THE ECONOMIC IMPACTS OF CHANGES IN IMPORT TARIFF REBATES ON SELECTED BRAZILIAN AGRO-INDUSTRIAL CHAINS

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Abstract

This article evaluates the impacts of policy measures that simulate the elimination of Brazilian import tariff rebates. A computable general equilibrium model is used to simulate the reaction of specific economic agents to those changes. The elimination of tariff rebates on imports from the rest of the world promotes a strong fall in the levels of Brazilian productive activity leading to a reduction in family incomes and their spending on consumption. Tariff rebate elimination also implies a fall in the level of economic indicators, the levels of rural and urban employment, and the level of consumer welfare. This behavior reflects the essentiality of imports for Brazilian economic growth.

Key words: Tariff rebate, imports, agro-industrial activities, MERCOSUL

1. Introduction

Brazilian agribusiness has been strongly exposed to regional competition; a result of the volume of zero tariff imports that are brought into Brazil from the MERCOSUL allied countries. Agricultural

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protectionism in the developed countries has also negatively affected Brazilian agribusiness. Agricultural subsidies, granted by European Union countries, Japan, and other OCDE countries, have promoted losses for segments of the Brazilian agro-industrial chain, both by decreasing agro-industrial prices in external markets and by hindering the entrance of Brazilian agro-industrial products into these markets.

Brazilian commercial policy has been quite complex, including tariff and non-tariff restrictions and the application of fiscal incentives through special import regimes. In 1995, 35.06% of the value of imports received fiscal incentives; in 1998 this percentage rose to 45.52%. The member countries of ALADI and MERCOSUL, two special trading regimes, are exempted from part or all Brazilian tariffs and receive rebates on the tariffs they do pay. These rebates increased 3.71% between 1995 and 1998, from 15.35% to 19.06% (Graph 1). Automakers and vehicle assemblers located in these two trade blocks also receive a special tariff rebate, which increased from 0.04% in 1995 to 7.05% in 1998 (Graph 1).

Fiscal tariff rebates granted to ALADI and MERCOSUL members cost the Brazilian government an estimated six billion Reais (U.S.$ 2.4 bil.) in tax revenue annually. Reduction of these rebates could have financed the current transactions deficit caused by deviations in the real effective exchange rate through 1998; though, the Agreement of Integration among MERCOSUL member countries preserves tariff rebates on intra MERCOSUL trade.

GRAPH 1
Import tax and tariff rebate according to taxation regimes
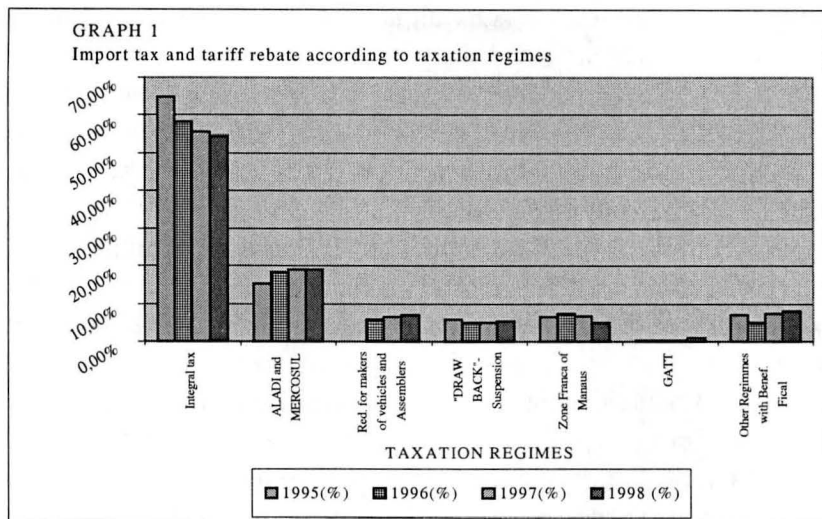
Source: BRAZIL. Ministry for Development, Industry and Trade (1999).

The objective of this study is to evaluate the impacts of Brazilian import tariff rate changes on the performance of Brazil's main agribusiness chains, specifically, the impacts of tariff rebates on income, employment and consumer welfare levels in the agribusiness sector.

2. Methodology

A computable general equilibrium – CGE - model is used to simulate interaction among economic agents, such as consumers, firms, and governments, by means of market forces. The producer maximizes profit subject to technological restrictions while the consumer maximizes utility subject to budgetary restrictions. The model finds a vector of prices and quantities, such that all excess demands are eliminated. In this model, only relative prices are considered and money is neutral.

Economic activities are aggregated into sectors to facilitate the focus on agribusiness activities. In this sense, the entire economy is

231

represented by 20 sectors: Agricultural, Other Manufactured, Energy, Mechanics and Electric, Chemistry, Alcohol, Fertilizers, Textile Fibers, Coffee Products, Milled Rice, Wheat Flour, Red Meat, Poultry, Dairy, Sugar, Vegetable Oils, Services, Financial Services, Trading and Transport, and Public Administration. Twelve of these sectors are directly related to agribusiness.

For all activities, the model incorporates substitutability and complementary patterns in the production process, both in the combination of primary factors and in the combination of intermediary inputs. The producer chooses the combination of input requirements by unit of production, optimizing the production process by means of cost minimization.

Graph 2 illustrates the generic production system modeled in this study with shaded boxes specifying the functional forms used in each stage. Two great input categories are recognized: intermediary inputs and primary factors. The restrictions are determined by the technology of nested production functions. In the first level (superior level), it is assumed that intermediary inputs and primary factors are combined in fixed proportions (Leontief). In the second level, the left of the graph, the available input from the activity itself and other inputs from MERCOSUL and the rest of the world are combined in fixed proportions (Leontief). Also in the second level, on the graph's right side, capital and labor are combined in a (CES) aggregation. In the third level, there are the substitutions (CES) of domestic for imported inputs. In the fourth level, packages of imported input originating in distinct regions are combined by means of (CES) aggregations.

In the discussions of foreign goods, it is assumed that a country sells differentiated products in the international market and the demand function for exports has finite price-elasticity. It is also admitted that imported goods are imperfect substitutes for domestic goods. In this case, a composite product represented by a (CES) aggregation between imported goods and domestic goods is used to express domestic

availability. Taking into account the relationship between the prices of these two goods, the solution for cost minimization determines the relationship between imported/domestic inputs, where the marginal rate of substitution among these inputs is equal to the relative price of these inputs.

Graph 2
Structure of production technology for economic activities.
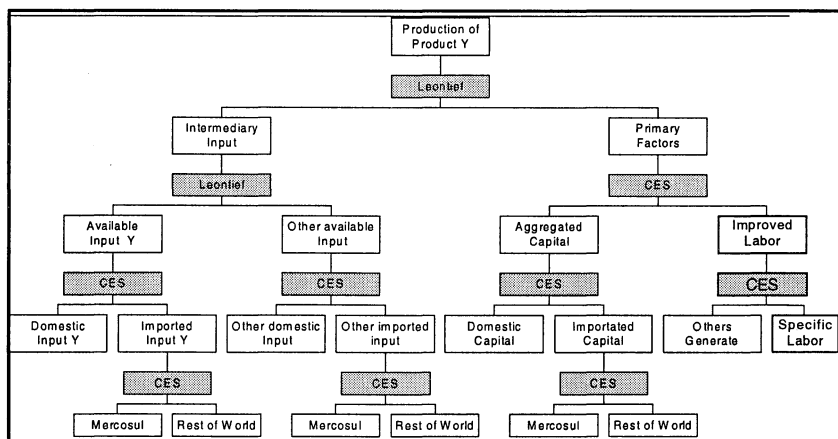
Source: Brandão, Hertel and Campos (1994), adapted by the authors.

The demand equations are specified to differentiate the demand by families and governments for consumption goods from the demand by industry for capital goods. The consumer maximizes utility subject to the respective budgetary restrictions. In a superior level, families maximize utility by substituting future consumption for present consumption. Therefore, the consumer's choice depends on his income expectations. At a slightly lower level, there is substitution in consumption between foods and other goods. While at the intermediary level, the derived utility of the consumption of available goods is maximized through substitution between cereals, proteins, and nutritious products

233

such as sugar, coffee, oils, and other agricultural products. At the most inferior level, there is the substitution between rice and wheat among the cereals, and beef, poultry, pork, and dairy products among the proteins.

2.1. Calibration of the model and the benchmark equilibrium

The functional structure of a general equilibrium model involves the utilization of a system of equations in order to model the agents' behavior. In this way, the determination of the several parameters for those behavioral functions is a basic condition for the evaluation of the effects of exogenous shocks that are transmitted to the several sectors of the economy. The calibration should be understood as a method of estimating parameters so that the specified model is capable of reproducing the base-year observations as the model's equilibrium solution (Shoven and Whalley, 1998). In this fashion, the model is solved with the initial equilibrium information generating the model's parameters. In contrast with stochastic econometric methods, which frequently simplify the structure of the economic model to allow the richest statistical specification, the calibration method opts for the richest economic representation through a deterministic model but does not allow for any sophisticated statistical representation.

According to Shoven and Whalley (1998), this procedure admits that the circular flow specified in the Social Accounting Matrix (SAM) for the base-year represents a solution for the initial equilibrium. The changes caused by external shocks provoke a process of readjustments in the system until it reaches a new equilibrium position. Consequently, analysis of the impact of shocks follows the comparison among the values of the endogenous variables in two optimized situations. Thus, the calibration method is simpler and more practical than econometric estimation, allowing the CGE model to become more operational as they acquire more parameters.

2.2. The effect of tariff structure change on consumer welfare

Equivalent variation is one of the most common measures used to estimate change in welfare relative to an initial equilibrium. It refers to the additional monetary income needed to maintain the level of consumer welfare found in the initial equilibrium situation as the consumers reach different levels of utility in each of the alternative solutions. All calculations being based on relative price changes.

2.3. Model and data source

The first procedure in constructing the model is to define the aggregated sectors and activities in the Brazilian input-product matrix. Next, the Social Accounting Matrix (SAM) is constructed with a 26x26 dimension. This SAM provides the basic data for calibration of the model used to execute the simulations. For each simulation, the model was solved for the endogenous variables, starting from shocks in the values of the exogenous variables and other parameters. The new flows of goods and services reflect the tariff shock applied in each simulation on those variables associated with the study objective.

The main parameters used in this model were the elasticity coefficients for import and export demand production functions. These parameters were obtained from the Social Accounting Matrix for 1995 and from elasticity coefficient values found in Brazilian and international economic literature. The consumer price index represents a weighted average of all consumer prices and is used as a numeraire. The main information is obtained from the Instituto Brasileiro de Geografia e Estatística's (IBGE) 1995 input-output table. The other data are from National Account Files, economic censuses, the Central Bank Bulletin, Agrianual (1996 and 1999), and Anualpec (1996 and 1999).

3. Results and Discussions

3.1. Analytical scenarios

In this study, the average real import tax is represented by the real tariff that is effectively paid on Brazilian imports and is a function of the degree of Brazilian fiscal rebates. Fiscal rebates are obtained from the difference between the nominal tariffs mandated by the Common External Tariff (TEC) and the rates that are actually paid by each specific import regime (Baumann et al., 1997).

To construct the scenarios and to visualize the nature of the simulations, one must first determine the initial equilibrium tariff rates and then select new tariffs rates to represent specific situations in the Brazilian economy (Table 1). After that, simulations are generated employing the new tariff conditions selected for each specific scenario; and the results are then used to evaluate the effect of tariff changes on the Brazilian economy's behavior.

The Initial Equilibrium condition is based on 1995 real Brazilian import tariffs applied to imports from the rest of the world except that the tariff rates on goods imported from MERCOSUL member countries will be considered zero (2a column of Table 1).

SCENARIO 1: Adjustments of tariff incidence on imports from the rest of the world to the levels mandated in the 1995 Common External Tariff (TEC) (Table 1, 3ª column), supposing zero tariff for the imports from MERCOSUL member countries.

SCENARIO 2: Adjustments of tariff incidence on imports from the rest of the world to 1998 (TEC) levels, (Table 1, 4ª column), maintaining the zero tariff on MERCOSUL imports.

SCENARIO 3: Adjustments of tariff incidence on imports from the rest of the world to the real tariff paid in 1998 (Table 1, 5ª column), maintaining zero tariff on the imports from MERCOSUL.

The proposed adjustments minimizing tariff rebates indicate an

236

increase in the real tariff paid but don't alter nominal tariff rates. In synthesis, SCENARIO 1 corrects for fiscal rebates in 1995; SCENARIO 2 corrects for fiscal rebates and growth of the real tariff paid between 1995 and 1998; and, finally, SCENARIO 3 only corrects for growth in the real tariff between 1995 and 1998.

Table 1 – Tariffs on imports under different analytic scenarios, Brazil, 1995/98

Discrimination	Real Tariff 1995, except MERCOSUL	Tariff Rates T.E.C. 1995	Tariff Rates T.E.C. 1998	Real Tariffs 1998, except MERCOSUL
	Initial Equilibrium	Scenario 1	Scenario 2	Scenario 3
Agricultural Goods	10.60	10.84	12.62	12.15
Other Manufactures	7.16	15.14	17.93	8.99
Energy	8.59	9.91	12.69	11.22
Mechanical & Electrical	13.92	17.12	22.86	16.27
Chemical	5.99	11.72	14.43	7.18
Alcohol	5.54	11.31	13.92	7.01
Fertilizer	1.14	3.34	5.75	1.96
Textile	11.90	16.78	19.39	13.93
Milled Rice	5.76	11.16	13.87	13.68
Wheat Flour	1.41	13.09	15.82	4.57
Red Meat	6.12	11.49	14.12	5.47
Dairy	22.51	18.04	20.74	25.57
Vegetable Oils	5.12	11.25	13.97	6.66
Average	8.13	12.40	14.85	10.36

Source: The authors' calculations

3.2. Effects of the elimination of fiscal rebates and other tariff alterations on imports

The results shown in Graph 3 indicate generalized falls in the levels of the main economic indicators other than Government Revenue. This agrees with Guilhoto (1994) who also found that fiscal rebate reductions and/or tariff increases caused a negative response in Brazil's

economic indicators.

GRAPH 3
Effects of simulated tariff changes on selected economic indicators
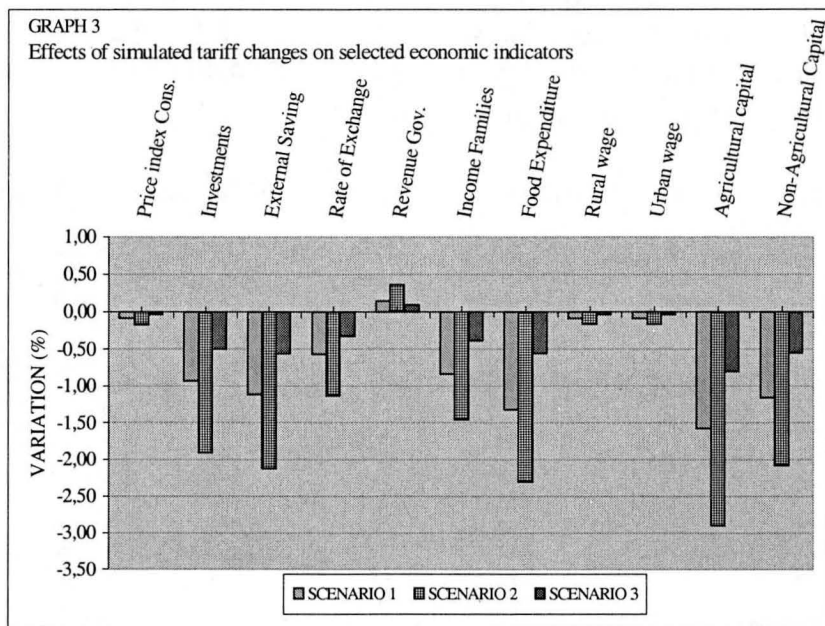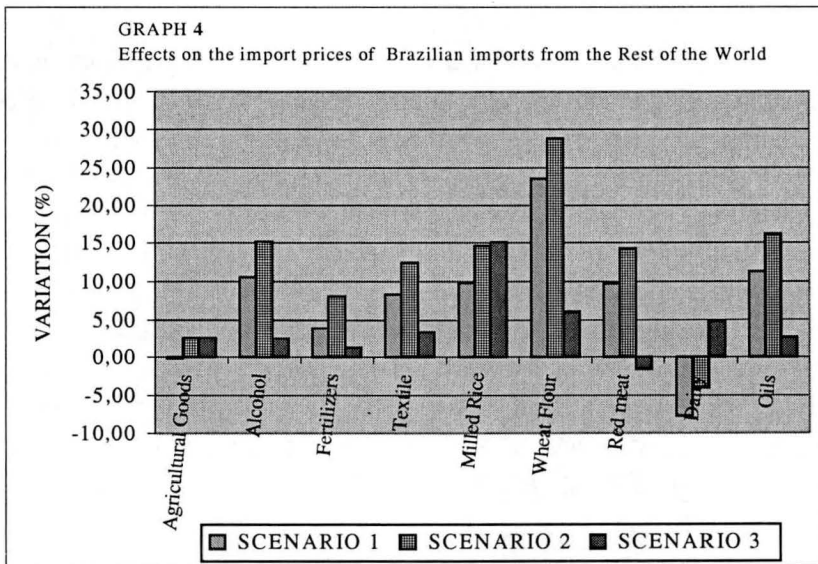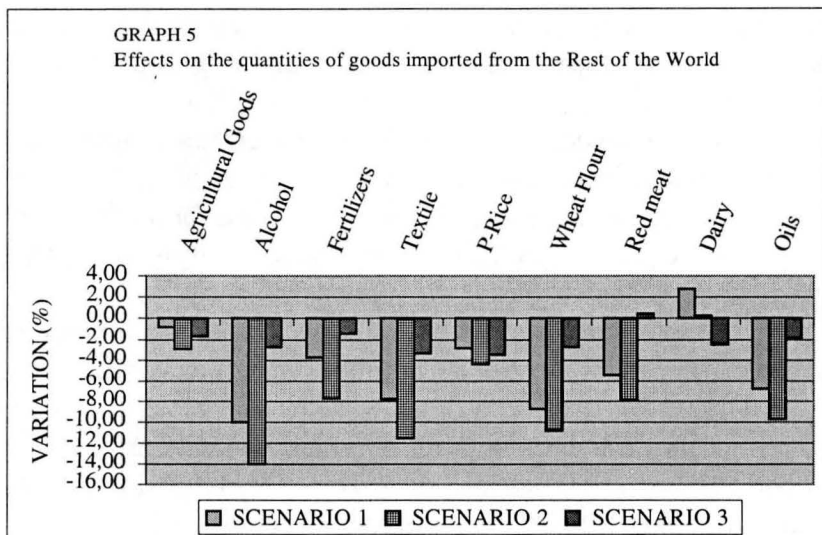
Elimination of the fiscal rebates on imports from the rest of the world promotes a strong fall in the levels of Brazilian productive activities, leading to a reduction of family income, which alters domestic food consumption patterns. The import price increases hinder access to raw materials, which again reduces productive activity levels in all productive chain segments and affects the final availability of consumption goods. The reduced level of productive activities also lessens demand for investment capital, negatively affecting demand for external savings. Tariff rebate elimination had negative effects on the consumer price index and on rural and urban wages, but these were relatively small when compared to the effect observed on rural and urban capital rates of return. Relative to the Initial Equilibrium, all scenarios represent tariff

increases, implying a movement toward isolation of the Brazilian economy that reduces Brazilian welfare and resource allocation efficiency.

As a consequence of falls in the level of economic activity and import demand, there is appreciation in the real rate of exchange. In a floating rate regime, the appreciation would work as a form of correction for part of the previous exchange overvaluation, contributing, in this way, to the reduction of the external deficit (Silva, 1999).

Graphs 4 and 5 show the effects of implementation of the analytical scenarios on prices and quantities of agro-industrial imports from the rest of the world. Logically, those effects depend on the complementary and substitution relationships that exist between goods imported from the rest of the world and those produced domestically or imported from MERCOSUL member countries.

GRAPH 4
Effects on the import prices of Brazilian imports from the Rest of the World

SCENARIO 1   SCENARIO 2   SCENARIO 3

239

GRAPH 5
Effects on the quantities of goods imported from the Rest of the World

The elimination of fiscal tariff rebates is observed to cause price increases and reductions in the quantities imported of almost all agro-industrial products, except in Scenario 1—Agricultural, Scenario 3—Red Meat, and Scenarios 1 and 2—Dairy. These results show coherence with the theory of tariffs, as the implementation of the scenarios implies the effective growth of tariffs and, consequently, growth in the price index and a reduction in the domestic availability of imported products.

The negligible change agricultural sector product prices as tariffs increase was due to the very small participation of imports from the rest of the world in this sector (0.24 %). The great fiscal rebate for the agricultural sector occurred when Argentina, Brazil, Paraguay and Uruguay signed the MERCOSUL Agreement.

GRAPH 6
Effects on the values of imports from the Rest of the World
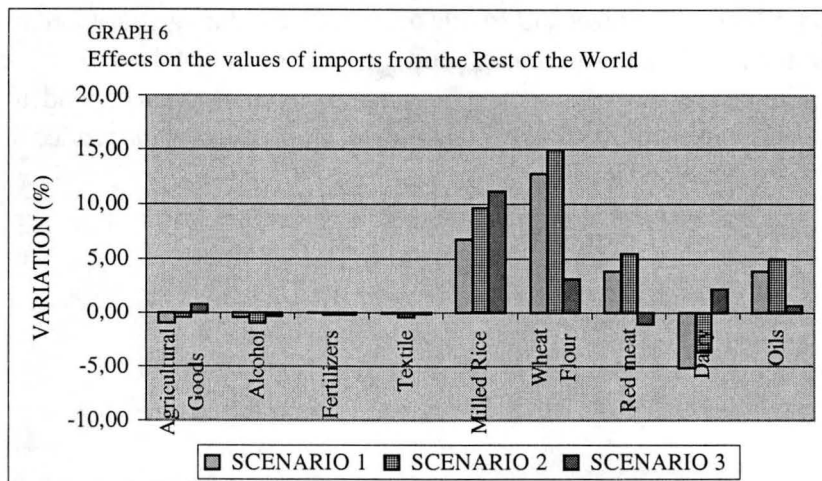
Graph 6 shows the effects of the tariff increases imposed in each scenario on the value of imported goods. The cost of imported Milled Rice, Wheat Flour, Red Meat and Vegetable Oils rises greatly. Since tariff rate growth causes the prices of these products to greatly increase while the respective quantities imported do not decrease in the same proportion, it is possible to deduce that the demand for these products is price-inelastic and, or, complementary to domestic supply.

On the other hand, there is less spent on the importation of other agro-industrial products. Such behavior is associated to the income effect resulting from the fall in domestic economic activity; though, dairy product importation is a special case. The reduction in the value of Dairy imports is a consequence of the shock simulated in Scenarios 1 and 2 having an opposite effect on Dairy tariffs: the tariff on Dairy imports fell in Scenarios 1 and 2. This reduced the expenses incurred importing dairy products and consequently dairy product prices.

The analysis of domestic price behavior (Graph 7) helps to understand domestic market changes. Graph 7 shows that the prices fell for the products of all agro-industrial activities other than Fertilizer

and Textile. Fertilizer and Textile prices increase, though not enough to impede falls in the quantities produced in each one of those activities (Graph 8). Such behavior isn't surprising, given the great dependence on imported raw materials and intermediary products in the production of fertilizers and textiles


GRAPH 7
Effects on the prices of domestic goods

GRAPH 8
Effects on the levels of domestic production.
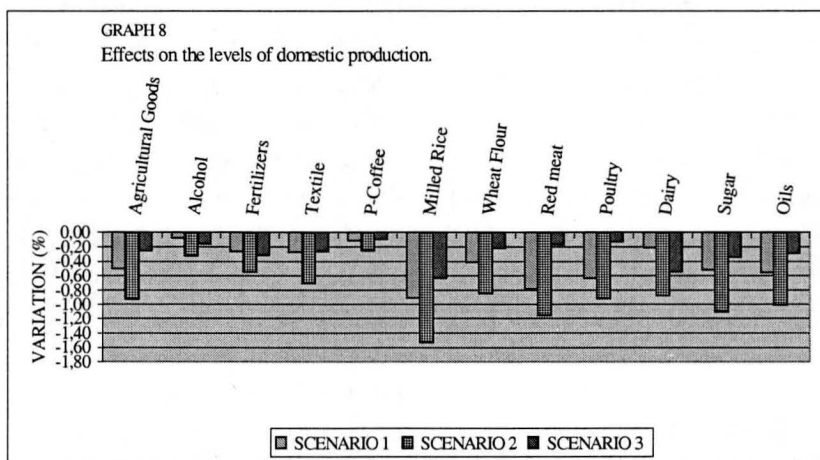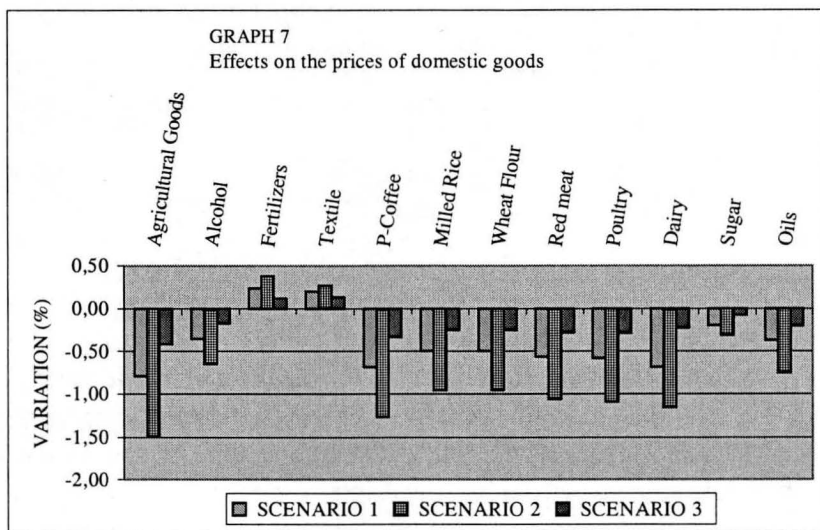
Graph 8 shows that production levels for all activities were reduced. Such behavior reflect the essentiality of Brazilian importation, that is, elevation of the costs of imported intermediary goods depresses economic activities and, consequently, national agribusiness. This indicates that fiscal rebates are associated with the development of key economic sectors. The elimination of the fiscal rebate directly and negatively affects production and employment levels in several productive activity branches. In this way, the decrease of economic activity provokes a general fall in absorption and production levels, giving rise to a vicious cycle that is explained by the absence of the multiplier effect of imports in the Brazilian economy.

In 1998, the tariff rebate for imported raw materials and intermediary products used in the manufacturing industry was 35.17%, while imported capital goods for the same industries received a 32.63% tariff rebate. These rebates amounted to 45.50% of the total value of Brazilian tariff rebates, evidencing an implicit government incentive provided to the manufacturing industry. In this way, when those rebates are eliminated, the incentive to manufacture is strongly reduced.

The effect of simulated import tariff increases is quite varied. If there is a domestically produced substitute for the imported good, there will be substitution of the domestic product for the imported one. However, if domestic supply is fixed, the growth in demand for the domestic product can lead to an increase in its price, with secondary repercussions on export supply. In general equilibrium, the effects of the three scenarios' implementation are sometimes of small magnitudes but of considerable range. In this sense, the reductions in the export values of products from all productive activities shown in Graph 9 help to explain the hypothesis that most fiscal rebates had incidence on imports from chains of value with strong interdependence.

When the fiscal rebate on imports is eliminated, Brazilian exports from the majority of the activities respond negatively. Since the acquisition of inputs and capital goods becomes more expensive as rebates are

eliminated, automation and modernization of production is delayed as a function of the absence of imported intermediary goods. This makes the affected production facilities less competitive in the external market. Textile manufacture is the most mechanized of all studied activities, and textile exports suffer the most impressive fall in total export value.

GRAPH 9
Effects on the values of Brazilian exports
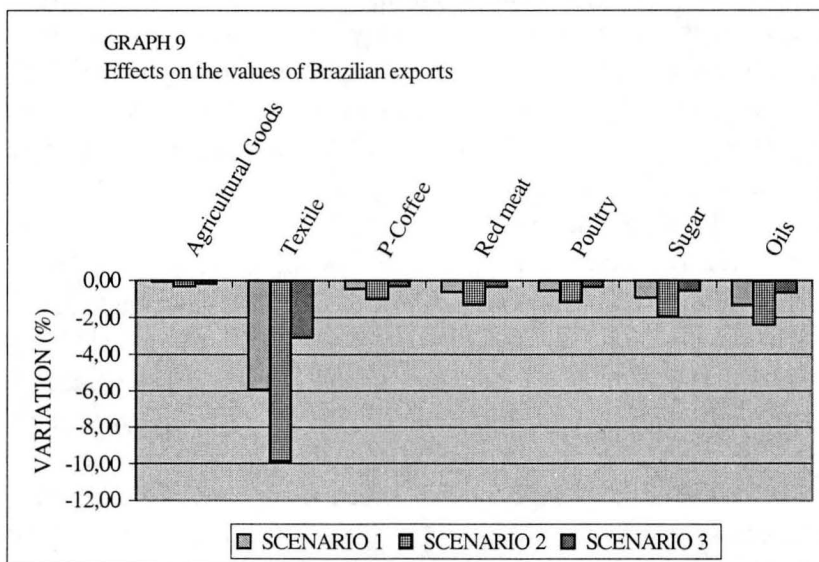
However, the exported quantity of the product of some activities, such as Agricultural and Processed Coffee, responded positively to the elimination of tariff rebates. For these activities, the slight fall in total value of their exports when the fiscal rebate was suspended implied that the reduction in these product prices elicited an almost corresponding expansion of the amount of product exported. In this way, and because they are agro-industrial activities less dependent on imports, the suppression of the fiscal rebate provoked only small variations in the values of Agricultural, Processed Coffee, Meats, Sugar, and Vegetable Oils exports.

As seen previously, the implementation of the three scenarios implies a series of interactive effects on the supply and demand for goods in the domestic and external markets. These interactions between productive sectors and their respective markets affect the demand for labor within the economy (Graph 10).

GRAPH 10
Effects in the levels of unemployment
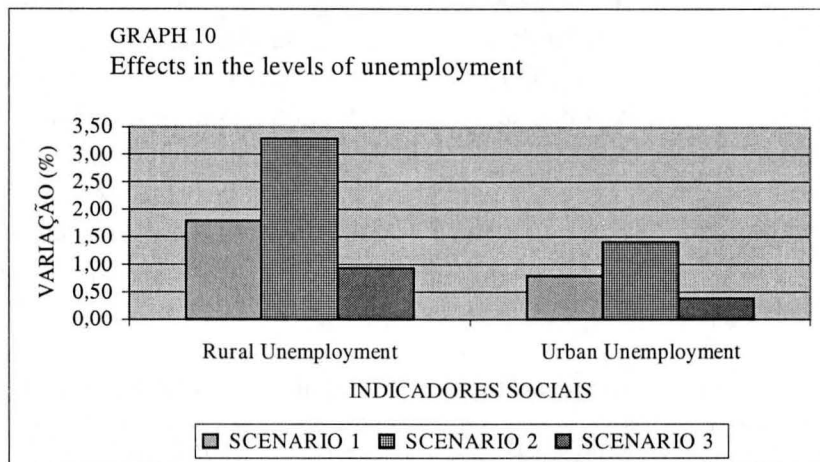
Elimination of the fiscal tariff rebate causes increased rural and urban labor unemployment. The elevations in the unemployment rates result from the decline in economic activity, given the strong interdependence between imports and some segments of the value chains. Such behavior is seemingly in conflict with the theory of tariffs, which assumes that an increase of the tariff rate on an imported good should increase domestic production of a similar good and, as such, should generate more domestic employment opportunities. The observed contradictory behavior is intimately related with the importation of crucial intermediary products and reflects the dominance of the essentiality effect on the means of Brazilian production. In this sense, it is observed that tariff rebates on automobile parts and other intermediary

goods imported into the Zona Franca, Manaus, Brazil, facilitate employment growth in both the local economy and in Brazil as a whole.

It is also important to ascertain the effect of the simulated alterations from the initial tariff equilibrium on the level of consumer welfare. From this perspective, estimates of equivalent variation in relation to the initial equilibrium provide the new positions for alternative solutions (Table 2). Equivalent variation refers to the additional quantity of monetary income needed to maintain consumer welfare at the same level found in the initial equilibrium situation assuming the change of prices elicited by the tariff alterations simulated in each scenario. Our data, outlined in Table 2, indicate that the elimination of the fiscal rebates simulated in Scenarios 1 and 2 and the tariff increase simulated in Scenario 3 reduces the welfare of society relative to the initial equilibrium state.

Table 2 - Effects of the tariff rebate alterations on consumer welfare (in millions of Reais)

| Discrimination | Family Income | | | Foreign Exchange | | |
	Total	Equiv. Variation	(%)	Total	Equiv. Variation	(%)
Inicial Equilibrium	406,636.82	0	0	81,490.89	0	0
Scenario 1	402,907.07	-3,729.75	-0.92	80,429.54	-1,061.35	-1.30
Scenario 2	399,741.70	-6,895.12	-1.70	79,543.66	-1,947.23	-2.39
Scenario 3	404,797.44	-1,839.38	-0.45	80,978.83	-512.06	-0.63

Source: Research data.

4. Conclusions

The elimination of fiscal rebates on imports from the rest of the world promotes a strong fall in Brazilian economic activity levels and, consequently, in family income, decreasing their domestic consumption

spending. There is also fall in the final availability of consumption goods as a result of the higher cost of intermediary imported goods. The increase in the price of imports hinders access to raw materials, reducing the levels of productive activities in all productive chain segments. This reduction in the level of economic activity reduces producer investment, negatively affecting the demand for external savings.

As a consequence of reduced economic activities and import demand, there is an appreciation in the real effective exchange rate. In a floating exchange rate regime, this behavior works to correct part of an exchange rate overvaluation, thereby contributing to reduce the trade balance deficit. Therefore, the reduction of tariff rebates acts as a corrective instrument for possible currency overvaluation.

The elimination of fiscal tariff rebates in the first two simulations and the tariff increase in the third simulation represent isolations of the Brazilian economy from the rest of the world and cause all economic indicators other than those measuring government revenue to deteriorate. In all three simulations, production levels in all examined activities decrease and the price levels of all examined products except for fertilizers and textiles increase. This behavior reflects the essentiality of Brazilian imports; that is, the elevation of the cost of imported goods has a recessive impact on the economy, decreasing economic activity, provoking falls in both production and absorption levels, increasing unemployment, and reducing the level of consumer welfare. Thus a vicious cycle is begun, a cycle that is explained by the multiplier effect of imports in the Brazilian economy.

Though the elimination of fiscal tariff rebates does facilitate more than six billion Reais of tax revenue growth, the secondary effects of this measure have strong negative impacts that greatly overshadow the current tax benefit.

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