developing countries and intra-industry trade. However, within those studies¹, there are two opposing views. The first view states that minimal effects would be evident on intra-industry trade for regional trade agreements of less developed small countries. The second view states that less developed small countries would experience a significant increase in intra-regional trade and consequently get significant benefit from regional trade agreements, because they had made limited use of economies of scale. We will try to give an assessment to these two views for the case of

¹ Balassa (1965, 1979), Grubel and Lloyd (1975), and Drabek and Greenaway (1984). See Greenaway (1989), pp. 31-32.

Mercosur.

The organization of this paper is as follows: in section II, we review the relationship between regional trade agreements and intra-industry trade. In section III, we analyze the relationship between intra-industry trade and regional trade agreements in the case of Mercosur. Lastly, we conclude in section IV.

II. Regional Trade Agreements and Intra-Industry Trade

Theories on intra-industry trade were developed in relation with regional trade agreements among developed countries. Intra-industry trade first arose from attention paid by economists to changes in international trade patterns after the formation of European Economic Community. Increased trade volume and similar product exchange seem to be a result of regional economic integration.

Many scholars have analyzed the relationship between regional trade agreements and intra-industry trade. Most of the studies found some evidence that regional trade agreements stimulate intra-industry trade and vice versa.² Grubel and Lloyd (1975) showed that intra-industry trade level had been increased after the formation of OEEC³ and EEC⁴. Economies of scale can be the main reason of intra-industry trade. Instead of producing every product, individual countries can produce a reduced number of products and exchange them to consume a large variety of products. In this way the country can take advantage of the economies of scale and consume differentiated products. Regional trade agreement among developed countries increases intra-regional trade because similar income level and similar preference increase the potential trade volume in intra-industry trade.

² Behar notes that the establishment of the precursor agreement to Mercosur between Argentina and Brazil was explicitly motivated by a desire to expand intra-sectoral trade. See Behar (1991).

³ Organization for European Economic Cooperation (OEEC) is predecessor of OECD (Organization for Economic Cooperation and Development) and it was formed in 1961 for reconstruction of Europe after World War II.

⁴ EEC (European Economic Community) is antecedent of EU. EEC was formed in 1958.

This explains why regional trade agreements among developed countries increase intra-industry trade within the region.

Globerman (1992) suggests that intra-industry trade can increase for regional trade agreements between developing countries and developed countries as North American Free Trade Agreement (NAFTA). Globerman's explanation for this is that developing countries have suffered from high levels of industrial concentration and made scant use of economies of scale, so that developing countries would benefit from the powerful stimulus toward rationalization of production provided by free trade. For example, Mexico that is a country with a rapid increase in intra-industry trade since the late 1980's has had trade links with the United States following implementation of various stages of NAFTA. As a result, the elimination of tariff barriers and Mexico's relatively low labor costs has led to set up '*maquiladora*' in the border region, which devoted to the assembly and re-export of goods. Among them, the scope of intra-industry trade of manufactured goods is much higher than other goods. Moreover, top ranking Mexican export products to United States almost coincide with the top ranking import products from United States⁵ after the formation of NAFTA. This shows that as a result of regional trade agreements with developed country, the intra-industry trade of the member developing country may increase.

However, Rodas-Martini (1998) asserted that the effects of regional trade agreements and intra-industry trade in less developed countries are insignificant. He calculated both intra-industry trade and revealed comparative advantage to analyze intra-regional trade among Central American countries in 1994. The results were low levels of intra-industry trade and the presence of many products with high levels of revealed comparative advantage. This study showed that intra-industry trade is not high among less developed countries like the Central American countries.

⁵ See (OECD, 2002: 71)

He continued to suggest that the low level of IIT was a reflection of the relatively high number of products with revealed comparative advantage and disadvantage, which is trade characteristic of less developed countries.

Our interest is in the Mercosur case, a regional trade agreement among medium income developing countries. This is different from the cases mentioned above, as it is not a case of industrialized countries, nor one of developing countries and industrialized countries, nor one of less developed countries.

The case of Mercosur is especially interesting because its members are very heterogeneous in economic size. The markets of Argentina and Brazil are much larger than those of Uruguay and Paraguay. Moreover, even if Latin American countries have established several regional trade integrations since 1960s, there are only a few studies on the effects of economic integration on intra-industry trade in this region.⁶

III. Intra-Industry Trade in Mercosur

1. Why Mercosur?

Mercosur, which is the latest economic integration in the Latin American region, is a regional bloc integrated by a group of developing countries with notably different characteristics. As can be seen in the [Table 1], Brazil is about one hundred times larger than Paraguay. Uruguay is much larger than Paraguay, but is just 1/10 the size of Argentina. However, with the exception of Paraguay, member countries have per capita GDP between

⁶ See (Baumann, 1994, Rodas-Martini, 1998, Guell and Richards, 1998, Sebastian and Miguel, 1989)

4,000 dollars and 8,000 dollars, which is relatively high among developing countries.

[Table 1] Economic size of Mercosur countries (1999)

	GDP (Billion dollars)	Population (Million dollars)	GDP per capita (Dollars)
Argentina	283.2	37	7741
Brazil	752.5	168	4474
Paraguay	7.7	5	1445
Uruguay	20.8	3	6280

Source: World development indicators

Our question is whether regional trade agreement stimulates intra-industry trade even in the case of an RTA among developing countries, like Mercosur. We have seen that this is not the case for RTAs among less developed countries. If intra-industry trade does increase for RTAs among developing countries, the next question is in which countries it increased more. We expect a larger increase in larger countries as Argentina and Brazil than in smaller countries as Uruguay and Paraguay. This is because intra-industry trade is more likely to occur in, and between, large economies that are able to support industries characterized by economies of scale.

Ekanayake (2001) found that for the case of Mexico, the extent of intra-industry trade was positively correlated with average income levels, average country size, trade intensity, trade orientation, the existence of a common border, the existence of a common language, and the participation in regional integration schemes, and negatively correlated with income inequality, inequality in country size, distance, and trade imbalance. Following Ekanayake, we expect a larger increase in intra-industry trade among member countries than between member countries and third parties, and a larger increase between larger member countries than between smaller ones. Another interesting question is whether the intra-industry with third parties will increase after the establishment of the RTA.

2. Methodology and Data

To measure intra-industry trade we used Grubel-Lloyd index (GL index), which is the most widely used measure of intra-industry trade levels. GL index measures the intensity of intra-industry trade by industry or by country. The intra-industry trade index of home country with a country j ($=1, \dots, m$) for an industry i ($=1, \dots, n$) is the following:

$$IIT_{ij} = 1 - \frac{|X_{ij} - M_{ij}|}{(X_{ij} + M_{ij})} \quad (1)$$

where X_{ij} and M_{ij} are the export and import of the product i to the country j . If the amount of exports equals that of imports ($X_{ij}=M_{ij}$), this means that all trade in industry i is intra-industry trade, and $IIT_{ij} = 1$. The index of intra-industry trade takes values from 0 to 1, and increases as the extent of intra-industry trade increases.

The intra-industry trade level of whole industries between two countries can be measured by the weighted average of industry IIT index. The weight is the share of each industry in total trade. The following is the IIT index of the home country with the country j .

$$IIT = \sum_{i=1}^n \sum_{j=1}^m \left[\frac{(X_{ij} + M_{ij}) - |X_{ij} - M_{ij}|}{\sum_{i=1}^n \sum_{j=1}^m (X_{ij} + M_{ij})} \right] \quad (2)$$

where

$$w_{ij} = \frac{X_{ij} + M_{ij}}{\sum_{i=1}^n (X_{ij} + M_{ij})}$$

The overall intra-industry trade index of the home country, that is the IIT index with respect to world (or a region), is as follows:

$$IIT_j = \sum_{i=1}^n w_{ij} \left[1 - \frac{|X_{ij} - M_{ij}|}{(X_{ij} + M_{ij})} \right] \quad (3)$$

This is equivalent to the weighted average of (2), the weight being the share of each trading partner in total trade of the home country.

One characteristic of GL index is that it is symmetric between the two trading countries. This is because the export of the home country to a partner country is import of the partner from the home country, and vice versa. But in the actual statistics, there is some mismatch. For example, the export of Argentina to Brazil is not exactly the same as the imports of Brazil from Argentina.

The source of the data used here is 'UN COMTRADE DATA' published by United Nations. We adopted three-digit level of Standard International Trade Classification (SITC).

3. Results

The results of the estimation of IIT index for the Mercosur countries in 1990-99 are shown in [Table 2]. Country-to-country GL index was calculated using the formula (2), and country-to-region and country-to-world GL indices were calculated using the formula (3).

[Table 2] Grubel-Lloyd index in Mercosur countries in 1990-99⁷

		Argentina	Brazil	Paraguay	Uruguay	World	Mercosur	Non-Mer
Argentina	92		0.26	0.06	0.34	0.23	0.33	0.18
	93		0.37	0.06	0.37	0.28	0.43	0.19
	94		0.37	0.07	0.41	0.27	0.42	0.18
	95		0.42	0.06	0.41	0.34	0.46	0.22
	96		0.40	0.09	0.35	0.32	0.44	0.19

⁷ Uruguay's 1990-94 data not available in UN COMTRADE Dataset

	97		0.45	0.06	0.39	0.35	0.48	0.20
	98		0.46	0.06	0.38	0.35	0.49	0.20
	99		0.45	0.06	0.41	0.33	0.49	0.22
Brazil	90	0.10		0.02	0.18	0.29	0.25	0.26
	91	0.25		0.01	0.23	0.33	0.27	0.31
	92	0.26		0.02	0.21	0.34	0.26	0.32
	93	0.32		0.02	0.19	0.36	0.29	0.32
	94							
	95	0.42		0.05	0.28	0.38	0.47	0.32
	96	0.41		0.04	0.26	0.38	0.45	0.31
	97	0.45		0.05	0.27	0.40	0.49	0.32
	98	0.44		0.07	0.27	0.41	0.48	0.34
99	0.44		0.08	0.27	0.39	0.48	0.32	
Paraguay	90	0.03	0.01		0.00	0.02	0.02	0.02
	91	0.04	0.01		0.01	0.03	0.03	0.02
	92	0.05	0.02		0.05	0.04	0.04	0.03
	93	0.05	0.02		0.08	0.04	0.05	0.03
	94	0.08	0.02		0.14	0.06	0.09	0.02
	95	0.07	0.05		0.07	0.06	0.09	0.02
	96	0.08	0.06		0.05	0.07	0.10	0.02
	97	0.07	0.05		0.07	0.06	0.08	0.02
	98	0.06	0.08		0.06	0.07	0.08	0.03
99	0.04	0.08		0.12	0.06	0.08	0.04	
Uruguay	95	0.36	0.27	0.08		0.27	0.37	0.12
	96	0.34	0.26	0.05		0.26	0.33	0.12
	97	0.38	0.27	0.06		0.26	0.36	0.11
	98	0.38	0.26	0.04		0.28	0.37	0.11
	99	0.40	0.25	0.05		0.26	0.37	0.11

Source: calculated using UN COMTRADE dataset

From [Table 2], we can see that the intra-industry trade has increased drastically after the establishment of Mercosur.⁸ Argentina's GL index with respect to the world market increased from 0.23 in 1992 to 0.33 in 1999.

⁸ Treaty of Asuncion was signed in 1991, but the integration process began even before this year.

Similarly, Brazil's index increased from 0.29 in 1991 to 0.39 in 1999. In the case of Paraguay, it increased from 0.02 to 0.06 in the same period, but is still very low. Therefore we found strong evidence that regional trade agreement stimulates intra-industry trade even in the case of an RTA among developing countries.

Moreover, after the formation of Mercosur, intra-industry trade increased more within participants than with third parties. In the table we can observe that in most of the member countries, intra-industry trade within the region was not only higher than that with non-Mercosur countries, but the former increased much rapidly in the 1990s than the latter. Argentina's GL index with third parties did not increase so much during 1992-99. Therefore most of the increase in intra-industry trade can be attributed to the intra-regional trade. The Brazilian case is also interesting. In 1990, Brazil's GL index within the region (0.25) was lower than the index with non-Mercosur countries (0.26). However, its GL index within the region increased drastically to reach 0.48 in 1999 whereas the GL index with non-Mercosur countries stayed at 0.32.

This shows that contrary to the case of RTAs among less developed countries like CACM, RTAs among middle-income developing countries with medium to large economic size, like Mercosur, can bring a large increase in intra-industry trade. This may be because some of these countries already have industries characterized by economies of scale, and they can take advantage of the regional integration to make the production of these industries more efficiently. In the next section, we will give more evidence of this point.

We expected a positive relationship between the economic size of a country and its intra-industry trade, as economies of scale and diversification of demand (resulting from high per capital income) in the bigger markets are the major factors stimulating intra-industry trade. As expected, Brazil, which is the largest country in Mercosur, shows the highest GL index with the world and within Mercosur.

Brazil's GL index in world trade varies from 0.29 to 0.41 between 1990 and 1999, and that of Argentina from 0.23 to 0.35 in the same period.

Uruguay's GL index averaged 0.27 during 1995-1999, significantly lower than that of Argentina. Paraguay, the smallest country in Mercosur, showed the lowest GL index ranging 0.02~0.07 during 1990~1999. These figures show a high correlation between the size of the country and its GL index. The GL index of Mercosur shows similar patterns, but with a small difference. Brazil's GL index with Mercosur used to be lower than that of Argentina in 1992-93. However, after 1995 the two became very similar. This is due to the large increase in Brazil's GL index: an increase of 0.23. Therefore we can conclude that for the Mercosur's case, the largest country achieved the largest increase in the intra-regional intra-industry trade.

As to the bilateral intra-industry trade index, Argentina has higher GL index with Brazil than Paraguay, while Brazil has much higher GL index with Argentina than Paraguay or Uruguay. On the other hand, GL index of Paraguay shows very low level with other countries. This tendency has not been changed with the establishment of the regional integration, but strengthened. Moreover, Uruguay has more intra-industry trade with Argentina and Brazil, which have much larger economic size, than with Paraguay, which is of relatively similar economic size. This means that countries increased intra-industry trade with larger countries instead of countries with similar size, as some Ekanayake (2001) suggested.

This may be because small countries, which were loosely integrated, horizontally or vertically, with larger neighboring countries, tend to get more closely integrated after the establishment of the regional trade arrangement. Because of the size, small country would specialize in the production of some intermediate goods or final goods instead of producing a wide range of products. This increases the intra-industry trade, and is consistent with the recent increase in the production sharing within the region.⁹

4. Intra-Industry Trade by Industry

To analyze more deeply the reasons of the increase in intra-

⁹ See Kim and Chon (2001)

industry trade, especially within the region, we analyzed the intra-industry trade in Mercosur at a sectoral level. The GL index of 261 products in SITC 3 digit level was calculated using the formula (1) for the years between 1990 and 1999. The products with high GL index are mostly in the sectors of SITC 5, 6, and 7. The products that contributed the most to the overall GL index are also in these sectors.¹⁰

As our interest is what products contributed to the increase in intra-industry trade after the establishment of the regional trade arrangement, in [Table 3] we present the products that contributed the most to the increase in the overall intra-industry trade within the region.¹¹

[Table 3] Top 20 products that contributed to the increase in IIT within Mercosur 1992-99

	Argentina	Brazil	Paraguay
1	782	782	122
2	781	781	044
3	783	542	001
4	542	783	081
5	713	676	893
6	334	821	642
7	642	625	522
8	591	741	098
9	554	679	658
10	741	778	291
11	676	657	581
12	351	073	743
13	634	074	651
14	743	081	542

¹⁰ Not shown in the tables

¹¹ Uruguay was excluded because of the lack of adequate data.

15	679	514	851
16	511	641	263
17	778	851	222
18	773	743	512
19	625	591	892
20	533	553	821

Source: calculated using UN COMTRADE dataset

Most of the products which contributed to the increase in intra-industry trade within the region during 1992-99 are products in the sectors of chemicals and related products (SITC 5), manufactured goods (SITC 6), and machines and transportation equipment (SITC 7), which are the sector with economies of scale. Among these products, products related to automobile contributed the most to the increase of intra-industry trade. For example, internal combustion piston engines and parts (SITC 713), motorcars and other motor vehicles (SITC 781), motor vehicles for goods and special purpose motor vehicles (SITC 782), and road motor vehicles (SITC 783) explain about 60.7% of the increase in Argentina's GL index with respect to Mercosur between 1992 and 1999.

The high intra-industry trade of the automobile industry was observed even before 1992. Behar already indicated in 1991 that the high intra-industry trade in Mercosur was due to Argentina and Brazil's trade concentration on the automobile industry. However, there are other important products that contributed to the increase of the intra-industry trade, like medicaments (SITC 542), paper and paperboard (SITC 642), heating, cooling equipment and parts (SITC 741), and iron and steel bars (SITC 676).

This increase in intra-industry trade between Argentina and Brazil was possible because the two countries had the industrial base to support it. As can be seen in [Table 4], the export of the industries in SITC 5, 6, and 7 during 1995-99 reached 50.4% of total exports in the case of Brazil, and 31.1% in the case of Argentina. In Paraguay, the export of these industries was 14.3%, much lower than the other member countries. A large increase of intra-industry trade was not observed in Paraguay because Paraguay did

not have industrial base in the sectors of SITC 5, 6, and 7. Therefore, even the small increase in intra-industry trade was largely due to the trade in products in sectors of SITC 1 and 2, which are the main export sectors of Paraguay. In [Table 4], we can see that the exports of food and live animals (SITC 0) and crude materials (SITC 2) exceed 75% of Paraguay's total exports.

[Table 4] Member countries' export by industry: 1995-99

SITC	Partner	Argentina	Brazil	Paraguay	Uruguay
0	World	36.0	21.5	19.2	45.5
	non-Mercosur	40.3	24.1	17.4	45.7
	Mercosur	27.6	7.4	20.7	45.2
1	World	1.4	3.0	1.3	1.6
	non-Mercosur	1.5	2.9	2.0	0.3
	Mercosur	1.1	3.5	0.7	2.9
2	World	7.5	14.2	56.7	13.1
	non-Mercosur	9.6	16.0	62.8	23.9
	Mercosur	3.2	4.0	51.4	2.1
3	World	11.1	0.8	0.2	0.8
	non-Mercosur	9.6	0.7	0.0	0.0
	Mercosur	14.0	0.9	0.4	1.6
4	World	9.3	1.9	6.6	0.5
	non-Mercosur	13.1	2.2	1.9	0.3
	Mercosur	1.8	0.2	10.7	0.8
5	World	6.4	6.4	2.5	5.6
	non-Mercosur	5.0	5.1	2.9	1.8
	Mercosur	9.1	13.9	2.1	9.5
6	World	11.6	21.9	11.1	17.5
	non-Mercosur	12.6	21.7	11.4	19.2
	Mercosur	9.5	22.8	10.8	15.8
7	World	13.1	22.1	0.7	6.5
	non-Mercosur	4.5	18.6	0.5	1.0
	Mercosur	30.1	41.1	0.8	12.0

8	World	2.9	6.0	1.8	8.3
	non-Mercosur	2.6	6.0	1.0	6.6
	Mercosur	3.5	6.0	2.5	10.0
9	World	0.7	2.3	0.0	0.6
	non-Mercosur	1.1	2.7	0.0	1.2
	Mercosur	0.0	0.1	0.0	0.0

Source: calculated using UN COMTRADE dataset

The same reason may explain why intra-industry did not increase in the less developed countries in Central America after the establishment of regional trade arrangement. Therefore, we can conclude that regional trade arrangements among developing countries can result in a significant increase in intra-industry trade only when the member countries have good industrial base in sectors characterized by economies of scale.

Besides the existence of an industrial base, the preferential treatment given to the imports from the member countries in the form of lower tariffs seems to have played an important role. Preferential treatment leads to an increased import from member countries. This increase among the member countries can be a reflection of a trade creation or trade diversion. Yeats (1997) shows that export of goods among Mercosur members increased dramatically right after the formation of Mercosur, and that these goods were mainly capital-intensive goods in which the member countries did not have comparative advantage in the world market. This raised the concern that the regional trade arrangement had encouraged trade diversion in the region.

However, trade diversion effect may have led to the increase of intra-industry trade, as intra-industry trade is characteristic of capital-intensive industry. If this were true, there would be two opposing effects on the efficiency. The first effect is the traditional trade diversion effect where the efficient production of the third parties is replaced by the inefficient production of the member country. This effect reduces the welfare. The second effect is that as economies of scale are enabled by intra-industry trade, production efficiency may have improved. If this effect is dominant, even the trade diversion effect would not be welfare reducing.

Still another reason that increased intra-industry trade in this region may be the change in the global production pattern. Baumann (1994) suggested there are universal sector-specific tendencies of intra-industry trade among Latin American countries, and between some industrial countries and Latin America in the 1980s. These comprise mainly in mature, and labor-intensive industries. He argued that it could be interpreted as a regional adaptation to the new international patterns of production and trade. Kim and Chon (2001) also showed that recently, production sharing increased in the region without close links to the United States. This would be reflected in increased intra-regional trade.

IV. Conclusion

This paper shows that contrary to the case of RTAs among less developed countries like CACM, RTAs among middle-income developing countries with medium to large economic size, like Mercosur, can bring a large increase in intra-industry trade. This may be because some of the countries already have industries characterized by economies of scale, and they can take advantage of the regional integration to make the production of these industries more efficiently.

Additionally, the preferential treatment given to the imports from the member countries in the form of lower tariffs seems to have played an important role. Preferential treatment leads to an increased import from member countries, which may be a reflection of a trade creation or trade diversion. If trade diversion effect led to the increase of intra-industry trade of capital-intensive products, there would be two opposing effects on the efficiency. The first effect is the traditional trade diversion effect where the efficient production of the third parties is replaced by the inefficient production of the member country, and which reduces the welfare. The second effect is that as economies of scale are enabled by intra-industry trade, production efficiency may have improved. If this effect is dominant, even the trade diversion effect would not be welfare reducing. Another

reason of the increase of intra-industry trade may be that production sharing increased in the region without close links to the United States, which would be reflected in increased intra-regional trade.

Abstract

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Key Words: intra-industry trade, regional trade arrangement, Mercosur / ? ? ? ?
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