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Assessment of the Distributive Impact of National and External Trade Reforms in Brazil*

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Abstract

This paper quantifies the distributional and poverty effects of national and external trade reform in Brazil using household survey data. We estimate the consumption and labor impact of the Mercosur trade reform following the methodology suggested by Porto (2006). In order to analyze the impact of external trade reforms over the Brazilian economy, we focus a major exported good: broiler. Results show that trade liberalization benefits more low income individuals. This result is largely explained by two major observations: the fact that consumption good prices decreased as Brazil enter Mercosur and a close to zero labor income effect. Additionally, we find that poverty indicators decreased after national trade liberalization (both for women and men). We obtained no significant inequality effects after national trade reforms. We analyze the impact on poverty and inequality of a 10% increase the broiler world price. In general terms, we find an increase in poverty of two points and no effect on income inequality.

Keywords: internal and external trade reform, poverty, inequality

JEL classification: F14, F16, D30, Q17

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1. Introduction

Trade liberalization and clear structural reforms have characterized Brazil's economic policy since the early nineties. It was in 1991, when Brazil initiated an ample programme of economic reform that has, over time, led to visibly more open trade and investment regimes. Thus, more neutral sector policies have been adopted and a more market-driven, decentralized environment has emerged through the deregulation of state monopolies and prices, investment liberalization, and privatization.

In 1991, the administration in place announced a series of tariff reductions to be phased in over the 1991-94 period. Additionally, although import licenses were not abolished, their approval became a relatively routine operation (most licenses were being issued within five working days). These were among the most far-reaching and significant reductions in Brazilian trade protection in several decades. The 1991 reforms implied, in many sectors, tariff reductions of about a third of their level in the early 1980s. Equally important, the reforms reduced the wide variability or dispersion of tariff rates that were once characteristic of Brazilian trade policy.

As Brazil entered Mercosur in the early nineties, the country embarked in a plan for tariff reduction at the regional and extra-zone levels. The coming years may imply further trade opening, particularly as the WTO Doha Development Agenda, the EU-Mercosur Association Agreement and other initiatives under negotiation will enter the implementation phase.

Brazil has continued to liberalize its economy and the overall trend in trade policy is clear. By the mid-1990s, Brazil had become a much more open economy. Even in the textbook case, traditional trade theory acknowledges that although the gains from trade might be positive for a country as a whole, they might not be distributed evenly across all the groups. There is nowadays an increasing concern throughout the region over the asymmetric distribution of costs and benefits of trade integration. One of the initial objectives of Doha was to ameliorate inequalities between rich and poor countries. In this context, it is fundamental to determine whether trade integration can be regarded as poverty reduction policy or, on the contrary, if it may be associated with intensified poverty effects.

Poverty reduction is an increasingly important consideration in the deliberations over bilateral and multilateral trade liberalization. Nowhere is this of greater concern than in Latin America, where poverty in the 1980's increased – a phenomenon often attributed

to policy liberalization**.** Regressive outcomes are more likely in the absence of complementary domestic reforms and policies that would help maximize gains from trade, protect the most vulnerable from transitional costs and ensure an equitable distribution of net gains. In order to design a domestic complementary agenda, it is therefore of the utmost importance to generate empirical evidence to determine the distributional impacts of trade liberalization.

Trade reforms cause direct changes in local relative prices which indirectly affect household's income, expenditure and welfare. On the expenditure side, net effects depend on product structure of the consumption basket and on whether individuals are net producers or net consumers. Changes in household's income are explained by the fact that the trade reforms imply a reallocation of resources between sectors, resulting in changes in factor prices, particularly wages. As we analyze both changes in prices and variations in income, we are able to determine the overall change in household welfare. Recently, promising trade economics literature is attempting to precisely measure the net effect of trade integration on income distribution and poverty, taking into consideration both income and expenditure effects (Giordano and Florez, 2007). In this context, this work seeks to expand the methodology used by Porto (2006) for the case of Argentina, and aims at completing the analysis for the biggest member of the regional integration agreement. This research work will contribute to the knowledge of the impact of trade liberalization on poverty and income inequality in the Latin American region.

By trade reforms we mean both national and foreign trade reforms. We consider that national trade reforms imply the removal of tariff protection on Brazilian imports. Foreign trade reforms refer to the possibility of local exports to access those markets in the developed countries (or elsewhere). When tariff reductions and import-quotas removals take place in third countries, the price of Brazilian exports to developed countries is positively affected. But trade liberalization plus enhanced market access does not necessarily equal poverty reduction. As a mean to measure the effect of trade liberalization on poverty and inequality, we plan to evaluate the impact of both national and foreign trade reforms on the head count ratio and on the Gini index.

A large body of work in the trade and poverty literature have used computable general equilibrium (CGE; see Harrison, Rutherford and Tarr, 2002 ; Decaluwé, Patry, Savard and Thorbecke, 1999). This modeling approach also captures the impact of any change in relative prices, not only on consumption, but also on earnings. Therefore, it

is well-suited to analyzing the links between trade and poverty. In our work we analyze the welfare effect of trade liberalization at the household level utiliting en econometric approach. We use data on tariff and price levels, individual (and household) characteristics and income levels in order to estimate the change in welfare due to changes in income and prices.

The objective of our research work is to assess the linkages between trade, poverty and inequality by analyzing the impact of trade liberalization through two main transmission channels: prices and income. Following the methodology developed by Porto (2006), the study first assess the implications of a given trade shock, i.e. a national or a foreign trade reform, in relative domestic prices of traded goods (imports and exports). Secondly, we analyze the response of labor income and consumption channels at the household level. This leads to the third step, which is the induced change in the head count poverty ratio and in the Gini index. Detailed data at the household level will be used to assess how inequality and poverty have evolved over time, across regions (e.g. urban areas compared to the rest of the country) and across different household types (e.g. ranked according to the education level; etc.). In connection to the analysis of the external trade reforms we focus in an important Brazilian export category: broiler.

Obtained results evidence that the gains for Mercosur range from 2% of the initial expenditure for high income individuals to 3.5% for low income individuals. Therefore, the impact of Mercosur is small and pro-poor. We observe that poverty indicators decreased after national trade liberalization (both for women and men). We obtained no significant inequality effects after national trade reforms. We analyze the impact on poverty and inequality of a 10% increase the broiler world price. In general terms, we find an increase in poverty of two points and no effect on income inequality.

2. Trade Reform in Brazil.

In Brazil, trade openness started at the end of the 1980s and was deepened at the beginning of the 1990s. In 1991, Brazil entered Mercosur, a Trade Agreement signed between the Argentine Republic, the Republic of Paraguay and the Republic of Uruguay (Treaty of Asuncion). Following the establishment of Mercosur, the average import tariff was further reduced to 12.6 per cent. The maximum tariff came down from 105 per cent, in 1990, to 32 per cent beginning on 1 January 1996 (excluding a few items).

The creation of Mercosur marked the acceleration in the fall of import tariffs and the long-term commitment that Brazil would continue the liberalization process. Table 1 presents information about Intra-Mercosur trade flows. Table 2 shows Brazil's Trade Openness Coefficient. Trade, as a percentage of GDP, remains is still low, compared to industrialized countries. There have been no major changes in the composition of Brazilian merchandise trade, the share of primary products in total exports declining only slightly with a corresponding increase in manufactured exports. Brazil remains the world's largest exporter of several agricultural products including coffee, orange juice and sugar. The United States and MERCOSUR, especially Argentina, are Brazil's most important markets, followed by the European Union (EU). The main suppliers to Brazil are, in decreasing importance, the EU, the United States, and Argentina.

Brazil is one of the world's major producers and exporters of agricultural products. Government intervention in the sector has decreased. Assistance to agriculture appears modest, especially in the context of market distortions introduced by the support provided to agriculture in other countries, a problem that remains of major concern to Brazil and other countries in Mercosur.

3. Inequality and Poverty in Brazil: the stylized facts

Poverty in Brazil is substantial. Brazil has the fifth largest population (170 million) and the eighth largest gross national product (GNP) in the world. Living conditions for Brazil’s 170 million people vary dramatically, and income disparities in Brazil are significant. There is an extensive literature on the distribution of well-being in Brazil – describing levels and dynamics of poverty and inequality outcomes; scrutinizing regional and sectoral disparities; and so on. An important stylized fact that emerges from this body of research is that, compared to other countries, Brazil is a clear outlier in terms of inequality and also accounts for a dominant share of the total number of poor in Latin America.

Poverty in Brazil still varies rather dramatically by region. The Northeast is the poorest region (particularly in the rural areas), followed by the North, the Center-West, the South and the Southeast, in that order. Given the large differences in overall population shares, the composition of poverty is biased towards the more populous Southeast.

In addition, high levels of inequality have been remarkably stable in Brazil. This striking persistence is part of what some authors refer to as “the unacceptable stability” of Brazil’s inequality. For example, Bourguignon, Ferreira and Leite (2002) indicate that, during the entire 1977–99 period, the Gini coefficient has never strayed outside the 0.58–0.62 range, except for an unexplained upward blip to 0.64 in 1989.

4. Methodology

From a theoretical perspective, the impact of trade on wage inequality could go in either direction. In a Heckscher-Ohlin model, workers should see wages increase relative to capital owners’ rents (alternatively, unskilled wages should go up relative to skilled wages) in a developing country relatively well-endowed with labor (or unskilled labor). In that case, workers would benefit relative to capital owners (or more skilled workers) and income distribution would improve. Under a specific factors model, however, workers that are unable to relocate to labor-intensive industries would lose, and the distributional impact of trade liberalization is ambiguous. Moreover, empirical studies show that the wage gap between skilled and unskilled workers may increase after trade and investment reform. This could occur, for example, if foreign-owned firms that begin operating in a developing country bring with them technology that increases the demand for skilled workers. In that case, the distributional impact is adverse.

This paper will study the link between trade, poverty and inequality by analyzing the impact of trade liberalization through two main transmission channels: prices and income. The first possibility is that price changes are explained by the new tariff levels that result from trade reforms. Price changes may affect individuals in different ways, for example, depending on the share of each good in their consumption basket, as suggested earlier, or if individuals are net producers (as in the case of farmers) or net consumers. A second possibility is changes in household income. This effect is explained by the fact that trade liberalization imply a reallocation of resources between sectors, resulting in changes in factor prices in the process.

4.1 Effects of National Trade Reform

To analyze the distributional impact of Mercosur on Brazilian households we use a model based on Dixit and Norman (1980) and extended by Porto (2006). The negative of the variation in exogenous income (Y^0) need to compensate household i to keep the

same utility after a change in the price of trade good k (k=1,…,4) because of the trade reform can be approximated by the following equation:

$$\frac{d Y_i^0}{dLn\tau_k}\frac{1}{e_i} = S_{ik}\frac{dLnP_k}{dLn\tau_k} + \sum_{n\in NT} S_{in}\frac{\partial LnP_n}{\partial LnP_k}\frac{dLnP_k}{dLn\tau_k} - \varepsilon_{wiP_k}\theta_{wi}\frac{dLnP_k}{dLn\tau_k} \qquad (1)$$

where Y_i^0 is the exogenous income of households i, τ_k is the tariff for traded good k, S_{ik} is the budget share spent on the good k by household i, P_k is the price of trade good k, P_n is the price of non traded good n, S_{in} is the budget share spent on the good n by household i, ε_{wiP_k} is the wage price elasticity with respect to traded good k and θ_{wi} is the share of labor income in total household income for household i.

The first term in equation (1) shows that for a given increase in the price of the trade good k, the higher the consumption share of that good the higher will be the income necessary to compensate the consumer. The budget share approximates the consumption effect. The second term of (1) shows the compensation generated by the change in the price of non trade good that is explained by the trade reform. Their importance is related also to the share spent on non traded goods. The first and second term in (1) approximate the consumption effect of the Mercosur. Finally, the last term is the labor effect. The trade reform, change the price of trade goods that change household wages. In order to assess the distributional effect to Mercosur we have to estimate the three terms of the previous equation.

It is important to notice that equation (1) captures only the direct effects of prices changes. Therefore equation (1) is valid only for small changes in prices (as in the case of Brazil).

In this study we restrict the analysis to four trade goods: food and beverages (FB), Clothing and footwear (CF), house equipment and electronics (HQ), other traded goods (OT) and four non traded goods: health and education (HE), transport and communications (TC), housing (HO) and other non traded goods (ON). In the Appendix A we describe each categories of goods.

4.1.1 Impact of tariffs on prices of traded goods

Initially, we will estimate the impact of tariffs on prices. Following Deaton (1997) it is possible to approximate the change in consumption explained by the changes in prices using the expenditures shares of each of the goods. Therefore, it will be considering only the direct impact and not other indirect effects. In order to quantify the distributional effects of these price changes there are two possibilities. The first one consists in the estimation of price indices for each individual in the survey, based on pre-trade reform expenditures shares with both prices. In a second step, the effects on individuals of the price change that is explained by the reforms will be quantified. The second approach following Deaton (1997) consists in a nonparametric estimation of expenditure shares across the entire distribution of consumption, and computing average market shares for different incomes. When using the second approach, results are highly dependant of a proper choice of the bandwidth.

In particular, the induced change in the price of trade good k after the trade reform is:

$$\Delta LnP_k = 0.5\sum_{l \in k} s_{lk}[\delta_{lm} Ln(1+\tau_{km}) + \delta_{kw} Ln(1+\tau_{krw}) - Ln(1+\tau_l^0)] \qquad (2)$$

where s_{lk} is the expenditure share of the sub category l in traded good k, δ_{lm} is the fraction of imports of good l coming from Mercosur and δ_{krw} is the fractions coming from the rest of the world. Equation (2) estimates the price change of traded goods from Mercosur.

4.1.2 Impact of prices of traded goods on the price of non traded goods

In order to estimate the impact of the prices of traded goods on the prices of non traded goods we will estimate the following translog equation:

$$LnP_{nt} = \alpha + \sum_{k \in T} \beta_k LnP_{kt} + \sum_{k \in T} \gamma_k LnP_{kt-1} + 0.5\sum_{k \in T}\sum_{h \in T} \phi_{kh} LnP_{kt} LnP_{ht} + 0.5\sum_{k \in T}\sum_{h \in T} \lambda_{kh} LnP_{kt-1} LnP_{ht-1} + u_t \quad (3)$$

We regress the prices on traded goods on monthly prices of the traded goods and their interactions. In order to avoid a spurious regression we check for cointegration between the variables included in equation (3).

4.1.3 Impact of prices on income

Some of the papers in this literature focus only on distribution effects of price changes after the reforms, without considering some import effects on the factor markets. This proposal seeks to quantify the impact of openness on total income. In addition the wage-price elasticity will be estimated. In particular we will regress the log of the real wage earned by person i against completed years of schooling (s), exogenous variables (z) such as age, marital status, children at home, region, etc, and the log prices of traded goods interacted with schooling and region.

$$Ln(w_i) = \alpha + \sum_k \beta_k Ln(p_i^k) + \gamma s_i + \delta z_i + \sum_k \lambda_k Ln(p_i^k) s_i + \sum_k \phi_k Ln(p_k^i) \mathrm{Re}gion_i + u_i \qquad (4)$$

Since the dependent variable, w_i, is a zero-censored variable the estimation of (8) should not be conducted using OLS. In that case, we would have obtained biased and inconsistent estimators of the impact of beef prices and of individual and geographic variables over labor income. Instead, we estimate the bias selection correction factor based on a Probit model in order to estimate labor market participation. Then incorporate the referred term into equation (8) but only for those wage levels that are strictly greater than zero.

Since it is likely that there is a large number of individuals who do not work (specially women) and therefore report zero wage it would not be appropriate to estimate equation (4), the wage equation, using OLS. Since the dependent variable is censored at zero, we only observe the wages of the employed individuals and estimation of the wage equation by OLS will simply yield inconsistent estimates. We allow the impact of the price of traded goods on wages to vary according to individual characteristics including schooling, age and geographical location of the household. This implies that the elasticities of wage and labor market participation with respect to prices vary from one individual to another, according to her age, schooling and geographic location. This is mandatory to estimate the impact of changes in prices on household wages at different points of the whole income distribution.

4.2 Effects of External Trade Reform

In order to analyze the impact of external trade reforms over the Brazilian economy, we focus a major exported good: broiler. The world main poultry producers are United States (USA), China, Brazil and the European Union (EU)[1]. Broiler is the main product in this sector and these countries are the principal producers too. Total poultry meat trade for 2007 is estimated approximately at 17,5 million tonnes. Broiler meat accounts for an 85% (volume base) of total poultry meat trade.

Although we only analyze how changes in the global market for broiler affect specific variables of the local economy, we understand that these results could be generalized to other exportable-goods items. Specifically, we will quantify the impact of trade liberalization in the global broiler markets over labor income, employment inequality and poverty levels in Brazil. First, we estimate how the change in global price impacts the price level in the local market. Second, using results obtained in the first stage, we estimate the impact of a 10% increase in the world broiler price over labor income, inequality and poverty.

We study the link between trade, poverty and inequality by analyzing the impact of trade liberalization through two main transmission channels: prices and income. The first possibility is that price changes are explained by the new tariff levels that result from trade reforms. Price changes may affect individuals in different ways, for example, depending on the share of each good in their consumption basket, as suggested earlier, or if individuals are net producers (as in the case of farmers) or net consumers. A second possibility is changes in household income. This effect is explained by the fact that trade liberalization imply a reallocation of resources between sectors, resulting in changes in factor prices in the process

4.2.1 The impact of changes in international prices on domestic prices

In this section, we aim to estimate the impact of variations in international prices on local price levels: what fraction of the change in global prices is transmitted to the local price levels? And, how long does the transmission process take? In this respect, we will test the long-term co-integration between international and domestic prices.

[1] These countries represents 90% of the total world exports (according to OECD data).

We work with an average national price. We estimate the following regression:

$$Ln(P_t) = \beta_0 + Ln(P_t^*)\ \beta_1 + u_t \qquad (5)$$

Equation (5) allows us to identify the long-term relationship between local and international prices. β_1 allows us to determine the referred relationship. In order to estimate co-integration, we conduct the ADF test over equation (5) residuals. Also, we are interested in testing the short term price dynamics so that we can identify the duration of the transitions process. We do this by estimating the following model of error correction:

$$Ln(P_t) - Ln(P_{t-1}) = \alpha + (Ln(P_t^*) - Ln(P_{t-1}^*))\ \delta + (Ln(P_{t-1}) - \beta_0 - Ln(P_{t-1}^*))\ \gamma + u_t \qquad (6)$$

Where local prices vary between t-1 y t due to changes in international prices for that period (response is indicated by δ) and due to the adjustment to the "long term equilibrium" level with a velocity of γ. In case, a co-integration relationship exists, equation (6) is valid since it deals only with stationary variables.

Based on equations (5) and (6) we obtain the local prices adjustment after a change in global prices (in an n-months time horizon). The interpretation is as follows: as world-prices increase by 1%, local prices vary by δ %. In the second period, a term for error correction (γ), is considered. The time horizon for the adjustment of local prices alter a shock in the world prices can be estimated as follows:

$$months_n = \beta_1 - (\beta_1 - \delta)(1+\gamma)^n \qquad (7)$$

4.2.2 The impact of changes in domestic prices on labor income

Some of the papers in this literature focus only on distribution effects of price changes after the reforms, without considering some import effects on the factor markets. In our work, we seek to quantify the impact of openness on labor income. In addition the wage-price elasticity will be estimated. In particular we will regress the log of the real wage earned by person i against completed years of schooling, exogenous individual variables, specific variables indicating geographic location of the household (per State), and the log of the broiler prices interacted with a sub-group of independent variables.

We estimate the following model at the individual level:

$$w_i = \beta_0 + Ln(p_t)\,\beta + \sum_d D_{d,i}\,\beta_d + \sum_d D_{d,i}\,\beta_d + \sum_x X_{x,i}\,\beta_x + u_i \quad (8)$$

where w_i is the logarithm of real wage per hour, p indicate domestic broiler prices, D indicate geographic variables (per state) and X are idiosyncratic individual variables. We indicate whether the individual is the household head, education level, employment status (and industry), marital status, number of children in the household with age 6 or below, number of people in the household with age between 6 and 14. As mentioned above, we estimated (8) by the Heckman two stage procedure.

6. Data

To undertake this study we use the annual Brazilian national household survey, Pesquisa Nacional por Amostra de Domicílios (PNAD), conducted by the Instituto Brasileiro de Geografía y Estadística (IBGE). Each survey wave contains approximately 350,000 persons from about 90,000 households. The PNAD is administered yearly with the purpose of generating an accurate picture of the urban and rural Brazilian employment situation along with the socio-economic characteristics of the population. We use PNAD data for estimating the price-wage elasticity for the 1995-2000 period.

We also use data from the Pesquisa de Orçamentos Familiares (POF), the national household expenditure and income survey (we use the 1996 wave). This survey identifies the consumption structure of an average family in Bazil. The survey is conducted every 10 years approximately and targets both rural and urban households. We use this data in order to estimate the consumption share of each of the relevant consumption categories for our study (food and beverage, clothes and footwear, furniture and electronics, other traded goods, health and education, transport and telecommunications, housing and other non-traded goods). POF also contains socio-economic information about Brazilian households. This fact is crucial for us, because it allows us to identify the consumption structure of households of the same socioeconomic group. We use this information in order to assess the impact of change in prices on changes in the value of the consumed basket of each household.

Asociación Latinoamericana de Integración (ALADI) provided historical information about the Mercosur common external tariffs for the period between 1986 and 2006. Secretaría del Mercosur (SM) provided data about intra-zone tariff levels (for the same

time horizon). Both ALADI and SM provided raw data at a per-item desegregation level. Our work consisted in identifying relevant expenditure categories and unifying disaggregated items into one of the four tradable goods categories so that we could process data from both tariffs and consumer price levels[2]. Additionally, ALADI and The Central Bank of Brazil (BCB) sourced our information about trade flows for the four-product categories with Mercosur and the rest of the world. We use this information in order to determine the impact of change in tariffs on prices of tradable and non-tradable goods. Information about price levels comes from the Consumer Price Index, constructed by IBGE.

6. Estimation of the effects of National Trade Reform

6.1 Impact of Tariffs on Traded Goods

Table 3 shows the evolution of tariff levels in Brazil since 1985. By the mid-eighties, the tariff levels in Brazil ranged between 11% and 59%. In 1991, Mercosur imposed a sharp reduction in the intra-zone tariff and a slightly decrease in the non-Mercosur tariffs. In particular, Brazil set intra-zone tariff levels at 0% for almost all good categories by 1996. The most significant decrease in the intra-zone tariff rate was in OT category (from 38% in 1992 to 0% in 1996). There were only a few exemptions like the sugar sector. Mercosur was an effective regional trade agreement to rapidly eliminate almost all intra-zone tariffs.

The situation is different with respect to the extra-zone tariff (Common External Tariff), where the reduction was minor. In 1985, extra-zone tariffs ranged between 58% and 11%. By 1996, the extra-zone tariff levels still oscillated between 12% and 33%. Brazil -and the Mercosur, in fact- did not move towards extra-zone tariffs elimination. Moreover, in specific cases (like the OT category) tariff rates show a reversal from the trend toward integration to the world economy.

In table 4 we estimate the induced change in tradable prices after Mercosur for the four categories of traded goods considered. We estimate the price change for the 1992-1996 period. Mercosur causes a decrease in the price of the four traded goods considered. It is remarkable that the price reduction was very similar across goods. The

[2] For information about the composition of each product category see appendix B.

highest decrease was for the other traded goods (5.7) and the lowest was for house equipment (3.4%).

Figure 1 shows the consumption effect for each of the traded good categories. Estimations are made as a Kernel regression. The effect is positive for all off the individuals. Additionally, we observe that for the case of poor individuals the consumption gain is higher than for richer individuals (see Figure 2). In particular, the consumption effect is clearly pro-poor for the FB and OT categories.

6.2 Impact of Tariffs on Non Traded Goods

To avoid the spurious regression problem we apply the Engle-Granger cointegration test (based on residuals) to determine the long term equilibrium cointegrating relationship between each of the prices of nontraded good and the prices of the traded goods.

In the first step, we use the ADF unit root test to analyze the stationary of the prices. Table 5 indicates that all the price variables are non stationary with a unit root. Next, we proceed to estimate the equation (3) by OLS and check for stationarity of the residuals. The result of the Engle-Granger based on residual cointegration tests is shown in Table 6: prices of non-traded and prices of traded goods are cointegrated. In other words, there is a stable long run relationship ion between both prices.

Figure 3 shows that the consumption effect of non traded goods is almost zero. We measure the variation in income needed to compensate each household to keep the same utility after a change in the price of non traded goods. In particular, the compensating variation of income (as percentage) is mildly negative. A negative change in the referred variable means that the household is worse off when compared to the pre-liberalization scenario. In the case of Brazil, this effect is almost insubstantial.

6.3 Wage-Price Elasticities

The Heckman selection model is estimated using maximum likelihood. All regressions include year and geographic location dummies. Estimates from this model allow us to calculate the impact of the price of trade goods on labor income and the impact of changes in prices of traded goods on the labor marker participation of each individual

in the sample. We also take into consideration the fact that men and women's labor market rewards may differ and we therefore separately estimate wage equations by gender. Our wage equations are limited to individuals aged 18 through 55.

Figure 4 shows that the labor effect of trade policy is small and close to zero.

One could think that this result can hide labor marker dynamics. For example, we can not disregard a hypothetical situation related to a person that change lost her job because of increase import competition and became employment in another sector at similar wage level. Our methodology does not allow us to identify this specific dynamics. However, Goldberg and Pavcnik (2003) provide evidence that labor force mobility across industries after trade liberalization in Brazil is limited.

6.4 Estimation of Total Effect

Figure 5 presents the estimation of the consumption and labor income effects. Trade liberalization had a clear positive impact for both the highly paid and those with the lower positions in the salary distribution. This particular –positive– effect is pro-poor. We observe that the total effect is mostly determined by the effect of the decrease of traded-goods prices after liberalization.

6.5 Poverty and Inequality Effects

We use the wage price elasticities estimated above to quantify the change in the head count ratio and income inequality indicators after Mercosur. Table 7 indicates poverty reductions for both men and women. Poverty alleviation is more substantial in the case of rural-female population and urban-male populations. Table 8 shows no significant changes in income inequality after reform. It is interesting to note that we observe a decrease in poverty buy income inequality remains constant.

7. Estimation of the Effects of External Trade Reform

First, we present results related to the price-transmission. Second, we show results related to the labor market participation and labor income.

7.1 Price Transmission

We aim to determine whether there is a permanent and long-term relationship between broiler domestic prices (paid to producers) and broiler global prices. We conducted a unit-root analysis, using the Augmented Dickey-Fuller test.

Table 9 presents the ADF results for variables expressed in levels and in differences. We analyzed both a model incorporating constant and trend and an alternative model without constant.

Results indicate that we cannot reject the null hypothesis about unit-root existence for the following series: the log of the price paid to the broiler producer; the log of the export price in Brazil; the log of the export price in USA and the log of the import price in Japan. So, we conducted ADF test for the growth rates of the prices levels. At this time, we were able to reject the null hypothesis at the 1% significance level. We conclude that series (in level) are integrated of order 1. This is to say that we are dealing with no stationary time series. So we proceeded to analyze the cointegration hypothesis between domestic and international prices.

We estimated cointegration for three relationships: domestic prices and export prices in Brazil; domestic prices and export prices in USA; domestic prices and import prices in Japan; In Tables 10 and 11 we present results for the cointegration test between (real) domestic prices in Brazil and the (real) international prices. We find that both prices are cointegrated at 1% significance level. We conclude that both international prices and domestic prices move together. Although the transmission is not perfect -β_1, from equation (5)- is 0.76 which is statistically significant different to 1 at the at 1% level.

We also analyzed the short-term price dynamics (Table 12). We find that adjustment to the long-term equilibrium price level takes 1 year1. We note that after 3 months that the external shock has appeared, only a 43% of the total impact has occurred; the total impact takes place after one year from the shock. We conclude the price adjustment occurs, but definitely at a moderate speed.

7.2 Selection models estimation

We used Heckman models for estimating wages for both men and women (and for the entire sample). Obtained results have the expected signs and are statistically

significant. Interestingly, results suggest that impact of global broiler prices over wage levels have the same signed for the cases of men and women.

7.3. Global price variations: Simulations

Table 13 presents the change in the probability of being employed under a 10% increase in the international price of broiler (a conservative estimate of the increase in the broiler international price because of the reduction in the OECD obstacles to the trade of broiler). For the case of men employed in the agricultural sector we see almost no impact for low educate males and a wage increase of 3% for medium and high educated males. For females in the agricultural sector we observe that variations are minor (less than 1%). This result is also observed for the case of women across a broad range of economics activities.

We analyze the impact on poverty and inequality of a 10% increase the broiler world price. In general terms, we find an increase in poverty of two points and no effect on income inequality. For example, the impact of broiler price changes over men and women are quantitative and quantitative similar. We observe a positive impact on poverty. The impact is higher for low educated individuals in non-agricultural areas.

We conducted simulations in order to evaluate the impact of variations in broiler prices over inequality levels. We conducted these analyses for the case of men and women, at the disaggregated level. We found that a 10% increase in international broiler prices has no impact on inequality levels[3] (Tables 15).

8. Concluding remarks

Although it is commonly believed that trade liberalization results in higher GDP, little is known about its effect on poverty and inequality. As many developing countries embrace trade integration as the remedy for all diseases, it is fundamental that liberalization could be analyzed from a broad range of perspectives (GDP growth, employment, poverty, inequality, etc).

[3] We calculated the poverty line by dividing the average income of the referred year by 2 (for each scenario).

In our work we focus on the poverty and inequality effects of the tariff reduction in Brazil after the creation of Mercosur (1991). We measure the negative of the variation in income needed to compensate each household to keep the same utility after a change in the price of tradable goods. A positive change in the referred variable means that the household has improved when compared to the pre-liberalization scenario. In this paper, we explore an issue largely documented in the literature: the effect of trade on poverty (and income inequality) depends largely on other policies being implemented simultaneously. The impact of trade on poverty reduction can be significantly enhanced (and the effects on inequality mitigated) by policies that increase the provision and access to skills and other productive assets for the poor.

We analyze the impact of trade integration on households welfare through various transmission channels: (1) reduced tariffs affect the price of tradable goods; (2) reduced tariffs impact the prices of non-tradable goods and (3) reduced tariff cause a reallocation of productive resources and changes on labour income. As said, when interpreting results, it is important to bear in mind that while intra-zone tariffs where slashed after Mercosur was in place, extra-zone tariffs slightly decreased in the 1992-2006 period. Also, note that while tariffs for the "food and beverage" category were drastically reduced in the initial Mercosur years, tariffs affecting other industrial sectors experienced a more "gradual" reduction.

Obtained results evidence that: i) the consumption effect of tradeable goods is pro-poor, ii) the consumption effect of non tradable goods is almost zero, iiii) the labor impact is negative but small. In sum, the total effect is pro poor but small. Results can be associated to the fact that tariff removals allowed for marked decreases in consumption good prices (in particular in the "Food and Beverages" category"). We identify that the decreasing prices dynamics implied a larger benefit for the poor than for the rich.

We consider that our analysis only accounts for first-order effects. The methodology employed does not allow for substitutions in consumption as relative prices change, i.e. consumption shares for each good-category are fixed. We conclude that the pro-poor results obtained constitute a lower bound for the total effect. Note that we identify a pro-poor effect related to the decrease in prices for the "Food and Beverages". The pro-poor effect would have been larger, in case we could take the substitution in consumption into account.

With respect to external trade reform we focus in an important Brazilian export: broiler. We find that the adjustment of local broiler prices after an external shock to the worldwide price levels is imperfect. Results show increase in poverty and no effect of income inequality after a 10% increase in the international broiler price.

We find interesting to compare our findings to other recent studies of trade liberalization and poverty in Latin America. While our finding of aggregate poverty reduction in Brazil due to trade liberalization appears to be in agreement with the recent findings of Harrison, Rutherford and Tarr (2002), the mechanisms underlying this reduction are quite different. A multiregion computable general equilibrium model is used to evaluate the regional, multilateral, and unilateral trade policy options of Mercosur from the perspective of the welfare of all potential partners in several proposed agreements. The focus for Brazil is on poverty impacts. Obtained results show that the poorest households in Brazil experience gains of 1.5--5.5 percent of their consumption, which are about three to four times the average gains for Brazil. They argue that the main determinant of poverty reduction is the change in the unskilled wage rate, relative to the basket of consumption goods for poor households. Hertel et al. find that, in *the short run*, the aggregate measure of poverty is reduced in Brazil and Chile, following multilateral trade liberalization.[4] Their finding is based on the fact that real unskilled wages fall in the case of Brazil. Poverty is instead reduced as a consequence of the increased agricultural profits that lift enough rural households out of poverty to offset the adverse impact on their urban counterparts. In our analysis, poverty is reduced due to a decrease in conmption-good prices.

Finally, it is important to note that other economic and political issues that occurred in the analyzed period have not been considered in our study. The employed methodology does not allow us to consider specific events that may have affected poverty and inequality indicators. In out study, we have not incorporated the impact of the "contagion effect" related to the 1998 financial crisis in the Emerging Markets and the 1999 devaluation, for example. We consider that both events have the potential to affect internal and export prices and to generate changes in poverty and inequality levels. Still, the employed methodology does not allow us to incorporate these issues to our analysis.

[4] The multilateral trade liberalization scenario involves complete elimination of merchandise tariff barriers as well as textile and apparel quotas in place in 1997.

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Tables and Figures

Table 1

Intra and Extra MERCOSUR Trade Flows

Thousand USD. Simple Average

	1995-2000	**2001-2006**
Intra-MERCOSUR Trade	35,464,482	34,620,294
Extra-MERCOSUR Trade	148,903,829	202,954,670
Total MERCOSUR Trade	184,368,311	237,574,964
Intra-MERCOSUR Trade (%)	19%	15%

Source: ALADI

Table 2. Trade Openess Coefficient

In %

1990-1994	13.41
1995-1999	13.40
2000-2004	21.02
2005-2007	21.52

Source: Central Bank of Brazil

Table 3
Tariff structure. Brazil

Simpled average	Food and Beverages	Clothing and foot	House Equipment and Electronics	Other Traded Goods
Intrazone				
1985	58	31	39	11
1992	16	25	26	38
1996	0	0	0	0
1999	0	0	0	0
2004	0	0	0	0
Extrazone				
1985	58	31	39	11
1992	16	25	26	38
1996	12	22	20	33
1999	15	23	20	20
2004	12	19	17	19
Weighted average by expenditure shares				
Intrazone				
1985	59	22	29	11
1992	18	27	27	32
1996	0	0	0	0
1999	0	0	0	0
2004	0	0	0	0
Extrazone				
1985	59	22	29	11
1992	18	27	32	32
1996	13	22	23	25
1999	16	24	23	22
2004	13	20	19	19

Source: ALADI

Table 4
Prices change from MERCOSUR

Category	Tariff 1992	Consumption share (%)	Intrazone Tariff 1996	Extrazone Tariff 1996	Price Change from MERCOSUR
Food and Beverages	18	58	0	13	**-4.95**
Clothing and foot	27	19	0	22	**-4.07**
House Equipment and Electronics	27	16	0	23	**-3.40**
Other Traded Goods	32	7	0	25	**-5.73**

Note: the price change in the last column is computed using equation (2)

Table 5
Unit-root Test: Tradable and Non-Tradable Prices
Lag Length on ADF chosen using Akaike Criterion

	Tradable Goods				Non-Tradable Goods			
Level	**FB**	**CF**	**HQ**	**OT**	**HE**	**TC**	**H**	**ON**
Constant and Trend	-1,49	-2,97	-0,26	-1,92	-1,22	-0,41	-1,12	-1,61
Constant	0,74	2,46	-0,54	-1,56	0,06	-3,06**	2,53	2,38
None	4,79	6,90	5,09	5,51	11,13	7,69	9,39	8,4
Log Difference								
Constant and Trend	-31,3***	-38,6***	-49,1***	-35,0***	-38,7***	-35,3***	-27,9***	-45,8***
Constant	-31,7***	-38,7***	-48,1***	-35,4***	-36,8***	-34,7***	-25,5***	-45,9***
None	-31,7***	-43,0***	-54,1***	-32,2***	-44,2***	-28,8***	-67,2***	-37,3***

* statistically different from 0 at the 10% level or better.
** statistically different from 0 at the 5% level or better.
*** statistically different from 0 at the 1% level or better.

Table 6 – Prices Cointegration
Engle-Granger Cointegration Test
Lag length on *ADF* chosen using Akaike Criterion

	Constant and Trend
Health and Education	-3,39*
Transport and Communications	8,83***
Housing	-6,27***
Other Non Tradable	-3,94**

* statistically different from 0 at the 1%
** statistically different from 0 at the 5%
*** statistically different from 0 at the 1% level .

Table 7. Poverty: Before and After Trade Reform

Headcount Ratio (P0), *Poverty* Gap Index (P1) and Squared *Poverty* Gap Index (P2)						
	Change P0		**Change P1**		**Change P2**	
1.- Men						
Total	-0.012	(**)	-0.008	(**)	-0.010	(**)
Education<=6 years	-0.010	(**)	-0.012	(**)	-0.002	(**)
Education 7-12 years	-0.019	(**)	-0.006	(**)	-0.006	
Education >12 years	0.000	(**)	0.000	(**)	0.000	
Rural	-0.014	(**)	-0.008		-0.005	
Non-Rural	-0.005		-0.012		-0.012	
Public	-0.008	(**)	-0.018	(**)	-0.006	(**)
Private	-0.032	(**)	-0.012	(**)	-0.005	
Non-Agricultural Sector	-0.025	(**)	-0.014	(**)	-0.009	(**)
Agricultural Sector	-0.005	(**)	-0.020	(**)	-0.020	(**)
2.- Women						
Total	-0.016	(**)	-0.003	(**)	-0.003	(**)
Education<=6 years	-0.027	(**)	-0.011	(**)	-0.005	(**)
Education 7-12 years	-0.004	(**)	-0.001		0.000	
Education >12 years	0.000		0.000		0.000	
Rural	-0.013	(**)	-0.004	(**)	-0.001	
Non-Rural	-0.032	(**)	-0.017		-0.009	
Public	-0.019	(**)	-0.008	(**)	-0.001	
Private	-0.012	(**)	-0.003		-0.009	
Non-Agricultural Sector	-0.014	(***)	-0.003	(**)	-0.001	(**)
Agricultural Sector	-0.041		-0.022	(**)	-0.011	(**)

Source: Author's estimations.

Notes: (**) statistically different from 0 at the 5% level or better.
Poverty line=half of mean laboral income

Table 8. Income Inequality: Before and After Trade Reform

Changes in Gini Index and Theil Index

	Gini change	Theil change
1.- Men		
Total	0.000	0.000
Education<=6 years	0.000	0.000
Education 7-12 years	0.000	0.000
Education >12 years	0.000	0.000
2.- Women		
Total	0.000	0.000
Education<=6 years	0.000	0.000
Education 7-12 years	0.000	0.000
Education >12 years	0.000	0.000

Source: Author's estimations.

Notes: (**) statistically different from 0 at the 5% level or better.
Poverty line=half of mean labor income

Table 9. Series Integration Order

Test Augmented Dickey Füller: unit root test

	Level (statistics)			First difference (statistics)		
Prices	Trend & Intercept	Intercept	None	Trend & Intercept	Intercept	None
Brazil						
Domestic Producers	-2.4778	-2.532	-0.975	-6.463***	-6.462***	-6.251***
International Prices						
Brazil Exports	-2.78	-2.758*	-0.659	-6.021***	-5.978***	-5.994***
USA Exports	-1.687	-1.695	-3.016	-4.813***	-4.830***	-10.118***
Japan Imports	-2.519	-2.557	-1.084	-4.697***	-4.728***	-4.689***

References: ** signifies statistically different from 1 at the 10% level or better, ** signifies statistically different from 1 at the 5% level or better, *** signifies statistically different from 1 at the 1% level or better*
Shaded cell refers to selected model through Akaike Criterion

Table 10. Engle and Granger Method. Broiler Market

Brazilian Domestic Producer Prices and International Prices

	Regression Equation		Residual Unit Root Test (ADF)		
			Level (statistics)		
International Prices	Coefficient	Std. Error	Trend & Intercept	Intercept	None
Brazil Exports	0.191**	0.082	-2.738	-4.042***	-4.018***
USA Exports	0.484***	0.054	-6.127***	-6.146***	-6.164***
Japan Imports	0.308***	0.048	-5.716***	-5.710***	-5.724***

References:
** signifies rejection of null hypothesis at the 10% level or better, ** signifies rejection of null hypothesis*
*at the 5% level or better, *** signifies rejection of null hypothesis at the 1% level or better*
Null hypothesis in regression equation: coefficient = 0
Null Hypothesis in residual test: coefficient = 1
Shaded cell refers to selected model through Akaike Criterion

Table 11. Johansen Cointegration Tests. Broiler Market

Brazilian Domestic Producers Prices and International Prices

	Intercept & No Trend		Intercept & Linear Trend		Intercept & Quadratic Trend	
International Prices	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Brazil Exports	**1.35**	**0.40**	1.35	0.41	**1.36**	**0.42**
USA Exports	**0.618*** **	**0.11**	0.615***	0.11	0.613***	0.11
Japan Imports	**0.7****	**0.13**	0.699**	0.13	**0.699****	**0.13**

References: ** signifies statistically different from 0 at the 10% level or better, ** signifies statistically different from 0 at the 5% level or better, *** signifies statistically different from 0 at the 1% level or better*
Bold signifies rejection of null hypothesis (i.e. cointegration equation exists) at the 5% level
Shaded cell refers to selected model through Akaike Criterion

Table 12a: Error Correction Mechanism

	USA export prices		Japan import price	
	Coefficient	Std. Deviation	Coefficient	Std. Deviation
Short run impact changes	0.059	0.081	0.02	0.083
Adjustment rate to long run eq	-0.305***	0.049	-0.24***	0.046

References: ** signifies statistically different from 0 at the 10% level or better, ** signifies statistically different from 0 at the 5% level or better, *** signifies statistically different from 0 at the 1% level or better*

Table 12b: Speed of adjustment

1) Johansen USA			
β1 =	0.618	1 month	0.229
δ =	0.059	3 months	0.430
γ =	-0.305	6 months	0.555
		12 months	0.611
		24 months	0.618
2) Johansen Japan			
β1 =	0.701	1 month	0.183
δ =	0.02	3 months	0.402
γ =	-0.24	6 months	0.569
		12 months	0.675
		24 months	0.700

Table 13: Changes in the Employment Probability after a 10% Increases in Boiler International Prices

By Activity Sector and Educational Level

	Education		
	Low	Medium	High
Men			
Sector			
Agricultural	0.0034	0.0307	0.037
Non Agricultural	-0.0038	0.0001	0.0032
Women			
Sector			
Agricultural	-0.003	0.0039	0.002
Non agricultural	-0.01845	-0.0039	-0.0059

Note: Based on the estimation of equation 8.

Table 14. Poverty: Before and After access to external markets (broiler)

Headcount Ratio (P0), *Poverty* Gap Index (P1) and Squared *Poverty* Gap Index (P2)			
	Change P0	**Change P1**	**Change P2**
1.- Men			
Total	+0.018 (**)	+0.007 (**)	+0.003 (**)
Education<=6 years	+0.032 (**)	+0.013 (**)	+0.006 (**)
Education 7-12 years	+0.005 (**)	+0.001	+0.000
Education >12 years	+0.000	-0.001	+0.000
Rural	+0.016 (**)	+0.005 (**)	+0.002 (**)
Non-Rural	+0.033 (**)	+0.021 (**)	+0.011 (**)
Public	+0.020 (**)	+0.008 (**)	+0.004 (**)
Private	+0.010 (**)	+0.002 (**)	+0.000
Non-Agricultural Sector	+0.029 (**)	+0.009 (**)	+0.003 (**)
Agricultural Sector	+0.057 (**)	+0.037 (**)	+0.020 (**)
No Broiler Producer (State level)	+0.020 (**)	+0.008 (**)	+0.004 (**)
Broiler Producer (State level)	+0.010 (**)	+0.002	+0.000
No Industry Transfomation	+0.035 (**)	+0.013 (**)	+0.006 (**)
Industry Transfomation	+0.018 (**)	+0.004	+0.002
2.- Women			
Total	+0.02 (**)	+0.005 (**)	+0.002
Education<=6 years	+0.037 (**)	+0.009 (**)	+0.003 (**)
Education 7-12 years	+0.001	0.000	-0.001
Education >12 years	0.000	0.000	0.000
Rural	+0.012 (**)	+0.002 (**)	+0.011 (**)
Non-Rural	+0.063 (**)	+0.017 (**)	+0.007 (**)
Public	+0.030 (**)	+0.007 (**)	-0.240 (**)
Private	+0.006 (**)	+0.001 (**)	-0.005

Non-Agricultural Sector	+0.011	(**)	+0.002	(**)	+0.001	(**)
Agricultural Sector	+0.080	(**)	+0.022	(**)	+0.008	(**)
No Broiler Producer (State level)	+0.023	(**)	+0.006	(**)	+0.002	(**)
Broiler Producer (State level)	+0.007	(**)	+0.001		+0.000	
No Industry Transfomation	+0.028	(**)	+0.007	(**)	+0.002	(**)
Industry Transfomation	+0.003	(**)	+0.000		0.000	

Source: Author's estimations.

Notes: (**) statistically different from 0 at the 5% level or better.
Poverty line=half of mean laboral income

Table 15. Income Inequality: Before and After access to external markets (broiler)

Changes in Gini Index and Theil Index

	Gini change	Theil change
1.- Men		
Total		
Education<=6 years	0.001	-0.001
Education 7-12 years	-0.002	-0.004
Education >12 years	-0.003	-0.003
Rural	-0.002	-0.007
Non-Rural	-0.001	-0.005
Public	-0.003	-0.010
Private	-0.002	-0.002
Non-Agricultural Sector	-0.004	-0.006
Agricultural Sector	0.002	0.001
No Broiler Producer (State level)	-0.002	-0.008
Broiler Producer (State level)	0.003	-0.007
No Industry Transfomation	-0.004	-0.006
Industry Transfomation	-0.002	-0.002
1.- Women		
Total		
Education<=6 years	0.001	0.000
Education 7-12 years	-0.002	-0.003
Education >12 years	-0.003	-0.003
Rural	0.000	0.000
Non-Rural	0.003	0.003
Public	0.000	0.001
Private	0.003	0.003

Non-Agricultural Sector	0.000	-0.001
Agricultural Sector	0.001	0.002
No Broiler Producer (State level)	0.001	0.001
Broiler Producer (State level)	0.001	0.000
No Industry Transfomation	0.001	0.001
Industry Transfomation	0.002	0.003

Source: Author's estimations.

Notes: (**) statistically different from 0 at the 5% level or better.
Poverty line=half of mean laboral income

Figure 1. Compensating Variation as % of Income by Income Distribution ($U) by Traded Good

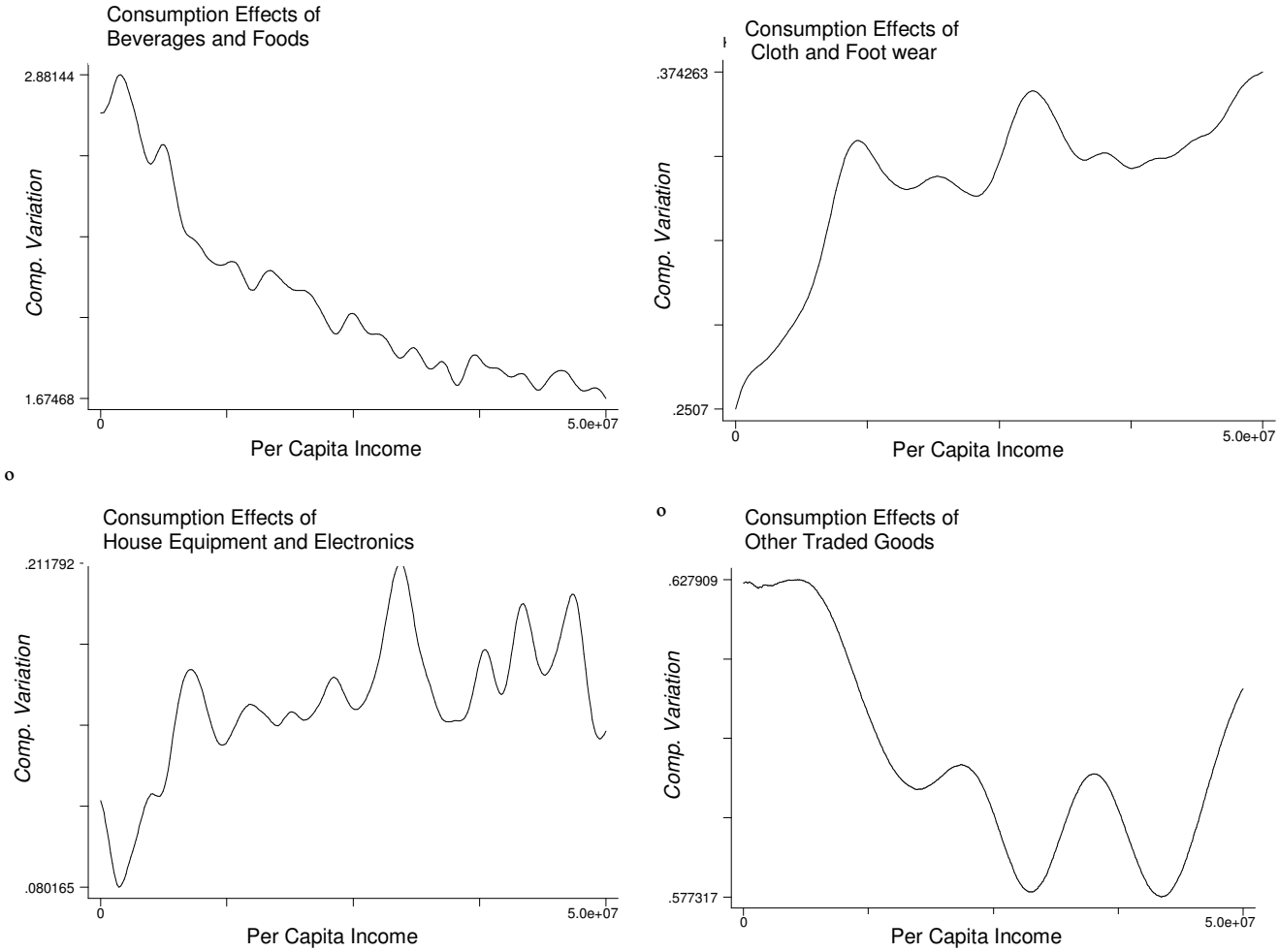


Figure 2. Compensating Variation as % of Income by Income Distribution Traded Good

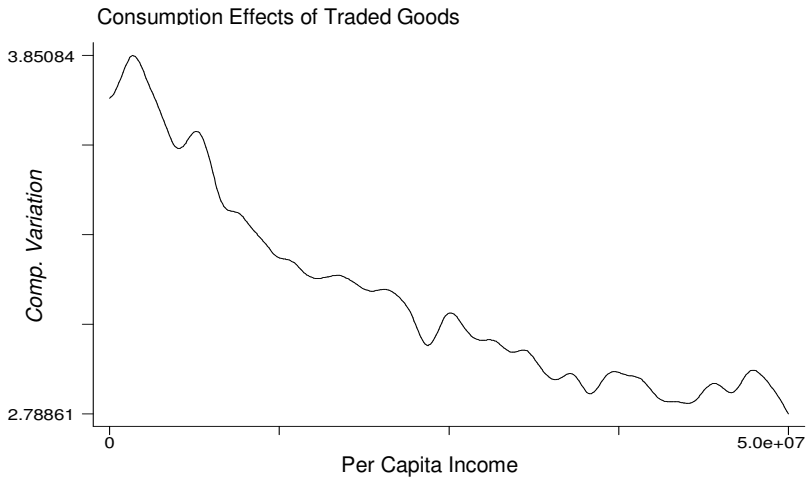


Figure 3. Compensating Variation as % of Income by Income Distribution
Non Tradeable Goods Effect

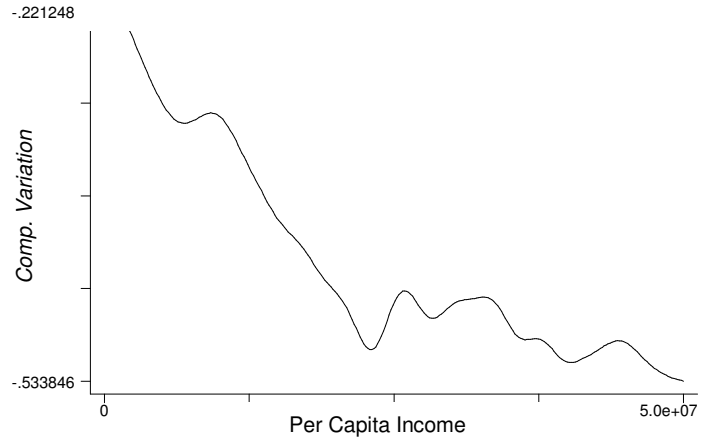


Figure 4. Compensating Variation as % of Income by Income Distribution
Labor Income Effect

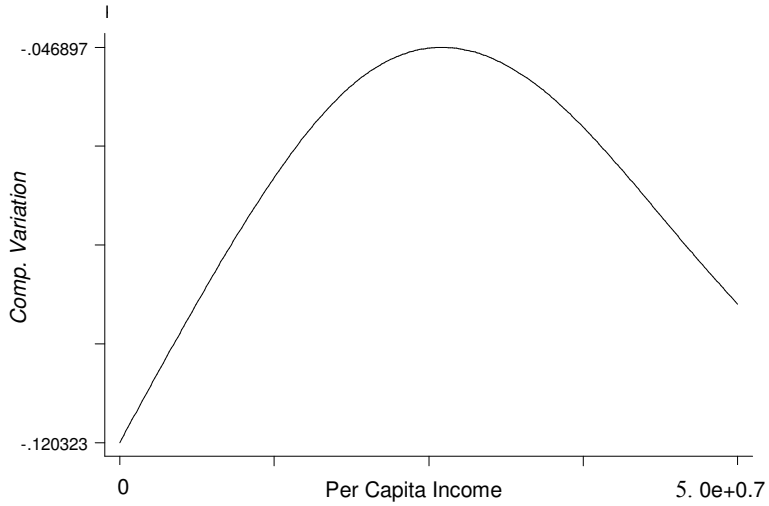
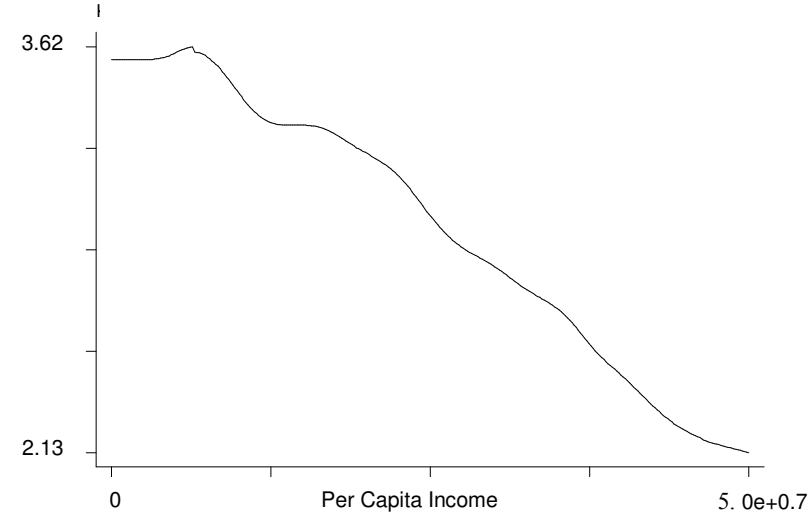


Figure 5.
Compensating Variation as % of Income by Income Distribution
Total Effect



Appendix

A: Data

Statitical Information		
Series	**Period**	**Source**
Trade Flows	1985-2004	ALADI
Tariffs	1985	ALADI
	1992-2004	SM
Expenditure Structure	1995-96	IBGE
Income		
CPI	1995-2006	IBGE

Appendix B: Tradable goods' categories

(%)	Tariff 1992	Consumption Share 1997	MERCOSUR Import Share 1996	Intrazone Tariff 1996	Extrazone Tariff 1996
Food and Beverages					
Bread, cookies and other bakers wares	25	12	50	0	17
Flour, rice and cereals	11	8	68	0	10
Pasta	36	1	40	0	16
Bovine and ovine meat	10	11	95	0	10
Fish and shellfish	14	1	36	0	11
Pork meat	10	1	1	0	10
Poultry meat	10	5	64	0	10
Preparations of meat	19	4	6	0	12
Dairy products	21	15	61	0	18
Eggs	20	1	34	0	7
Vegetable oils	10	1	-	0	11
Fats	10	0	80	0	12
Fresh vegetables, legumes and tubers	9	5	48	0	9
Fresh fruits	11	6	50	0	10
Sugar	20	5	39	3	17
Coffee	21	2	2	0	13
Alcoholic, non alcoholic beverages, juices and infusions	20	8	17	0	15
Elaborated or semi-elaborated food	31	11	40	0	17
Others (salt, seasoning products, etc)	11	3	3	0	10
Clothing and footwear					
Knitted and not knitted textiles	22	4	20	0	18
Clothes	30	68	18	0	20
Footwear	22	29	24	0	29
Housing equipment					
Furniture	25	42	20	0	19
Electrical appliances	28	49	19	0	29
Non-durable products	25	9	6	0	11
Other tradable goods					
Personal care products	20	49	66	0	17
Tobacco	40	36	6	0	20
Entertainment products	53	15	2	0	63

Source: ALADI and SM