Impact of the Uruguay Round Agreement and Mercosul on the Brazilian Economy*

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Summary: 1. Introduction; 2. Data, model, simulation and software; 3. Results; 4. Conclusion.
Palavras-chave: Computable general equilibrium; agricultural policy; Uruguay round agreement; Mercosul.
JEL code: Q18 e Q17.

This paper evaluates the impact of the Uruguay Round Agreement on the Brazilian economy, using an applied general equilibrium model. The results suggest that trade liberalization as agreed to in the Uruguay Round has a very small effect on the production of agricultural and non-agricultural commodities. However, it has a strong impact on trade. The influence of the Uruguay Round Agreement on the price index for private household expenditures is very small, causing an increase in price variation lower than 1.1%. GDP value increases by 1.24%, while welfare increases by more than 1.0%. Participation in the Mercosul economic block accounts for approximately half the changes in the Brazilian trade and GDP value.

Este artigo avalia o impacto do Acordo da Rodada do Uruguai na economia brasileira, usando um modelo de equilíbrio geral aplicado. Os resultados sugerem que a liberalização do comércio internacional nos moldes da Rodada do Uruguai tem uma influência muito pequena nas produções agrícola e não-agrícola. Contudo, percebe-se um forte impacto nas exportações e importações de produtos brasileiros. A influência do Acordo da Rodada do Uruguai sobre o índice de preços das despesas do consumidor privado é muito pequena, gerando um aumento na variação dos preços abaixo de 1,1%. O valor do PIB aumenta de 1,24%, enquanto o bem-estar social cresce acima de 1,0%. A participação no bloco econômico do Mercosul gera aproximadamente a metade das mudanças no PIB e no comércio internacional.

1. Introduction

The Final Act of the Uruguay Round Trade Agreement (URA), signed in April 1994, requires worldwide reduction of domestic agricultural production subsidies, export subsidies, and import tariffs. The impact of this agreement on the Brazilian economy is not well known. The main objective of this paper is to determine the impact of the Uruguay Round Trade Agreement on the Brazilian economy with an emphasis on the agricultural sector.

Provisions in the UR agreement referring to agriculture require a reduction of 20% in trade distorting domestic support, aggregated across all commodities, over six years, from a 1986-88 base in developed countries (DVC). Developing countries (LDC) are required to reduce domestic agricultural production subsidy by 13.3%, over 10 years. Budget expenditures on export subsidies must be reduced by 36% over six years in developed countries. The developing countries need to reduce expenditure by 24% over 10 years. Import tariffs, in the same period, must be reduced by 36% in developed countries and by 24% on average in developing countries (Gatt, 1994; Fagundes, 1994; Josling et alii, 1994). Although those are the required reductions, a much smaller decrease in import tariffs is expected, around 15%, for the main traded commodities, since the developed countries will try to be close to the minimum rate of reduction of 15% for each tariff line. The minimum reduction required for developing countries is 5% for each tariff line. Also, the domestic agricultural production subsidy may not face any reduction due to the "green box" and aggregate measurement of support (AMS) exemptions. On the other hand, quantity restrictions reinforce reductions in export subsidies and import tariffs, requiring reductions in the volume of subsidized exports by 21% in developed countries and by 14% in less developed countries. The "minimum access opportunity" requires that 3% rising to 5% of the domestic consumption must be imported by means of a reduced-tariff quota, in case of tariffation. Tariffs on manufactured goods must be reduced by 38.5% and 37.5% in developed and developing countries respectively.

Tariff theory states that for small country economies any tariff level reduces domestic welfare, that is, free trade should be pursued. On the other hand, large country economies can be better off with smaller tariffs, which generate terms of trade effect larger than the deadweight loss caused by a tariff (Helpman & Krugman, 1989; Vousden, 1990). The underlying hypothesis is that tariff reduction in the lines of the Uruguay Round Agreement would increase welfare and trade worldwide.

Partial equilibrium analysis has shown minor impact of the Uruguay Round Agreement on trade (Josling et alii, 1994). Also, Harrison et alii (1995), using a numerical general equilibrium model, found only moderate short run welfare gains from the round. However, this welfare gain can be very large after capital stocks have adjusted optimally. These authors found that, despite these global gains, some developing countries stand to lose from the round.

What is missing in most of these analyses is the much more trade liberalizing commitment by the countries inside regional economic blocks, such as Mercosul and Nafta. Trade among countries inside Mercosul (Brazil, Argentina, Paraguay and Uruguay), beginning January 1995, is to become free of import tariffs and export subsidies (Fagundes, 1994; Henz, 1994). Also, trade among countries belonging to Nafta (Canada, USA and Mexico) will be free of barriers in 10 to 15 years.

This paper adds that feature to the world trade picture and examines the changes. It presents next the data, the model, the simulations, and the software used to run the Global Trade Analysis Project (GTAP) model. After that, comes the discussion of the results, and conclusions.

2. Data, Model, Simulation and Software

This research is conducted under the framework of the Global Trade Analysis Project (GTAP) model (Hertel & Tsigas, 1996). GTAP consists of a global database and an economic model for performing simulations. Input-output matrices for 24 regions and 37 commodities are the data source. The database represents economic conditions in 1992 and it contains domestic and international trade information.

Table 1 presents the aggregation consisting of the 10 commodities and seven regions examined in this research. However, this paper reports only the results for Brazil. All four crop commodities in the database are selected: paddy rice, wheat, other grains (corn, sorghum, millet, rye, oats, and barley) and non-grain crops (coffee, coton, fruit and vegetables, sugar, and tobacco). Wool and other livestock products are aggregated in just one livestock category. The manufacturing sector is disaggregated into meat products, milk products, beverages and tobacco, and other manufac-

tured products. Services constitute one complete aggregated category. Also, the data set has three primary factor services (farmland, labor and capital). The chosen regions conform the three economic blocks: North America Free Trade Agreement (Nafta), European Union (EU), and South Common Market (Mercosul). The EU is treated as one single region. However, each country in the Nafta block (USA, Canada and Mexico) can be examined in isolation. For Mercosul only two countries, Brazil and Argentina, are considered. The other members, Paraguay and Uruguay, do not have input-output tables included in the database and are aggregated with all other countries in the rest of the world (ROW) category.

The model used is the Global Trade Analysis Project (GTAP), which is an applied general equilibrium (AGE) model (Hertel & Tsigas, 1996). Commodity supplies are based on single-output constant elasticity of substitution (CES) production functions. It is assumed that firms choose their optimal mix of primary factors independently of the prices of intermediate inputs. Thus, the elasticity of substitution between any individual primary factor on the one hand, and intermediate inputs, on the other, are equal. The mix of intermediate inputs is also independent of the prices of primary factors. In other words, separability is symmetric. Furthermore, imported intermediates are assumed to be separable from domestically produced intermediate inputs, following the Armington approach to modeling import demand. Sectoral demands for intermediate inputs, and primary factor services are based on cost minimizing behavior, and they are derived from a nested CES production function. Land is employed in agriculture only and it is imperfectly mobile across sectors. All sectors employ labor and capital, which are perfectly mobile across sectors in a particular region.

Regional income consists of primary factor payments and net tax collection, and it is allocated to private and government consumption and savings in constant expenditure shares. Private household demands for consumption are based on utility maximization and are derived from a constant difference elasticity (CDE) expenditure function (Hanoch, 1975; Hertel et alii, 1991). Government demands for commodities are fixed in value shares, implying unitary elasticity of substitution.

Table 1

Regional and commodity aggregation

Regional aggregation	Commodity aggregation
1. Canada (CAN)	1. Paddy rice
2. United States of America (USA)	2. Wheat
3. European Union (EU)	3. Grains
4. Argentina (ARG)	4. Non-grain crops
5. Brazil (BRA)	5. Livestock
	Wool
	Other livestock
6. Mexico (MEX)	6. Processed meat products
7. The rest of the world (ROW)	7. Processed milk products
Australia	8. Processed beverage and tobacco
New Zealand	9. Manufactures
Japan	Forestry
Republic of Korea	Fisheries
Indonesia	Coal
Philippines	Oil
Singapore	Gas
Thailand	Other minerals
China	Processed rice
Hong Kong	Other food products
Taiwan	Textiles
Rest of Latin America	Wearing apparel
Sub Saharan Africa	Leather
Middle East and North Africa	Lumber
Economies in Transition	Pulp paper
South Asia	Petroleum and coal
All other countries	Chemical, rubbers, plastics
	Non-metallic minerals
	Primary ferrous metals
	Non-ferrous metals
	Fabricated metal products
	Transport industries
	Machinery and equipment
	Other manufacturing
	10. Services
	Electricity, water and gas
	Construction
	Trade and transport
	Other services (private)
	Other services (govt.)
	Ownership of dwellings

International trade clears commodity markets, with each commodity being differentiated by its origin (the Armington assumption is applied at the country level). Production of new capital goods is financed by domestic savings and net capital inflow from all other regions. The price of new capital goods supplied to savers is the numeraire. It is obtained as a share of regional net investment in global savings.

Trade policy reform – for example, a reduction of the bilateral tariff on imports – has many implications in a general equilibrium framework. This lowers the domestic price of the imported good for firms and private consumption. Cheaper imports serve to lower the composite price of intermediates, causing excess profits at current prices. Provided the zero-profit condition is included in the model, this induces output to expand. The expansion effect induces increased demands for primary factors of production. This generates excess demand via the mobile endowment market-clearing condition, thereby bidding up the prices of these factors, and transmitting the shock to other sectors in the liberalizing region. In the country that produces the good for which the tariff has been reduced, there are many implications, given the responses of individual households, production sector, and government to the tariff shock.

The simulations in this paper run through different scenarios where domestic agricultural production subsidies, export subsidies, and import tariffs are reduced as suggested by the Uruguay Round Agreement (Gatt, 1994), Mercosul and Nafta (table 2). A multi-region general equilibrium closure is applied to the neoclassical framework of assuming full employment for land, labor, and capital. All shocks are once and for all, without a time schedule. However, the full impact of these agreements is expected by the year 2005 after the implementation of the URA (six to 10 years) and Nafta (10 to 15 years). It is assumed that full implementation of Mercosul will require the same period of time as the Uruguay Round Agreement and Nafta. The Agreement on Textiles and Clothing (ATC) is not simulated in this paper. However, 38.5% and 37.5% reductions in manufactures import tariff are simulated for developed and developing countries, respectively. Readers interested in ATC studies should see Hertel et alii (1995).

Table 2

Simulation under alternative scenarios of subsidy and tariff reduction

Scenarios	Production subsidy			Export subsidy			Import tariff		
Sectors	DVC	LDC	ROW	DVC	LDC	ROW	DVC	LDC	ROW
Scenario 1									
Agriculture	0	0	0	-36	-24	-36	-15	-5	-15
Manufactures	0	0	0	0	0	0	-38.5	-37.5	-38.5
Services	0	0	0	0	0	0	0	0	0
Scenario 2									
Agriculture	0	0	0	-36	-24	-36	-15	-5	-15
Manufactures	0	0	0	0	0	0	-38.5	-37.5	-38.5
Services	0	0	0	0	0	0	0	0	0
Nafta/Mercosul					YES			YES	
Scenario 3									
Agriculture	-20	-13.3	-20	-36	-24	-36	-36	-24	-36
Manufactures	0	0	0	0	0	0	-38.5	-37.5	-38.5
Services	0	0	0	0	0	0	0	0	0
Scenario 4									
Agriculture	-20	-13.3	-20	-36	-24	-36	-36	-24	-36
Manufactures	0	0	0	0	0	0	-38.5	-37.5	-38.5
Services	0	0	0	0	0	0	0	0	0
Nafta/Mercosul					YES			YES	

Note: DVC, LDC and ROW stand for developed countries, less developed countries, and rest of the world. YES means 100% reduction in export subsidies and import tariffs for trade among countries belonging to Nafta and for trade between Brazil and Argentina (Mercosul).

The first scenario simulates a restricted trade liberalization. It considers the minimum commitment by country and by product category or tariff line. Domestic agricultural production subsidies fulfilling certain "green box" criteria need not be counted. Also, if the current aggregate measurement of support (AMS) is less than 5% of the value of the product in developed countries and less than 10% in developing countries, it is exempted (Josling et alii, 1994). Thus, under this scenario, production subsidy will face no reduction. The agricultural export subsidy is reduced by 36% in DVC and ROW, and by 24% in LDC. Import tariff is reduced by 15% in DVC and ROW, and by only 5% in LDC. Processed foods like meat, milk, and beverage and tobacco, are treated as agricultural products for reductions of export subsidies and im-

port tariffs. Import tariff for manufactures is reduced by 38.5% and 37.5% in developed and developing countries, respectively.

The second scenario adds the more liberalizing commitment under Nafta and Mercosul accords to the first scenario. It simulates a 100% import tariff reduction in agriculture and manufactured goods for trade among members of Nafta and Mercosul. Also, export subsidies are eliminated for agricultural goods and processed products (milk, meat, and beverages/tobacco) (Carriquiry, 1994).

The third scenario takes trade liberalization to the full extent of the Uruguay Round. Agricultural production subsidies, export subsidies and tariff reductions are at the maximum required by the round. Production subsidy is reduced by 20% in the developed countries (DVC) (Canada and USA), by 16.8% in the European Union, and by 13.3% in the less developed countries (LDC) (Argentina, Brazil, and Mexico). Because some major developed countries are in the rest of the world (ROW) category, and because they are, in some cases, very protective, a 20% is assumed reduction in ROW agricultural production subsidy. The agricultural export subsidy in DVC and ROW is reduced by 36%, and by 24% in LDC. The agricultural import tariff is reduced by 36% in DVC and ROW, and by 24% in developing countries. Only import tariff reduction is required for the manufactures sector in the order of 38.5% for DVC and 37.5% for developing countries. There is no shock required for the service sector.

The last scenario adds the more trade liberalizing commitments of the economic blocks Mercosul and Nafta to the third situation. Trade among the member countries of the regional economic blocks, Nafta and Mercosul, is free of export subsidies and import tariffs on agricultural products. Also, import tariffs on manufactured goods are eliminated (Carriquiry, 1994).

Processed meat and milk, and beverages/tobacco are treated as agricultural goods and face the same reduction in import tariffs and export subsidies as other agricultural goods. However, they are not subject to shocks on domestic agricultural output subsidies, and thus are treated as manufactured products for which there is no agreement on output subsidy in the Round. Also, manufactures output subsidy is very rare and low, when it is not irrelevant. Quantity restrictions established by the Uruguay Round – such as the reduction in the volume of subsidized exports by 21% and 14% in developed and developing countries, respectively, and the "minimum access opportunity"

requiring that 3 to 5% of the domestic consumption should be imported in case of tariffation – are not simulated. These quantity restrictions were included in the Uruguay Round Agreement to make sure the agreed reductions on export subsidies and import tariffs would take place and impact trade. However, in the empirical analysis, the subsidy and tariff reductions are binding, making it unnecessary to impose quantity restrictions. On the other hand, in the case of tariffation, some countries set their tariff for the base period at a very high level, such that the Uruguay Round requirement for tariff reduction is not binding. In this case, quantity restrictions in the form of "minimum access opportunities", if imposed, would avoid overestimation of the impacts of the Uruguay Round. Also, a smaller reduction on export subsidies is possible. If trade liberalization increases world price as it is expected, export subsidy expenditure will be reduced relative to the base period, requiring a smaller reduction in export subsidy expenditure by each country. In this case, reduction in the volume of subsidized exports would be necessary to capture the true impact of the Uruguay Round Agreement on the Brazilian economy.

The data set representing economic conditions in 1992 used in this study does not take into account the country's offer for tariff and subsidy. Also, this data set may contain some reductions in tariff and subsidies due to the adjustment to negotiations parallel to the Uruguay Round, Mercosul, and Nafta at that time (the Dunkel Proposal, December 1991; the Blair House Agreement, November 1992). Thus, the simulation used in this paper reducing tariff and subsidies in the lines of the Uruguay Round, which requires reductions for the base period 1986-88, may overestimate the results. It is believed the overestimation is very small.

The GTAP model is implemented using the Gempack software (Codsi & Pearson, 1988; Harrison & Pearson, 1994). This software allows, by changing some closures, to run GTAP as a multi-region general equilibrium model and other variation like single or multi-region partial equilibrium. Although GTAP is implemented in a linearized setting, Gempack may obtain arbitrarily accurate solutions to the underlying nonlinear model (Pearson, 1991; Hertel, Horridge & Pearson, 1992).

3. Results

This section presents the findings which reflect the impact of the Uruguay Round Agreement, Nafta and Mercosul on the Brazilian economy, considering

the necessary period required for their full implementation (10 years). Four scenarios are examined, starting from a less trade liberalizing situation where only the minimum agreed in the round is considered, and finishing with the simulation of the agreement at its full extent, including the Nafta and Mercosul economic blocks, where all trade barriers are eliminated (table 2). Although the inclusion of Nafta adds reality to trade among the countries in this aggregation, Mercosul is the main source of shocks in the Brazilian economy. Thus, henceforth, the impact of Nafta and Mercosul on the Brazilian economy will be referred as the impact of Mercosul.

The results start with commodity output, progresses to trade, price variables, and finish with a discussion of the impact of the agreement and Mercosul on economic welfare.

3.1 Commodity output

Percentage changes in commodity output under four trade liberalizing scenarios are presented in table 3. Under the first scenario, agricultural output subsidy is still in place, and the import tariff on agricultural goods is reduced by 15% in developed countries and 5% in developing countries. The manufactured goods import tariff is reduced by 38.5% and 37.5% in developed and developing countries, respectively. The agricultural export subsidies fall by 36% and 24% in developed and developing countries, respectively. Thus, this is a very limited trade liberalizing scenario, the minimum agreed in the Uruguay Round. Under this scenario, rice and grains output in Brazil decreases by less than 1.0% due to the 5% reduction in its import tariff and the 24% reduction in its export subsidy that would increase the price of intermediate inputs by more than the commodity price. Production of wheat, non-grain, livestock, processed meat and milk, and beverages/tobacco increases by less than 1.5%. This increase in production is due to the impact of the differentiated reduction on import tariffs and export subsidies, which generates a small increase in the domestic market price for those products. Reductions of import tariffs are the main factor determining the small decrease in the production of other manufactured goods. In this case, although Brazil is a net exporter, the export subsidy for manufactured goods is non-existant or irrelevant, and there is not a large differential on the required tariff reduction between developed and developing countries, such that tariffs reductions reduce domestic market price (table 9).

Table 3
Percentage change in commodity output (qo)

Commodity	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Rice	-0.41	-0.64	-1.26	-1.46
Wheat	0.13	1.59	-1.54	-0.11
Grains	-0.65	-1.48	-1.43	-2.09
Non-grains	0.60	0.01	3.19	2.61
Livestock	1.00	0.93	1.31	1.23
Meat	1.36	1.29	1.97	1.89
Milk	0.87	0.13	0.02	-0.55
Beverages/Tobacco	0.81	0.57	1.02	0.75
Manufactures	-0.84	-0.70	-1.19	-1.06
Services	0.35	0.33	0.40	0.39

In the second scenario, trade liberalization is increased, relative to the first scenario, via a 100% reduction of import tariffs and export subsidies on trade among the member countries of Mercosul. Although the additional change in production is very small, most of it comes from the more liberalized trade environment with Mercosul. In this scenario, production of rice and grain in Brazil decreases by 0.64% and by 1.48% respectively. This fall in production is greater than that of the first scenario, possibly due to increased competition from lower cost producers in Argentina. The increase in the production of wheat, non-grain, livestock, meat, milk, and beverages/tobacco is smaller than that of the previous simulation, ranging from 0.01% for non-grain to 1.59% for wheat. Thus, the impact of Mercosul further reduces the production of rice and grains and increases the production of other agricultural commodities by less than in the previous scenario. Production of manufactured goods decreases 0.7%, a smaller fall than that observed in scenario 1. This is due to the increased demand for the Brazilian manufactured products in Argentina, which holds their prices at a higher level than in the first scenario.

The third scenario implies a much more trade liberalized environment. Domestic agricultural subsidies are reduced by 20% in the US, Canada, and ROW; by 16.8% in the EU; and by 13.3% in Brazil, Argentina and Mexico. Agricultural import tariffs and export subsidies are reduced by 36% and 24% in developed and developing countries, respectively. The reduction of import

tariffs on manufactured good is the same as in the first and second scenarios. The reduction of the production subsidies generates a larger fall in the production of rice (-1.26%) and of wheat (-1.54%). No change is observed in the production of grains relative to the second scenario, which means that this more liberalized situation has the same impact as the presence of Mercosul in the production of grains. The production of the other agricultural commodities increases more than with earlier scenarios from 0.02% for milk up to 3.19% for non-grains. Production of manufactured products decreases by 1.19%.

In the fourth scenario, trade is liberalized to a greater extent than in the third scenario, through the elimination of import tariffs and export subsidies in trade among countries belonging to the Mercosul economic block. The further reduction of import tariffs and export subsidies lowers the profitability of rice and grains in the Brazilian market thereby reducing production of these two commodities: rice production falls by 1.46% and the production of grains decreases by 2.09%. The reduction in wheat production is now much smaller, -0.11% relative to -1.54% in the third scenario. Most of it is due to the increase in the import price and market price of wheat (tables 7 and 9). Milk production, which increases in the other simulations, decreases by 0.55% in the fourth scenario. Production of other agricultural commodities increases by a lower rate in the presence of Mercosul. The production of manufactured goods is reduced by a smaller rate (-1.06%).

Summarizing these results, one can say that trade liberalization at the extent of that in the Uruguay Round Agreement has a very small impact in production of agricultural goods, non-agricultural commodities and services in Brazil. Further liberalization, following Uruguay Round criteria, would have a production reducing impact on rice, wheat, grain, milk, and manufactured products while increasing production of non-grain, livestock, meat, beverages/tobacco, and services. The impact of Mercosul on production in Brazil is even smaller than the effect of the Uruguay Round. The presence of Mercosul, since most of the effect on scenarios 2 and 4 comes from this block, has a positive influence only in the production of wheat, and manufactured goods.

3.2 Trade

The percentage changes of aggregate exports are presented in table 4. The value of exports at fob prices is in the first column.[1] The export value for each commodity (rice, wheat, grains, and milk) is lower than US$ 11 million, implying that Brazil is a residual exporter of those commodities. The most economically significant exports are non-grains, meat, beverages/tobacco, services and, above all, industrial products.

Table 4

Percentage change in aggregate exports (qxw)

Commodity	Export value (US$ million)	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Rice	0.73	5.10	12.27	-13.34	-8.67
Wheat	0.43	1.37	-1.43	-19.49	-21.86
Grains	2.06	-7.56	-4.04	-17.80	-15.22
Non-grains	2,677.82	3.74	1.37	21.92	19.39
Livestock	161.20	13.66	21.14	37.14	41.97
Meat	1,376.88	9.24	9.59	18.65	18.49
Milk	10.96	21.08	95.96	19.51	77.10
Beverages/Tobacco	1,036.76	3.87	2.08	7.66	5.42
Manufactures	32,303.15	14.95	28.04	13.29	26.19
Services	3,178.43	3.28	2.03	3.35	2.03
Total exports	40,748.41	12.54	22.31	12.93	22.51

In the first scenario, where trade liberalization is restricted to the minimum commitment agreed to in the Uruguay Round, the exports of all commodities, except grains, increase. Increasing trade liberalization, as simulated in the second, third, and fourth scenarios, expands the quantity of exports for all significantly exported commodities, except services. In the second scenario, adding the more trade liberalizing conditions of Mercosul to the first scenario, has a small effect on the most exported agricultural commodities. However, it almost doubles the change in the exports of manufactured products. After trade liberalization is complete in the fourth scenario, change in exports of the main agricultural products, which are non-grain, meat, and beverages/tobacco, is more than twice what it is in the first scenario. This is

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[1] *Export values (EV) are obtained from the I-O tables at fob prices.*

due to the strong trade liberalization impact of the Uruguay Round Agreement on agriculture exports (scenario 3). On the other hand, Mercosul has again a small negative impact in the most significantly exported agricultural products (scenario 4). However, through participation in the Mercosul economic block (scenario 4), Brazil's export of manufactured products increases by 26.19%, almost twice the 13.39% increase in the third scenario.

Total exports, weighed by fob prices, increase by 12.54% in the first scenario and by 22.51% in the fourth. The greater impact of Mercosul on exports reflects the large manufactured products share in the Brazilian export sector.

The changes in export quantities are explained, in part, by the increase in the market price of aggregate exports (table 5). Export prices for all agricultural commodities increases with trade liberalization, reducing domestic consumption and increasing exports. Although the export price increase is small, in the range of 1.03% to 3.38% (table 5, scenario 4), for the agricultural commodities showing positive changes in export, its impact on export is strong (table 4, scenario 4). The much higher increase in the market export price of rice, wheat and grain, around 5% and 6%, has no impact on the exports of those commodities, since their export is negligible. Change in the aggregate exports of other manufactured goods is better explained by the differential between the world price, which increases with trade liberalization, and the domestic price, which is reduced by 0.27% (table 5, scenario 4).

Table 5

Percentage change in aggregate export price index (pxw)

Commodity	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Rice	0.44	1.08	5.42	6.13
Wheat	0.55	1.53	3.92	4.97
Grains	1.32	2.04	5.44	6.27
Non-grains	1.23	1.86	2.41	3.07
Livestock	0.72	1.40	2.22	2.94
Meat	0.78	1.50	1.68	2.44
Milk	0.88	2.44	1.79	3.38
Beverages/Tobacco	0.13	0.74	0.38	1.03
Manufactures	-0.78	-0.56	-0.52	-0.27
Services	0.12	0.89	0.27	1.06

The percentage change in aggregate imports (qim) is shown in table 6. The second column has the value of imports at cif prices.[2] Imports of each commodity (rice, grain, livestock, meat, milk, and beverages/tobacco) are small, under US$ 210 million. Imports of wheat and non-grain are each below US$ 1,000 million, while imports of industrial products and services are above US$ 5,000 million for each commodity.

Table 6

Percentage change in aggregate imports (qiw)

Commodity	Import value (US$ million)	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Rice	111.05	-1.07	4.39	5.09	10.14
Wheat	687.32	-2.05	-3.69	-0.59	-2.22
Grains	144.62	-2.90	26.65	9.18	34.34
Non-grains	782.49	-0.18	4.43	4.90	8.51
Livestock	96.03	3.14	6.00	9.83	12.53
Meat	194.66	-10.45	2.98	-1.03	9.67
Milk	207.37	-7.66	14.99	4.37	22.63
Beverages/Tobacco	96.10	2.93	13.20	17.10	25.19
Manufactures	24,934.61	19.07	33.05	19.52	33.36
Services	5,660.42	-0.13	0.53	0.03	0.74
Total exports	32,917.28	14.24	25.42	15.03	26.01

In the first scenario, where trade liberalization is very limited, and because of the tariff reduction differential, imports of agricultural goods decrease, except for livestock, and beverages/tobacco. Imports of agricultural goods are reduced in the range of 10.45% for meat to 0.18% for non-grain. This reduction in imports is explained by the increase in the market price of composite imports (pim) of agricultural goods, other than livestock and beverages/tobacco (table 7). The increase in the market prices of imports (pim) is caused by an increase in international prices, due to trade liberalization which more than offsets the decrease that should occur in the domestic market due to tariff reduction.

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[2] *Import values (IV) are obtained from the I-O tables aat cif prices.*

Table 7

Percentage change in aggregate price of composite import (*pim*)

Commodity	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Rice	0.67	-0.98	2.36	1.02
Wheat	1.56	4.03	3.47	6.00
Grains	1.41	-9.53	-0.36	-8.76
Non-grains	0.81	-0.44	-0.65	-1.46
Livestock	-0.22	-0.55	-1.23	-1.43
Meat	6.87	1.63	2.59	-1.09
Milk	4.55	-3.23	-0.59	-6.08
Beverages/Tobacco	-0.80	-2.96	-5.41	-6.78
Manufactures	-8.83	-12.66	-8.82	-12.60
Services	0.32	0.75	0.40	0.82

The second scenario increases trade liberalization by eliminating import tariffs among member countries of Mercosul. In this scenario, a 100% reduction in import tariffs between Brazil and Argentina (Mercosul) has a strong impact on imports (table 6). Imports of all agricultural goods except wheat increase, varying from an increase of 2.98% for meat to 26.65% for grain. Also, tariff reduction has a strong impact in the market price of imports (table 7). The percentage change in the market price of imports is negative for all agricultural commodities other than wheat and meat (table 7, column 3).

The third and fourth scenarios increase trade liberalization to the full extent of the Uruguay Round Agreement and then add further liberalization through Mercosul. Imports of agricultural goods increase in both scenarios, except for wheat and meat (table 6). This increase in imports is explained by the decrease in prices of all commodities, except rice and wheat (table 7). Imports of manufactures also increase from 19.07% in the first scenario to 33.36% in the fourth scenario (table 6). The increase in imports of services is very small, less than 0.75%. Total imports increase the most: by 26.01% in the fourth scenario, where trade liberalization includes Mercosul, and by only 15.03% in scenario 3, where free trade between Brazil and Argentina is not taken into account.

Percentage change in prices received (*psw*) and prices paid (*pdw*) for tradable, and in terms of trade (*tot*) are shown in table 8. Prices received for tradable decrease less with increasing trade liberalization. That is, in the first scenario, with restricted trade liberalization, prices received decrease by

0.71% while their decrease is 0.16% in the fourth scenario with more trade liberalization. However, prices paid for tradable increase with liberalization. Percentage changes in prices received and paid for tradable generates a decreasing terms of trade effect, around 1.0%, in every scenario.

Table 8

Percentage change in prices received (psw) and prices paid (pdw)
for tradable and in terms of trade ($tot = psw - pdw$)

Price	Scenario 1	Scenario 2	Scenario 3	Scenario 4
psw	-0.71	-0.49	-0.40	-0.16
pdw	0.09	0.58	0.17	0.66
tot	-0.80	-1.07	-0.56	-0.81

In summary, trade liberalization under the Uruguay Round and Mercosul agreements expands exports of non-grains, meat, and manufactures, the most important Brazilian exported commodities, by more than 18% (table 4, scenario 4). Mercosul has a very small negative impact on export of agricultural commodities, but a strong positive effect on the exports of manufactured products. Imports of agricultural products, except wheat, increase with trade liberalization. Elimination of import tariffs between Brazil and Argentina almost double the change in imports of agricultural and industrial commodities. Total imports increase by 14.24% in the first scenario and by 26.01% in the fourth scenario. The decrease in terms of trade is very small, less than 1.1% in any scenario.

3.3 Prices

Table 9 presents percentage changes in market price (pm) of endowments, tradable commodities and capital goods. Market price increases for all commodities, except for manufacturing and capital goods, in every scenario. The endowment with the highest increase in price is land. Its price increases with trade liberalization, changing from 2.03% in the first scenario to 4.83% in the fourth. Because land is not mobile across sectors, increasing the market price of agricultural commodities bids up most the price of this production factor. The impact of Mercosul on land price is very small relative to the effect of

the Uruguay Round Agreement. Although the increase in the prices of capital and labor is smaller than that of land, most of their price change can be accounted to the Mercosul accord. The agricultural commodities with higher price increases are rice, grains, and wheat. Yet, production of rice and grains decreases (table 3), possibly due to a higher increase in the price of intermediate inputs. Uruguay Round Agreement trade liberalization accounts for most of the change in these prices, though Mercosul provides an important contribution. The percentage change in the market price of rice increases from 0.44 in scenario 1 to 5.42 in scenario 3.

Table 9

Percentage change in market (pm)

Commodity	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Land	2.03	2.22	4.54	4.83
Labor	0.65	1.76	0.76	1.88
Capital	0.57	1.68	0.68	1.80
Rice	0.44	1.08	5.42	6.13
Wheat	0.55	1.53	3.92	4.97
Grains	0.39	0.90	4.47	5.08
Non-grains	0.63	1.20	1.80	2.41
Livestock	0.72	1.40	2.22	2.94
Meat	0.57	1.23	1.47	2.18
Milk	0.46	1.14	1.36	2.08
Beverages/Tobacco	0.12	0.73	0.38	1.03
Manufactures	-0.78	-0.56	-0.52	-0.27
Services	0.12	0.89	0.27	1.06
Capital goods	-1.23	-1.26	-1.01	-1.01
CPI $(ppriv)$	-0.28	0.18	-0.01	1.05

By adding the influence of Mercosul, rice price increases by 6.13% (scenario 4). The percentage change in the market price of other agricultural commodities like non-grain, livestock, meat, milk, and beverages/tobacco vary from 1.03 to 2.94 (table 9, column 5). Market prices of other manufactured and capital goods decrease by 0.27% and 1.01%, respectively, in the fourth scenario.

The price index for private household expenditures $(ppriv)$, taken as the consumer price index (CPI) in this paper, decreases by 0.28% in the first scenario, with restricted trade liberalization, and by 0.01%, where full Uruguay

Round Agreement is taken into account (table 9). However, it increases by 0.18% and by 1.05%, respectively in the second and fourth scenarios, where Mercosul is included. Thus, trade liberalization has overall a small impact on price variation in the Brazilian economy.

3.4 Welfare

Percentage change in GDP value, percentage change in per capita utility, and equivalent variation of per capita utility in millions of US dollars are presented in table 10. GDP growth is strongly affected by trade liberalization caused by Mercosul. Brazilian GDP increases 0.31% in the first scenario, with limited trade liberalization. However, when Mercosul trade agreement is considered, GDP increases by 0.91%. At full Uruguay Round Agreement, Brazilian GDP increases by 0.61% in scenario 3, and by 1.24% when trade liberalization includes the economic blocks (scenario 4). Thus, trade liberalization and participation in economic blocks can have some influence on Brazilian economic growth.

Table 10

Percentage change in value of GDP, and in per capita utility
from aggregate household expenditure

Variable	Scenario 1	Scenario 2	Scenario 3	Scenario 4
GDP value	0.31	0.91	0.61	1.24
Utility	0.73	0.95	0.81	1.03
Equivalent variation*	2,474.90	3,223.88	2,747.60	3,503.84

Trade liberalization produces a very small percentage change in per capita utility.[3] In scenario 4, the most broad trade liberalized situation, welfare increases only 1.03%. However, the equivalent-variation measure shows that this small increase in utility is equivalent to a national welfare gain of more than US$ 3.5 billion (table 10, scenario 4).

These results are closely related to the findings of Brandão & Martin (1993), Goldin & Van Der Mensbrugghe (1995), and Harrison, Rutherford &

[3] *Per capita utility is an estimate of real per capita consumption obtained by deflating expenditures by an appropriate price index.*

Tarr (1995). Brandão & Martin (1993) found a welfare impact of agricultural trade liberalization alone, under the Dunkel Proposal (that generates an environment close to scenario 3 above), equivalent to a 0.3% (US$ 2,057 billion) increase in the Brazilian GDP. Goldin & Van Der Mensbrugghe (1995), working with reforms on agriculture and manufacturing sectors, also found an increase in real income in the order of 0.3% or 0.4%, depending on the base period (1982-93 or 1991-93) for the average protection benchmark. Harrison et alii (1995) found long-run estimates of welfare effects varying from US$ 134 million (for reforms only in the agricultural sector) to US$4.5 billion (for reforms in agriculture and manufactures).

4. Conclusion

Trade liberalization under the Uruguay Round Agreement, even considering the more liberalized conditions of Mercosul, has a very small impact on the production of agricultural and non-agricultural commodities. The production of grains, the commodity whose production decreases most, is reduced by 2.09%, while production of non-grains, the commodity with the highest increase in production, increases by 3.19%. Trade liberalization in the framework of the Uruguay Round Agreement has a production decreasing impact on rice, wheat, grains, and manufactures; and an increasing effect in the production of non-grains, livestock, meat, beverages/tobacco, and services. The Mercosul accord has a smaller effect on production than the Uruguay Round Agreement. It reduces the production or the increase in production of all commodities, with only two exceptions, namely wheat and manufactures.

The Uruguay Round Agreement, Mercosul included, expands by more than 18% exports of non-grains, meat, and manufactured goods, all products with export value above US$ 1 billion. The impact of Mercosul alone on Brazilian exports of agricultural products is, in general, very small and negative. However, its impact on manufactured goods, commodities with export value above US$ 32 billion, is very large.

Imports of agricultural products, except wheat, increase with trade liberalization. Elimination of import tariff between Brazil and Argentina (Mercosul) has a strong positive impact on imports of agricultural and industrial products. The decrease in terms of trade, approximately -1.0% in every scenario, is the least (-0.56%) when the Uruguay Round Agreement's trade liberalization is at its extreme (scenario 3).

The impact of the Uruguay Round Agreement on the variation of the consumer price index, measured by the change in the price index for private household expenditures, is very small, less than 1.1%. However, it increases with trade liberalization, from -0.28% in scenario 1 to 1.05% in scenario 4.

The value of Brazilian GDP increases by 1.24% in the most liberalized trade scenario. Without Mercosul the increase in GDP value would be only 0.61%. Percentage changes in per capita utility are very small. Even in the scenario with the most broad trade liberalization, welfare increases by only 1.03%. However, the equivalent variation estimates show that this small increase in utility is equivalent to a national welfare gain of US$ 3.5 billion.

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