TRADE CREATION AND DIVERSION IN MERCOSUR: THE CASE OF AGRICULTURAL PRODUCTS

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ABSTRACT

The objective of the present paper is to estimate the trade creation and trade diversion values for the main agricultural imports in Brazil between 1988 and 1996: cotton, rice, corn, wheat, milk, and beef. We will try to separate the effects resulting from the creation of Mercosur from those resulting from the general process of trade opening. This theme is important not only in order to evaluate the implementation of Mercosur or of trade policies, but also for future discussions regarding more general actions of regional integration, such as the ongoing discussions within the European Union or other American countries.

Key words: Creation and trade diversion, Mercosur, agricultural products

1. Introduction

One of the main arguments against the creation of regional agreements of commercial integration is trade diversion, that is, the substitution of an efficient non-member supplier for a less efficient one

* From IPEA's research direction. The authors would like to thank Gervásio Castro de Resende and all three anonymous reviewers of the earlier version of this work.

belonging to the block, which is favored by the common external tariffs. However, it is true that the literature also points out trade creation, which is the increase of member-States imports due to the reduction of the global level of protection, among the effects of such agreement.

So far, during negotiations for the implementation of ALCA, representatives of the North-American government have insisted that the main effect of Mercosur was trade diversion although no proofs of such declaration were presented. However, what we can notice is a great trade expansion, both in and out of the member-States regions.

In Brazil, a concern that haunted the creation of Mercosur was the possibility of abrupt losses in its agricultural production, mainly in typical cultures of the South, such as wheat. In another paper, we tried to demonstrate that that possibility has not become a reality so far (Nonnenberg and David, 1997). However, no calculations have been made in order to evaluate the effects of trade creation and diversion for agricultural products.

These two concerns suggest that it is fundamental to estimate the effects of trade creation and diversion for the main agricultural imports in Brazil recently – cotton, rice, corn, wheat, milk, and beef – and this is the objective of this paper, which is organized as follows: in the second section a discussion on the theoretical and empirical difficulties of estimating these effects is presented, whereas in the third, a formula for its calculation is introduced. The fourth section is about the methodology used and the elasticity estimates on imports price, while, in the fifth, the results are presented and analyzed. In the last section, the main conclusions are presented.

2. Concepts of Trade Creation and Diversion

The theoretical elaboration of trade creation and diversion concepts dates back to Viner's (1950) pioneer work. In short, trade creation occurs when the establishment of a free trade zone, as it voids inter-regional

import tariffs, results in the substitution of domestic production by imports originating from one of the member-states of the block. As to trade diversion, it happens when a member-state stops importing from a non-member state and starts importing from a member one. That happens because the elimination of inter-block tariffs makes some products from member-states cheaper than the ones produced in non-member ones, even if member-states are less efficient in their production. In the first case, there is welfare increase as a less efficient – domestic – producer is changed into a more efficient one. In the second case, there is welfare loss since the change was from a more efficient producer to a less efficient one.

With the objective of elucidating the concepts of trade creation and trade diversion, we will make use of the diagram below (figure 1), which illustrates the partial balance for a certain good X.

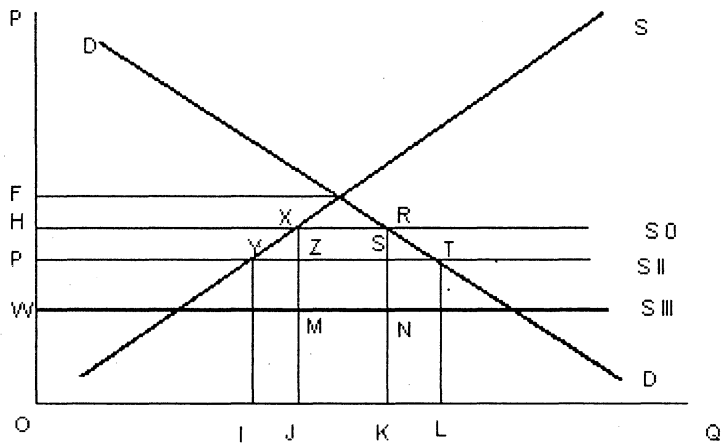

Figure 1. Trade Creation and Diversion

Curves DD and SS represent, respectively, the demand and supply curves of good X in country I. In that diagram, F is the balance price in I for which this country does not participate the international trade. SII and SIII are the supply curves of the good in countries II and III. In

short, the supply elasticity is thought to be minimal.

WH is the tariff imposed by country I to both countries. Only the price of III makes exportation to I possible. The total amount of imports to country I originating from III is given by JK. We can notice that country I does not do business with country II, because the introduction of the tariff makes the price of the product which is supplied by that country prohibitive, that is, it is above the balance price in I. Now, we will assume that countries I and II form an economic block. That means that the imports from II will not be taxed, while in country III the situation remains the same as before. In this new context, all the products imported by I come from II and nothing is imported from III. Country I's production drops from OJ to OI due to the fall of prices in the internal market from OH to OP, and domestic consumption rises by KL. Therefore, the increase of imports or trade creation can be divided into two effects: one originated by the fall in the domestic production, and another one originated by the consumption increase.

The fall in domestic production IJ represents a welfare gain for country I and it can be explained in the following way: if country I had to produce that amount, it would have to incur an additional cost equivalent to area XJIY. As it imports such amount from country II, its cost is, then, expressed by area YZJI. The difference among those two measures reflects the obtained savings, that is, if country I had produced IJ instead of importing it, it would have incurred a production cost expressed by the area of triangle XYZ.

A welfare gain originated by the increase in consumption can also be demonstrated. Due to the fall in the price of good X, because of the preferential treatment given to country II, there is an increase in the amount demanded by I given by KL. If the free trade zone did not exist, consumers would be ready to pay a maximum value expressed by area RKLT for that consumption. With the block, the expenditure is represented by TLKS, which is lower than the previous expenditure. The difference between these two amounts, given by triangle RST, measures the welfare

gain that, to consumers, results from the end of the protection.

The diagram also allows us to analyze the effect of trade diversion. Before the formation of the block, country I trades with the most efficient source, country III, while country II is excluded. With the formation of the block, country I does not trade with the most efficient supplier in the global context, but with the supplier which supplies the lowest price within the block. Before the creation of the block, importation costs of amount JK could be divided in two installments: the first, given by rectangle MNKJ, represents the total amount paid to the exporters of country III; and the second, expressed by rectangle XRMN, represents the total amount kept by country I corresponding to duties on the price of the product. Thus, the total import cost before the existence of the block is given by XRKJ.

After the creation of the block, the expense regarding the same amount JK is ZSKJ. Because of the trade diversion effect, the external payment for the product increased by ZSMN. This happened because of the change from a more efficient supplier that was not benefited by the preferential treatment to a less efficient participant of the free trade zone.

The liquid effect on the welfare originating from the process of commercial integration can be obtained by the difference among the welfare gain generated by trade creation and the welfare loss caused by trade diversion. In the diagram, it will be the difference in the sum of triangles XYZ and RST and rectangle ZSMN.

Whereas, in the theoretical plan, it is relatively simple to establish the concept, empirically, its estimate is all but trivial. Considering the simple examination of the proportion variation in the inter-regional exchanges in the total trade of member-states as an indicator of the existence or non-existence of trade diversion, for example, may lead to some interpretation errors, as pointed by Machlup (1977). Thus, the increased participation in inter-regional exchanges may be provoked by effective competitiveness gains among member-states. These exchanges

may not be related to the changes in the tariffs, and, therefore, cannot be classified as trade diversion. Similarly, a reduction of that participation may be followed by a global increase in the external demand for a certain product provoked, for example, by the decrease in the competitiveness of the domestic production due to alterations in the exchange rate. Another criticism on the developed analysis is that the model considers that the exchange terms are not affected by the tariff elimination. Another aspect that should be pointed out is that the above analysis in that work does not take in consideration the substitutability existence among the goods. As seen in McMillan and McCann (1981), a country gains with the decrease of the tariff if, and only if, both the internally produced good and the one produced in the external market are net substitutes. The substitutability and complementarity analysis of the products still have as an important result the fact that there can be an increase in the welfare of a country even if there is trade diversion.

Therefore, this calculation must involve changes in the flows related to tariff changes. The solution for this problem is elaborating models of general or even partial balance that capture the modifications in trade and other current economic variables of the trading policies, among other factors. Today, there are several computable models with these characteristics adapted to different uses. We have, for example, the RUNS (Rural/Urban-North/South) Model, initially developed by the World Bank and, later on, together with the Center of Development of OCDE (Goldin et alli, 1993). These two organizations, together with the World Trade Organization, supported the development of the GTAP model (Global Trade Analysis Project), developed by the University of Purdue, in the United States. Another model, built to simulate the effects of trade liberalization policies, emphasizing the economies in development, is Trade Policy Simulation Model (TPSM), developed by UNCTAD. In that model, the main calculations related to the direct effects on the trade refer to trade creation and trade diversion (see Laird and Yeats, 1986). Later, the World Bank and UNCTAD built the Software for Market Analysis and

Restrictions on Trade (SMART) as a simplified version of TPSM to be used in PCs. The methodology used by this model was chosen to calculate the above mentioned effects (UNCTAD and World Bank, 1997). Although it is a model of partial balance and, therefore, subject to several of the criticisms already mentioned, it has the advantage of working at an extremely high level of details.

Whereas the model created by UNCTAD uses information priorly developed in precedent studies concerning the parameters, the present paper makes use of new estimates of import elasticity-price, besides working with three different hypotheses for elasticities of substitution. These alterations help obtain more realistic scenarios from the changes in international trade policies.

3.Effects Calculation Formula

3.1. Trade Creation

The formula used to measure trade creation is given by the following expression:

$$TC = S\ Mijk*Emk*[(NTijk - VTijk)/(1+VTijk)] *1/[1-(Emk/Exjk)] \quad (1)$$

where Mijk is country i's imports of product k from country j; Emk is the elasticity-price of the import of product k in country j; NTijk and VTijk are, respectively, the old and the new import tariffs of product k, from country j, in country i, and Exjk is the elasticity-price of the export of product k in country j.

Thus, the trade creation calculation depends on the value of the export and import elasticities, and on the variation of the import tariff in the considered period. The derivation of that formula is found in the Appendix.

Initially, SMART considers as default that the value of the elasticity of export is infinite, which amounts to say that export prices will not vary

according to increase of imports in country i. Thus, in the present work that hypothesis is maintained, as long as this behavior for the analyzed products is expected to be reasonable. Thus, we can easily notice that the denominator on the right of the expression equals one, therefore, the trade creation effect derives from the present volume of imports, the import elasticity-price, and the change in the price of the product provoked by the change in the tariff. In that specific case, we have a situation in which the effect price equals zero, what implies that the change in the tariff revenue is directly proportional to the imports alteration. In general, the variation of the tariff revenue is owed to the combined effect of the change in the import volume and the change in the price of the product in the internal market. On the other hand, the model assumes a value of -1.5 for import elasticities, what does not seem reasonable. Thus, in the next section, estimates for those elasticities are presented.

3.2. Trade diversion

The trade diversion calculation is given by the following equation:

$$TD = \Sigma [(Mikj*MikJ*EsijJ.*\Gamma)/(Mikj+MikJ+MikJ*EsijJ)] \quad (2)$$

being $\Gamma = [(1+NTikJ)/(1+NTikj)]/[(1+VTikJ)/(1+VTikj)]$.

J represents Mercosur member-states and **j** represents other countries.

EsijJ is the elasticity price of substitution among Mercosur partners and others. The SMART model considers that elasticity as being equal to -1.5. In the present work, due to the nonexistence of enough information to calculate it, three simulations were made for the following values of the elasticity: -0.5, -1.5, and -2.5, which should cover the whole possible range for that parameter. Thus, the calculation of trade diversion is a function of the tariffs differential (new and old) concerning Mercosur countries and others, of the elasticity price of substitution and import flows from each of the two areas.

4. Methodology

In this section, the calculation procedures for import elasticity will be presented. The results can be found in Table 1. The simplest and most commonly used method for the estimation of import demand in the context of imperfect substitute goods is the Marshall's (ordinary) demand function, which relates the total of goods imported by a country in relation to the real income (or some real variable which captures the capacity of domestic expenditures), the price of the imported good, and the domestic substitute price in the same currency. In that sense, the exchange rate is introduced indirectly. It is important to notice that the real income includes the exports and excludes the imports, and, therefore, there are no double counting problems in the choice of the variable.

The generic function for the added import is expressed as follows:

$$Md = F(Y, Pm, Pd): F1>0, F2<0, F3>0 \qquad (3)$$

where the variables are defined as:
Md = quantum of imported goods;
Pd = domestic price;
Pm = import price;
Y = real income; and
Fi is she partial derivative in relation to variable i.

This is in accordance with the conventional demand theory, which assumes that the consumer maximizes the utility, being subject to a budgetary restriction. If the importer is a producer, he maximizes the production, being subject to a cost restriction.

A model that contemplates the market balance should take into consideration that the combinations of prices and amounts generated from the interaction between demand and supply curves. Thus, estimating a demand function from an individual curve is an incorrect procedure. In

order to avoid that problem, the elasticity-price of supply is assumed to be infinite or at least independent from the imported amount. That allows us to estimate only one equation in the reduced form by ordinary least squares, for the prices are given exogenously.

The theory does not suggest the functional form as ideal. In that sense, we will introduce a log-linear version of equation (3) as:

$$LnM_t = \beta_0 + \beta_1 LnY_t + \beta_2 LnPd_t + \beta_3 LnPm_t + e_t$$

The proposal of the above equation is due to some factors: first, the main objective is estimating the international elasticity-price – parameter β_3 illustrates directly that amount –; second, Thursby and Thursby (1984) tested nine functional forms for import demand, demonstrating that, the logarithmic form is the one that best adjusted to United States. Finally, the application of a linear transformation to the data softens the series and reduces the scale, what can eliminate some numeric problems when we work with a high greatness order. Greene (1993, p. 238) affirms that the logarithmic formulation is particularly useful in production and demand studies.

In this paper, because we have a reduced-size sample, a traditional econometric approach was applied. In order to use techniques that deal with cases where basic hypotheses, such as stationarity and normality, are violated, it would be necessary to dispose of a much larger sample, since most of the statistical results in those cases are asymptotically generated.

The model uses the following hypotheses: functional log-linear forms, exogenous regressors matrix of complete position and independent disturbances and usually distributed with zero average and constant variance.

Table 1. Selected Equations for Import Elasticity-Price Calculations

Products	Domestic Price	International Price	Domestic Production	Income	Tests R2	DW	ARCH 1
RICE*	3.1042	-2.8245		7.7228	0.6000	2.0600	0.1507
Value t	1.8630	-2.3040		4.6030			
CORN***		-3.3563	-2.4911		0.7487	1.6400	0.0840
Value t		-6.9190	-1.3970				
WHEAT***		-0.3881	-2.5563		0.4308	1.9600	0.0499
Value t		-1.7940	-2.4430				
COTTON*		-2.6050		7.6711	0.8324	1.1900	0.0040
Value t		-2.3770		4.2330			
COTTON***		-2.4756	-1.2819		0.8668	2.1400	0.4017
Value t		-2.3300	-2.3970				
**MILK ** **		-0.4017	-0.2717	3.6640			
CATTLE**		-1.4000		3.7970			

Observations: (*) The estimates of the parameters for rice and cotton were obtained through a conventional analysis of minimum square. In the spaces where the respective elasticities do not appear, the model was estimated without the inclusion of the variable, considering its significance degree as null. (* *) The elasticities estimated in those two cases were obtained by co-integration analysis. (***) In such cases, parameters were estimated with the inclusion of the domestic production and the exclusion of the income variables and domestic price.
Source: the authors' estimates

As form of checking the degree of reliability of the model, we must verify if the estimated parameters are within the limits of the theory. That can be done by checking if the signs of elasticities obtained by the regression being verified are the same as the signs of the partial derivatives of equation (1) and, yet, if the order of greatness fits some previously established pattern.

On the other hand, we must remember that, although the determination coefficient R^2 transmits the idea of adjustment of the sampling data to the linear model, it should not be taken as an important indicator, since what interests us are the parameters. "Nothing in the classic model of regression requires R^2 to be high. Therefore, a high R^2 is not evidence in favor of the model. In the same way, a low R^2 cannot be used as a sign that the model is not good". (Goldberg, 1993). As our main interest is the populational parameters, we must be worried with the degree of significance of the estimator that is given by statistic t and the associated p-value. Once the estimated coefficient is not significant, the adopted procedure is to estimate a new regression with the remainder of the significant variables. The ARCH (Autoregressive Conditional Heterocedasticity) test presents the Lagrange's multiplier test for an ARCH against the null hypothesis that the disturbance is homoscedastic.

After that, some observations are made on specific problems of the accomplished regressions. Not always do all the estimators present a reasonable degree of significance. In that sense, as we are interested in a certain parameter we are led, in some cases, to exclude the non-significant variable. Another subject refers to the fact of altering an explanatory variable for another. Many times, because of the tariff apparatus or some other mechanism to disable the market balance, the domestic price is not included in the group of important variables to explain the demand for import. In that case, an alternative would be the substitution of that variable by the internal production. This procedure presented good results for corn, wheat and cotton.

4.1 Data Sources

The given data come from several sources. The GDP series are from IBGE[1]. The imported amount as well as the international price was obtained at FAO. The domestic price and the domestic production were extracted from David. (1997) All the series are annual and date from 1966 to 1995. The data of value were updated in December 1995. The values in dollars were corrected by the IPA-USA and those in national currency by the producer index price (IPR/FGV).

5. Results

For the calculation of trade creation and diversion, average import tariffs of each one of the analyzed products were used, discounted the effective preference ranges for the countries of Mercosur during the transition period. Since 1995, inter-Mercosur tariffs have been of zero percent.

We selected the most important agricultural products in the list of Brazilian imports: wheat, corn, cotton, rice, beef, and milk. The estimate was achieved by comparing the 1988/90 period average to the 1991/93 average and, soon after, of the latter period to the average of 1994/96. The comparison between the first and the third periods was also obtained. Those three periods are showed in the tables as periods I, II, and III, respectively. For example, II/I in Table 2, means that the estimate of trade creation is achieved by comparing the 91/93 period to the early 88/90 period.

Table 2 presents the results for trade creation. We must remember that the calculations were based on export elasticity equal to infinite. For a better understanding of that table, we must observe that the calculation, both of trade creation and trade diversion necessarily involves two periods.

[1] Note: Brazilian Institute of Statistical Geography

As explained in section 3.1, the calculation of trade creation is performed separately for the countries of Mercosur and for the other countries. For the latter, the calculation results from the global process of commercial liberalization, whereas for the Mercosur ones, it is the result of the application of the preference ranges. As expected, trade creation is much larger in the countries of Mercosur than in other countries. Besides, it is significantly larger from the first to the second period, when the fall in the tariffs are higher, than from the second to the third period. We must insist that the calculation of the trade creation depends on the flows, in the initial period, of the variation of the tariffs and on the elasticity. Thus, it is a potential value and is not directly related to the variation occurred in the analyzed periods.

We must pay attention, in the first place, to the case of beef. In spite of presenting the largest value for trade creation, the number of imports coming from Mercosur actually fell significantly between the first and the second periods, as showed in Table 3, which contains the actual values imported per area (deflationated by the IPA-USA). At the same time, the imports originating from the other countries increased in the same period, and the value for trade creation in those countries is small. On the other hand, the inter-regional imports of that product between 1991/93 and 1994/96 have experienced a strong growth, whereas the others have dropped. This could perhaps be interpreted as an indication of the explanatory power of the estimate. That is, the potential of trade creation was only showed with a lag of some years.

However, a careful examination in the case of milk indicates that, perhaps, we cannot give such forecasting power to the calculation. In fact, although milk has a small potential of trade creation, as observed in Table 2, its inter-regional imports had an extraordinary growth from the second to the third period. It is also true that the extra-regional imports equally presented a strong growth, indicating that that variation is explained by the supply conditions and domestic demands and by changes in trade policy.

That also seems to be the case for cotton. In spite of the great

trade creation from the first to the second period, as the tariffs have not changed since 1990 (zero percent), the effect is null for Mercosur and negative for other areas. Nevertheless, its imports rise extraordinarily during the whole analyzed period, being higher the variation of the extra-regional imports. In that case, among other factors, the elimination of non-tariff barriers (import shares) and the loss of relative competitiveness of the traditional areas before to the zones producing of other areas of the world prevailed.

The case of wheat is similar, with low values for trade creation in both areas and strong elevation of the imports during the analyzed years. In that case, an expressive fall of the Brazilian production has been observed since the late eighties. This fall has been compensated by the increase of the imports.

Table 2. Trade Creation (US$ thousand/1995)

Mercosur Countries

	Cotton	Rice	Cattle	Milk	Corn	Wheat	Total
II/I	22174,79	23.600.95	29,522.55	2,690.73	8,614.16	11,149.58	97,752.76
III/II		16,621.22	1,979.51	617.50	9,452.89	8,275.09	36,946.20
III/I	22174,7	31.053.88	35,569.33	3,427.68	10,950.20	14,879.33	118,055.22

Other Countries

	Cotton	Rice	Cattle	Milk	Corn	Wheat	Total
II/I	2,641.43	1,187.84	2,379.86	2,490.07	2,058.77	594.25	11,352.22
III/II	-3,342.68	-7,210.43	193.62	-555.38	723.40	6,852.08	-3,339.39
III/I	2,379,92	475.14	2,538.52	2,020.51	2,607.78	1,188.50	11.210.37

Source: authors' estimates

Unlike these products, trade creation estimates for rice are consistent with the variation of the imports. As observed in Table 2, trade creation is relatively high for Mercosur and reduced for other areas. In fact, during the whole period, Mercosur imports have presented the highest growth in absolute values.

In short, the estimates achieved seem to show that tariff reduction, both in and out of Mercosur, was responsible for a relatively small portion

– larger in some cases than in others – of the total growth in the imports of these six agricultural products.

Table 3. Import of Agricultural Products according to their origin (US$ thousand/1995)

Cotton	Total	Mercosur	Others
I (88-90)	152422,07	136198,34	16223,72
II (91-93)	328589,32	134168,08	194421,25
III (94-96)	825951,23	312551,68	513399,55
Rice			
I (88-90)	76060,01	65966,83	10093,18
II (91-93)	226339,65	128481,72	97857,93
III (94-96)	345756,76	278879,64	66877,12
Beef			
I (88-90)	173956,68	134292,38	39664,30
II (91-93)	83389,86	37059,31	46330,55
III (94-96)	155364,51	152106,32	3258,18
Milk			
I (88-90)	104975,56	34131,78	70843,79
II (91-93)	99446,73	22986,59	76460,14
III (94-96)	318458,04	181522,15	136935,88
Corn			
I (88-90)	39121,45	25013,12	14108,33
II (91-93)	108612,57	90830,91	17781,67
III (94-96)	186313,26	166235,66	20077,59
Wheat			
I (88-90)	214662,21	191694,51	22967,70
II (91-93)	608743,99	361567,59	247176,41
III (94-96)	927628,66	621622,63	306006,03

Source: FAO, data elaborated by authors

Table 4 presents data relative to trade diversion calculated on the basis of the three hypothesis for substitution elasticities: -0,5, -1,5 e -2,5. It is worth noting that, in first place, in any of the adopted hypothesis, the

total values of trade diversion are substantially smaller than the values of trade creation, suggesting that, at least for Brazilian agricultural goods, Mercosur has caused strong welfare gains. Taking in consideration the whole period, trade creation in Mercosur totalled US$120,9 millions, compared with a minimum of US$6,1 millions and a maximum of US$26,2 millions of trade diversion.

The goods with the highest values – much higher than the others – are milk and beef. It is worth noting that, in the case of the latter product, the participation of imports from Mercosur dropped from 77% to 44% from the first to the second period. However, in the third period, it rose to 98%. As to milk, a similar behavior takes place, although with a smaller intensity, with the participation of Mercosur dropping from 32% to 23% from the first to the second period and rising to 57% in the last one.

Wheat presents a negative trade diversion from the second to the third period. In other products, the estimated values for trade diversion, even with elasticity of -2,5, are irrelevant before imported values or even the variation observed in the imports. Thus, for example, while the diversion of the select trade for the corn is, at the most, of US$1,6 million along the complete period, the imports rise from US$39,1 million to US$186,3 million. As to wheat, those same values are respectively, US$3,4 million, US$214,7 million and US$927,6 million.

The highest value observed for trade diversion refers to rice in the second period, mainly because it presents the lowest fall in the extra-Mercosur tariffs, despite the fall in the participation of the inter-regional imports from the first to the second period. The values for cotton and corn are inexpressive when compared to import flows even with elasticity of -2,5.

Table 4. Trade Diversion (US$ thousands/1995)

Es = -1,5

	Cotton	Rice	Beef	Milk	Corn	Wheat	Total
II/I	0.00	1044.15	4813.77	3891.56	789.63	2449.97	12989.08
III/II	777.64	5509.07	1064.38	2149.99	416.46	-2990.12	6927.42
III/I	141.34	1671.32	5881.58	6085.48	1002.46	2145.50	16927.67

Es = -0,5

	Cotton	Rice	Beef	Milk	Corn	Wheat	Total
II/I	0.00	373.83	1745.85	1346.50	273.41	879.18	4618.76
III/II	259.91	1907.97	360.31	730.35	141.02	-988.73	2410.83
III/I	47.39	626.24	2175.60	2151.71	350.77	762.66	6114.37

Es = -2,5

	Cotton	Rice	Beef	Milk	Corn	Wheat	Total
II/I	0.00	1627.98	7422.42	6256.80	1268.71	3812.19	20388.09
III/II	1292.62	8849.65	1747.21	3517.37	683.43	-5024.05	11066.23
III/I	234.20	2508.60	8920.76	9593.10	1595.20	3366.20	26218.06

Source: authors' estimates

6. Conclusions

The article estimated trade creation and trade diversion values for the six main agricultural products of import in Brazil between 1988 and 1996, using the UNCTAD and World Bank methodology.

We must point out that, for the analyzed products, trade creation overcame trade diversion thoroughly, both for each product individually and for the group of the six products. It is evident, likewise, that trade creation provoked by the global process of commercial liberalization is substantially inferior to the one caused by Mercosur.

By comparing the trade creation data to the effective import data, we have noticed that changes in the total values of import of the products

according to the origin distinction among member-States and non-member-States was much more provoked by other factors – such as the fall of non-tariff barriers, the reduction of domestic production and the increase in the total demand – than properly by the decrease of the inter-regional tariffs.

It is necessary to insist in the fact that the achieved estimates always have the initial period as basis and, therefore, indicate the potential of trade creation and diversion and not the modifications which effectively happened. Another limitation is that the simplifying equal-infinite export elasticity-price hypothesis was adopted. Thus, if it is viable to suppose that the increase of the Brazilian demand can influence export prices of our suppliers, it will be necessary to reformulate that hypothesis.

The methodology employed seems completely consistent with the facts. Therefore, its use seems to be promising for a larger number of products than just the agricultural ones.

7. References

DAVID, Maria Beatriz Albuquerque - Les Transformations de l'Agriculture Brésilienne: une Modernisation Perverse. École des Hautes Études en Sciences Sociales/Centre de Recherches sur le Brésil Contemporain, 1997.

GOLDBERG, A - A course in econometrics. Harvard Press, 1991.

GREENE, William H. - Econometric Analysis, Prentice Hall. 1973, second edition.

GOLDIN. Ian ; Odin Knudsen e Dominique van der Mensbrugghe - Trade Liberalisation: Global Economic Implications. OECD. Paris, 1993, 217 págs

LAIRD, Sam and YEATS, Alexander - The UNCTAD Trade Policy Model: a note on methodology, data and uses. Mimeo, Geneva, 1986.

MACHLUP, Fritz - A History of Thought on Economic Integration. MacMillan 1977, 323 págs.

MCMILLAN, J. and McCANN, E. Welfare Effects in Cusstons Unions. The Economic Journal, 1981, v. 91, p.697-703

NONNENBERG, Marcelo & DAVID, Maria Beatriz - Mercosul: Integração Regional e o Comércio de Produtos Agrícolas, Texto para Discussão, n°494-IPEA/DIPES, 1997.

VINER, Jacob - The Customs Union Issue - Carnegie Endowment for International Peace, New York, 1950

THURSBY, J. & THURSBY, M. (1984) -How Reliable Are Simple, Single Equation Specification of Import Demand?, The Review of Economic and Statistics 66(1): 120-128.

UNCTAD e BANCO MUNDIAL - SMART Simulation Model: Note on the methodology and model guide. Mimeo, 1997.

Appendix

Derivation of the formula of trade creation effect.

As follows, the basic identities of the model are defined. The country i's import function for good k produced in country j is expressed in general terms as:

$$Mij = M(Yi, Pij) \qquad (1)$$

being Yi country i's income. In order not to carry the notation, subscript k is suppressed in this section. The export supply function from j to i can be defined as:

$$Xji = X(Pji) \tag{2}$$

where Pji is the price of good k – produced by country j – in country i. Assuming equality between (1) and (2) we have that:

$$Mij = Xji \tag{3}$$

Finally, since there is an ad valorem tariff on the price of good k produced in j, imposed by the country i, Tij, the price of that product from j in i can be defined in the following way:

$$Pij = Pji(1+Tij) \tag{4}$$

Given the basic model defined by equations (1) to (4), and bearing in mind that the effect of trade creation is nothing more than the increase of i's imports from country j due to the price change in the market of that country because of a change on the incident tariff, its formula can be obtained through the following procedures.
Applying the total differentiation in (4), we have that:

$$dPij = PjidTij + (1+Tij)dPji \tag{5}$$

Starting from the simple concept of import elasticity-price, country i's imports growth rate can be expressed in the following way:

$$\frac{dMij}{Mij} = Emi\frac{dPij}{Pij} \tag{6}$$

Substituting (5) and (4) in the expression above, the imports growth rate is then redefined in the following way:

$$\frac{dMij}{Mij} = Emi\left(\frac{dTij}{1+Tij} + \frac{dPji}{Pji}\right) \qquad (7)$$

After these first procedures, the problem is obtaining the total variation of the imports in the terms of well-known variables and parameters. Based on the fact that the price increase rate of good k in country j can be calculated from the elasticity-price of the supply of that country and of the exports growth rate, we have then that:

$$\frac{dPji}{Pji} = \frac{dXji}{Xji}\frac{1}{Exj} \qquad (8)$$

From (3) it is not difficult to verify that:

$$\frac{dMij}{Mij} = \frac{dXji}{Xji} \qquad (9)$$

From those last two equations and, expression (7) can be redefined in the following way:

$$\frac{dMij}{Mij} = Emi\left(\frac{dTij}{1+Tij} + \frac{dMij}{Mij}\frac{1}{Exj}\right) \qquad (10)$$

Assuming that $TC = Mij$, the final result of trade creation effect starting from (10) it is better defined as:

$$TC = MijEmi\left(\frac{dTij}{1+Tij}\right)\left(\frac{1}{1-\frac{Emi}{Exj}}\right) \qquad (11)$$

There are two fundamental differences between the formula above and that of section 3. The first is because, here, the results of the model were

derived under the continuity supposition, so that it was possible to use the differentiation techniques. However, when it comes to the practical application, it is necessary to adapt the infinitesimal terms to its discreet version. Thus, the tariff differential *dTij* can be rounded up by the difference between the new tariff and the one that prevailed before, *Ntij - VTij*. The other point to be mentioned is that, in that case, several products are being worked with and, therefore, the obvious adjustment in (11) is to introducing the sum indexed by product k's index. Having these observations in mind, both expressions become identical.