

Brazil's New Floating Exchange Rate Regime and Competitiveness in the World Poultry Market

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ABSTRACT

In early 1999, Brazil devalued its currency, increasing its competitiveness in the poultry industry and capturing world market share. This paper discusses the devaluation and its effects on Brazil's trade, evaluates preliminary statistics on the impact of the devaluation on world poultry markets, and reports the results from a computable general equilibrium (CGE) simulation of the devaluation. The medium-run CGE results are compared to the short-run impacts reflected in the preliminary statistics.

Key words: *Brazil, currency devaluation, GTAP, poultry, world market share.*

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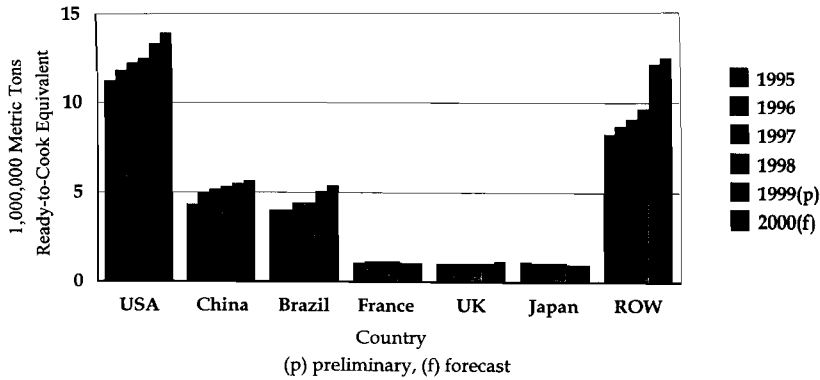
The United States is the largest producer and exporter of broiler meat in the world. China is the second largest producer, and the second largest consumer of broiler meat. Brazil is the second largest exporter and third largest producer of broiler meat in the world (see Figure 1 for world poultry production and export trends for the period 1995–2000, Foreign Agricultural Service, FAS). Because of Brazil's prominent role in world poultry trade, structural changes in Brazil's production or changes in their government policies may impact world market shares and poultry exports from other countries as well as domestic consumption, production, and trade.

After a long period of pressure on its currency and efforts to keep the exchange rate fixed at some desired level, Brazil's central bank, supported by the president, decided to adopt a fluctuating exchange rate regime in 1999, devaluing Brazil's currency, the Real, by nearly 60 percent (Instituto de Pesquisas Econômicas Aplicadas, IPEA). The devaluation of the Real had effects on both the inputs and outputs of broiler production in Brazil. Inputs became more expensive, increasing the cost of broiler production 15 percent, given the fact that Brazil imports genetic stock and veterinary products from other countries (O'Connor). On the other hand, broiler prices became less expensive for the export market, increasing world demand, and resulting in higher returns and larger world market share for Brazilian poultry producers. Although imported input prices increased, this increase in production costs did not override the benefits of currency devaluation, because imported inputs in the poultry sector are only a minor share of total costs.

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World Broiler Meat Production



World Broiler Meat Exports

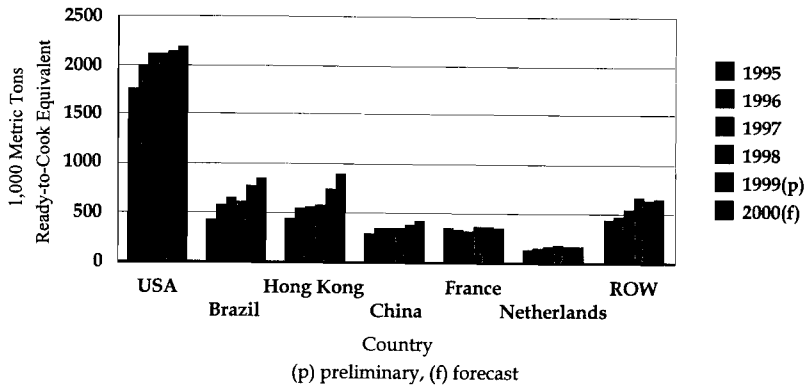


Figure 1. Broiler production and exports of major producers and exporters in the world

This study analyzes the effects of Brazil’s currency devaluation on the world poultry markets, focusing on poultry markets for Brazil and the United States. The results of the devaluation will have long- and short-term impacts on the poultry industry in Brazil. This study simulates impacts of the devaluation using the Global Trade Analysis Project (GTAP) general equilibrium software and database and compares the results to preliminary country data collected for the year following the devaluation.

Objectives

The overall objective of this study is to analyze changes in Brazil poultry trade relation-

ships after the currency devaluation adopted in Brazil in early 1999. The present analysis focuses on the following objectives: (1) Discuss short-term impacts of Brazil’s currency devaluation on world poultry market and welfare measures for Brazil. This section is subdivided into the following sections: (i) Currency devaluation theory and its effects on exporters and importers, (ii) Effects on the world market and Brazilian poultry, and (iii) Welfare effects of currency devaluation in Brazil; (2) Simulated currency devaluation with GTAP and comparison of results to trade data reported by the government (FAS) to analyze short- and medium-term changes in world market shares and exports of Brazil and the United States. If GTAP performs well on the modeling deval-

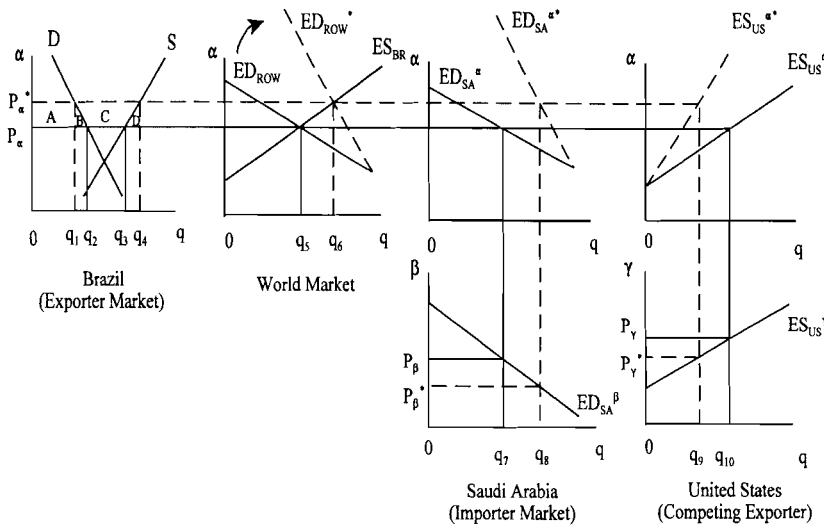


Figure 2. Effects of currency devaluation on large exporting country and effects on importing countries and competing exporting countries

uation in Brazil, it might be useful for additional policy analysis related to the Brazilian poultry industry.

Conceptual Interpretation of Currency Devaluation

Impacts on Exporter and Importer Markets

The effects of the Real’s devaluation on poultry markets in Brazil and in the rest of the world (ROW) can be illustrated as in Figure 2. The effects of a currency devaluation on a large exporter country and its effects on the world market, including importers and competing exporters, are depicted in a partial equilibrium framework (Houck).

The currency of a large exporter country (Brazil) is represented by α ; Saudi Arabia’s currency, a major importer of Brazil’s poultry, is represented by β ; and the United States’ currency, Brazil’s major exporting competitor in the world poultry market, is represented by γ . Prices and quantities are represented by P and q , respectively. Initial prices and quantities are represented by solid lines and no asterisks. After the devaluation, which is denoted by the rotation on the ED_{ROW} line on chart two of Figure 2, takes place all new points are represented by asterisks and dashed lines.

The first chart on the far left represents the domestic market of Brazil, where poultry supply (S) has an upward slope and demand for poultry products (D) has a downward slope. The second chart represents the world market, where Brazil is considered a large exporter of poultry and, hence, the excess supply function of Brazil (ES_{BR}) has an upward slope and rest of the world represents a consumer of poultry (ED_{ROW}). The third chart represents the excess demand of a major importer of Brazilian poultry products in terms of Brazil’s currency (ED_{SA}^{α}). The chart underneath chart three represents the major importer’s excess demand in terms of its own currency (ED_{SA}^{β}). Chart four, on the far right, shows the excess supply function of a major competitor in the export market (United States) in terms of Brazil’s currency (ES_{US}^{α}). Finally, the last chart underneath chart four represents the excess supply function of the competing exporter in terms of its own currency (ES_{US}^{γ}).

As Brazil adopts a fluctuating exchange rate and its currency is devalued, the excess demand curve for poultry in the rest of the world rotates up, increasing the quantity demanded from Brazil from q_5 to q_6 , and increasing the world price in Brazilian currency from P_{α} to P_{α}^* . This rotation in the excess demand of rest of the world is expected to have the

Table 1. Poultry Production, Demand and Export for Brazil During the 1998–99 Period

Year	1998	1999	Change
Unit	1,000 MT	1,000 MT	percent
Production (Supply)	4,498	5,154	+15
Domestic Consumption	3,886	4,200	+8
Exports	612	770*	+26
12-month average wholesale price (R\$/KG)	0.88	0.92**	+9

Source: FAS Attache Report (O'Connor).

* Ending stocks equal 174 (1,000 MT).

** In terms of 1998 (Inflation for year of 1999 equals approximately 4.36 percent).

following effects: (1) poultry production in Brazil increases from q_3 to q_4 , (2) poultry demand in Brazil decreases from q_2 to q_1 , (3) poultry demand in the world market and Saudi Arabia increases from q_7 to q_8 (Saudi Arabia case) given the fact that imported poultry from Brazil costs less in the importing country's currency with prices declining from P_β to P_β^* , and (4) the quantity exported by competing exporting countries declines due to a loss in world market share to lower cost Brazilian exports. The domestic price in competing countries declines from P_γ to P_γ^* as exports decline from q_{10} to q_9 .

Welfare Changes Generated by Currency Devaluation

Welfare analysis was conducted to determine the benefits and losses to both poultry producers and consumers in Brazil using the data for periods before and after the currency devaluation

Table 2. Export Trade Matrix for Brazil During the Period 1998–99

Year	1998	1999	Change
Importer	MT	MT	%
Argentina	62,364	51,991	-8.34
European Union	69,922	88,456	+26.51
Hong Kong	72,444	101,522	+40.14
Japan	73,360	100,541	+37.05
Russia	16,582	9,880	-59.58
Saudi Arabia	167,994	217,165	+29.27
Singapore	20,942	25,808	+23.24
UAE	24,527	25,441	+3.72
Others	104,343	149,748	+43.52
Total	612,478	770,552	+25.81

Source: FAS Attache Reports.

(1998 vs 1999). It was expected that poultry producers would have an increase in producer surplus relatively greater than the loss in consumer surplus, given the fact that other factors also influence poultry demand. The loss in consumer surplus is represented by areas A and B in the chart in the far left (Figure 2). The gain in producer surplus is represented by areas A, B and C. Area D represents the higher costs of production because there has been a change in relative input prices. Areas A and B account for a consumer loss, due to higher poultry prices after devaluation.

Effects of Currency Devaluation on World Market and Shares

Production (or supply, since there were no imports and no stocks) increased by 15 percent and internal consumption increased by approximately 8 percent from 1998 to 1999 (Table 1). The increase in supply is consistent with the positive expectations in the poultry industry because of the favorable exchange rate. Broiler parent stocks increased nearly 15 percent for the 1998–99 period, being responsible for most of the increase in production (O'Connor). The increase in domestic consumption represents a sustained growth of the internal demand in Brazil that is showing some response to the recovery of its economy.

World Market for Brazilian Poultry

Poultry exports from Brazil increased by approximately 26 percent from 1998 to 1999 (Table 1). Major importers of Brazilian poultry are presented in Table 2. Imports from Bra-

zil increased considerably for the 1998–99 period, except for Argentina and Russia, which had political and economic difficulties of their own that may have caused poultry imports from Brazil to decrease. Argentina imported less poultry from Brazil for the 1998–99 period because both countries reached an agreement that Brazil would sell to Argentina only a maximum of 7 percent of the Argentine production. Argentine poultry production increased during the 1998–99 period (Shull). Russia imported less poultry from Brazil during the 1998–99 period, because Russia devalued its own currency in August 1998, making imports from any other markets (including Brazil) more expensive (Wiggin).

Saudi Arabia represents the largest importer of Brazil's poultry, followed by Hong Kong, Japan, and the EU. The increase in Saudi Arabia's imports is equal to approximately 29 percent in just one year. This is because Brazilian export prices fell an average of 40 percent from 1998 to 1999 (given the currency devaluation). Further, Brazilian chicken products are preferred by institutional customers, such as restaurants, in Saudi Arabia. Among the contributing factors for an increase in demand for Brazilian products we can list (1) the institutional trade tends to prefer broilers without the offal, and all imported frozen broilers from Brazil are without offal, (2) Brazilian suppliers guarantee smaller-sized birds which fit rotisseries used by restaurants, and (3) Brazilian chickens shrink less in rotisserie cooking because of lower moisture content compared to chickens from France and United States (Wilson).

Brazil represents the second largest exporter to Hong Kong, with a 9-percent market share. The United States is the largest exporter to Hong Kong, accounting for approximately 65 percent of the import market share (Wetzell). Brazil is one of the main exporters to Japan, EU, UAE and Singapore as well (Bean, Hommez, Verdonk, and Good, respectively).

Welfare Changes in Brazil's Post Devaluation Period

Using the data on Table 1 obtained from FAS, one can measure the welfare impacts from the

currency devaluation (O'Connor). Average annual internal prices changed from R\$ 0.88 in 1998 to R\$ 0.92 in 1999 at 1998 prices (inflation in Brazil for the period was estimated to be 4.36 percent using the IPCA, Consumer Price Index for Brazil, IPEA). Broiler production increased from 4.498 to 5.154 million metric tons. Domestic consumption increased from 3.886 to 4.200 million metric tons for the same period. Given the fact that price increased during the period studied, it was expected that internal consumption would decrease, but it actually increased, contradicting the fact that higher prices decrease consumption *ceteris paribus*.

There may be two reasons for this increase in demand: (1) income increased for the period 1998–99, which would tend to increase the demand for all meats; and (2) there may be a slope shift in the demand curve as well, if Brazilian consumers are substituting poultry for beef and pork because of poultry promotion and better prices for poultry relative to prices of beef and pork (O'Connor).

The change in producer surplus, areas A, B and C in Figure 2, is equal to the difference in internal prices for the 1998–99 period times the difference in poultry supplied for the same period. This area is equal to R\$ 193,040,000, which are approximately equal to US\$ 107,244,444 (exchange rate 1 US\$ = 1.80 R\$, IPEA). The change in consumer surplus, areas A and B, is equal to the difference in prices practiced internally for the 1998–99 period times the difference in poultry demanded for the same period.

As an illustrative tool (since the data does not allow us to compensate for the income and change in preferences on the demand function), if we assume that consumption decreases inversely proportional to the values reported by FAS, the area will be equal to R\$ 161,720,000 which is approximately equal to US\$ 89,844,444. Note that the loss for consumers is more than offset by producers' gains. Further, this is a rough estimate of what consumer surplus would be after exogenous factors, such as increases in personal income and relative increase in the price of substitute products (such as pork and beef). Area D is

equal to the difference in prices for the period 1998–99 times the difference in production for the same period divided by two. Area D is equal to R\$ 13,120,000 or approximately US\$ 7,288,889. Thus, the increase in the cost of production was relatively minor compared to the changes in producers and consumers' welfare.

Simulated Currency Devaluation Using GTAP

In 1992, Purdue University researchers established the Global Trade Analysis Project (GTAP) with the objective of lowering the cost of entry for those seeking to conduct policy and quantitative analyses of international economic issues in an economywide framework (Hertel). GTAP has become a fully documented, publicly available, global database and computable general equilibrium (CGE) model that government agencies have used to simulate changes in policies and their impacts on specific countries, regions, and the world markets. Its database is derived from government and non-government sources and the most current version uses a 1995 base year. This study uses GTAP as a simulation tool for its analyses.

Table 3 shows the regional and commodity aggregation for this study. The 45 regions of GTAP are combined into eight aggregates: Brazil, the United States, Japan, China, Hong Kong, the European Union (EU), Rest of Middle East (RME)—which includes Saudi Arabia and United Arab Emirates—and the rest of the world (ROW). The 50 GTAP commodities were aggregated into 10 groups: cereal grains nec (cereal), oil seeds (oil), other grains, non-grain crops (nongrain), livestock, bovine meat products (bovine meat), meat products nec (which includes poultry), other processed agricultural commodities (OPAC), mining and manufactures (MM), and services and activities (services).

While a currency devaluation shock cannot be directly modeled in GTAP, it can be proxied by simultaneously simulating impacts of an export subsidy and an import tax. A devaluation of the Brazilian currency can be rep-

resented by a subsidy on Brazilian exports and a tariff on Brazilian imports (Grennes, and Houck). Such shocks are available in GTAP and their intensity was determined by the percentage change in Brazil's currency relative to the United States' dollar for the same period. The export subsidy was set equal to 56.37 percent (change relative to the R\$/US\$ average exchange rate for the period 1998–99, IPEA) and the import tariff is set equal to 63.95 percent (change relative to the US\$/R\$ average exchange rate for the period 1998–99, IPEA).

Simulation Results

After incorporating the import tariff and export subsidy to the aggregated regions and commodities, simulation results show changes in trade quantities for all regions and products included in the model. These changes reflect the elasticities and base values that are incorporated in the database of GTAP and after the policy shocks that are simulated with the model. The results available from GTAP are extensive and there are many tables one can use to report various effects on every country or product. Because of the objectives of this study, the analysis is concentrated on two tables of results from GTAP—percentage changes in quantities of Brazil and the United States' exports of all commodities to the rest of the world.

Simulation results in Table 4 show percentage changes in exports of Brazilian products to major importers of Brazilian poultry. The results indicate that Brazil would capture market share in the world poultry market from importing countries relative to its competitors after the currency devaluation took place. Such increase of world market share can be seen in countries such as Japan for the 1998–99 period which is supported by country's preliminary data reported in Table 2. Japanese imports of Brazilian poultry increased by 35.11 percent (Table 4) compared to a real increase of 37.05 percent (Table 2). This increase in real exports for one year is also greater than that simulated for Hong Kong as well (32.88 percent in real data versus 40.14 percent using simulated GTAP results). For

Table 3. Regional and Commodity Aggregation

Regional Aggregation	Commodity Aggregation
1. Brazil	1. Cereal Grains nec (Cereal)
2. United States	2. Oil Seeds (Oil)
3. Japan	3. Other Grains
4. China	Paddy Rice
5. Hong-Kong	Wheat
6. EU	4. Nongrain Crops (Nongrain)
7. Rest of Middle East (RME)	Vegetables, Fruits, Nuts
Saudi Arabia	Crops nec
UAE	5. Livestock
8. Rest of the World (ROW)	Bovine Cattle, Sheep and Goats, Horses
Australia	Animal Products, nec
.....	Raw Milk
	6. Bovine Meat Products (Bovine Meat)
	7. Meat Products nec (Poultry)
	8. Other Processed Agricultural Commodities (OPAC)
	Wool, Silk Worm Cocoons
	Vegetable Oils and Fats
	Dairy Products
	Fishing

	9. Mining and Manufactures (MM)
	Forestry
	Coal
	Oil

	10. Service and Activities (Services)
	Electricity
	Gas Manufacture, distribution
	Water
	Construction
	Trade, Transport

Table 4. Effects of Currency Devaluation on Poultry Exports to World Markets (Sales in US\$ Million)

Exporter	Brazil			United States		
	Before	After	% Change	Before	After	%Change
EU	212.06	287.76	+35.70	78.36	78.13	-0.28
Japan	258.12	348.75	+35.70	879.06	868.30	-1.22
China	0.60	0.82	+36.09	36.68	36.67	-0.03
Hong Kong	113.46	150.77	+32.88	379.95	367.96	-3.16
RME	283.65	369.37	+30.22	74.31	69.6	-6.34
ROW	205.67	278.76	+35.54	1879.27	1868.03	-0.6

other countries, however, results vary. EU increased imports of Brazil's poultry by only 26.51 percent compared to 35.70 percent simulated by GTAP and UAE and Saudi Arabia (RME in GTAP) increased their imports by 29.27 percent and 3.72 percent respectively compared to 30.22 percent in GTAP's simulated results. Overall, the increase of Brazilian poultry exports are in the average equal to 33.78 percent (using a weighted average with 1998 imports from Brazil as weights, Table 4). This increase is greater than the one-year change in the real data of 25.81 percent (Table 3). Even though the simulated results exceed the first year percentage changes, there are a few factors that suggest this may be a reliable result: the analysis in GTAP is oriented towards a medium-run scenario and longer-run elasticities and responses often exceed short-run elasticities and responses, and there are other political and economic policy changes that are not incorporated in this model that would possibly modify the results if incorporated.

Simulated results for the United States are reported in Table 4 for the same set of countries presented for the Brazilian results. Simulated results indicate that the United States would decrease its exports to most importing countries after Brazil's currency devaluation. This is mainly due to the fact that Brazil's poultry is more competitive (i.e., cheaper) than importing countries. The highest decrease is seen in exports to RME (6.34 percent) and the lowest decrease is seen in exports to China (0.03 percent). Overall, the simulated decrease in exports is on the average of 1.17 percent (using a weighted average with 1998 imports from the United States as weights, Table 4). This decrease may not be large in absolute values, but when added to the increase in Brazil's exports, the market share reallocation is significant.

The projected gain in Brazil's international market share for poultry is shown in the interaction of the percentage change columns in Table 4. For all of the countries listed in Table 4, Brazil had considerable gains in poultry market share compared to the United States. Poultry exports from Brazil to all countries in-

creased while poultry exports from the United States fell considerably, denoting the loss in market share to Brazil.

Conclusion and Discussion

Even though currency devaluation can be harmful to the economy, increasing import prices of finished products to consumers as well as input costs to producers, such devaluation brought overall benefits to the Brazilian poultry industry, especially in the export market. Preliminary data suggests that Brazil increased market shares in the world poultry market, and the GTAP simulations suggest that these increases in market shares may be even larger in the long run. Welfare impacts are also positive, as shown earlier, given the fact that domestic consumption is still in the rise.

The United States and its poultry export development agencies may need to emphasize product differentiation promotions to try to regain some of the market share captured by Brazil. Given the first-year change in market shares and the longer term projections from GTAP, major losses can result for the United States poultry export market and industry.

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