

Assessment of the Distributive Impact of Trade Reforms in Uruguay*

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* We thank Marcela Arnaiz for excellent research asistense.

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Non-Technical summary

Although trade integration has potential benefits for developing countries, it is disputed whether trade liberalization processes are, per se, sufficient for poverty reduction and inequality abatement. Abundant work has analyzed the link between tariff reduction, poverty levels and inequality in both developed and developing countries. Gains from trade are generally observed. Still, those benefits from integration are unevenly distributed. So, one should be careful when comparing and generalizing results from different countries. The impact of trade integration on income levels should be analyzed on a case-by-case basis.

Uruguay has been embarked in a gradual trade liberalization process since the early seventies. As Uruguay entered Mercosur in 1991, the country reaffirmed its commitment to openness and trade. Still, Mercosur's original ideals have suffered reversals since the beginnings. State members have proved to be more driven by national (and nationalistic) interests than by a commitment to reinforce the Trade Agreement. In the end, the integration process has resulted in a sinuous path. In any case, when put in perspective, evidence shows an unambiguous tariff reduction in Uruguay in the last three decades. In our work we analyze the long-term poverty and income inequality effects of Uruguay's trade policy for the 1986-2006 period. We follow a methodology suggested by Porto (2003) in order to study whether the trade liberalization process resulted in poverty and inequality reduction or not.

Results show that average income increased along the liberalization process across the entire income distribution. We think that this result is important, indeed. For the case of Uruguay, talking about the income effect of trade liberalization should not be associated with the typical "winners and losers" scheme. Evidently, specific groups obtained higher benefits than others, but we could not find any evidence about absolute losers resulting from Mercosur. Broadly speaking, those with lower and higher levels of income received a significant portion of the "gains from trade". Results also show that those in the middle of the income distribution only received mild income increases after trade liberalization.

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I. Introduction

Marked trade liberalization and deeper regional integration have characterized Uruguay's trade policy since the early seventies. As Uruguay 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.

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.

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 project seeks to expand the methodology used by Porto (2003) for the case of Argentina, and aims at completing the analysis for the other full members of the regional integration agreement.

The project is consistent with the guidelines established in the IDB Regional Programming Document for Mercosur. In this context, the need to manage asymmetries in order to guarantee the political sustainability of the agreement and its contribution to equity and social cohesion is highlighted (paragraph 3.18e). The Bank's strategy aims at pursuing actions that limit the asymmetric impact of integration and at furthering equity objectives that promote greater social cohesion (paragraph 3.28). Moreover, the project is also well aligned with the objectives of the Trade and Poverty Trust Fund as it will contribute to the knowledge of the impact of trade liberalization on poverty and income inequality in the 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 Uruguayan imports. Foreign trade reforms refer to the possibility of local exports to access those markets in the developed countries (or elsewhere). For small open economies, like Uruguay, theory indicates that changes in world prices translate immediately to local price levels. Therefore, when tariff reductions and import-quotas removals take place in third countries, the price of Uruguayan 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, we plan to evaluate the impact of both national and foreign trade reforms on the head count ratio.

The objective of this technical research 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 (2003), 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, the studies will 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. This methodology will allow us to identify the new income that individuals would earn as a result of a policy change, in order to determine to which extent trade liberalization contributes to poverty reduction.

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.). Obtained results evidence that: (1) the decrease of tradable goods' prices largely benefited the lower-income segment of the Uruguayan population; (2) the dynamics of the non-tradable goods' prices had a clear pro-rich impact and (3) trade liberalization had a clear positive impact for both the highly paid and for those with the lower positions in the salary distribution.

II. Trade Reform in Uruguay.

The trade liberalization process that took place in Uruguay since 1980 can be classified in four periods. Average formal tariff decreased from a 30% level in 1980 to around 16% in 1983. From 1983 to 1990 it remained quite constant (it actually grew on a year-to-year basis in 1985 and 1990). The nineties marked an intense period of tariff reduction: average tariff went from 14% in 1990 to 8% in 1994. Since then, the average tariff level has been stable. We can conclude that in the last 25 years Uruguay has experienced two periods of marked tariff reduction (1980-1983 and 1991-1994) and two periods of tariff stability (1985-1990 and 1995-2005). When we observe the trade statistics, it is direct to conclude that Uruguayan trade flows show a sharp increase in the last 35 years. As shown in the Table 1, trade has particularly intensified in the last 10-15 years. It is interesting to note that while imports were 12% higher in 2004 than in 1995, exports grew by 28% in the same period.

In 1991, Uruguay entered Mercosur, a Trade Agreement signed between the Argentine Republic, the Federative Republic of Brazil, the Republic of Paraguay and the Eastern Republic of Uruguay (Treaty of Asuncion). The regional agreement fostered two main objectives: to eliminate any duties, charges and other restrictions applied to members' reciprocal trade and to begin a programme of gradual, linear and automatic tariff reductions for imports from third countries (not members of Mercosur). The Treaty of Asuncion allowed for a list of exceptions submitted by each of the States Parties. This list of exceptions should not be regarded as a minor detail since, in the end, it has represented a possibility to weaken the regional integration impulse. Since 1991, exceptions have created plentiful of disputes and negotiations among state parties, blocking further integration programs.

In any case, the creation of Mercosur marked the acceleration in the fall of import tariffs and the long-term commitment that the Uruguay would continue the liberalization process. At the early years of Mercosur, the administration in place made strong emphasis on finally concluding the liberalization process (started at the middle of the seventies), removing the remnants of the protectionism apparatus. For example, since 1991 the number of tariff categories was reduced from five to three. In this scenario, the Uruguayan trade policy imaged those requirements of the country's regional partners. The Ouro Preto Treaty was signed in December of 1994. The agreement established the institutional structure of Mercosur and defined a general procedure for complaints to the Mercosul Trade Commission, a body created to monitor the application of the common trade policy instruments. Although it was not originally intended, Ouro Preto also implied a change in the liberalization schedule within Mercosur and relaxed the speed of the liberalization process and changed the mechanism of convergence.

From January 1995, Mercosur began to operate like an imperfect customs union. Ideally, Mercosur would enable Uruguay to obtain preferential access to a large and close market. But at present there is a level of disenchantment with the integration process at Mercosur. Many Uruguayans feel that the integration process has been slow-paced, responding to specific interests from industrial lobbying groups from Brazil and Argentina. As an example, the proliferation of non-tariff barriers shows the low level of commitment to trade disciplines. This phenomenon has operated in a way that production specialization has not really occurred in Uruguay. At the beginning of the integration process it was possible to think about industrialization processes taking place in Paraguay or Uruguay in order to sell to Brazilian or Argentinean consumers. At this time, it is patent that few investors (local or multinational firms) really consider that intra-zone trade flows are as smooth as they are supposed to be. Table 2 presents information about Intra-Mercosur trade flows. At the extra-zone level, after more than a decade, the degree of compliance of national trade policies with the regional agreement is low. This is clearly observed when looking at current levels of the common external tariff in each country¹. Consequently the process is not meeting with universal free movement that should characterize a customs union.

¹ Additionally, another sign of Mercosur modest results at the extra-zone level is related to the low number of trade agreements signed with with third parties (countries or regions). In fact, it was only in 2007, that Mercosur (as a group) signed its first trade agreement with a extra-zone party (Israel).

III. Inequality and Poverty in Uruguay: the stylized facts

It is important to make clear that income inequality and poverty are different concepts. While income inequality refers to income distribution (a relative term), poverty refers to the relationship between (absolute) individual income and the poverty line. Poverty reduction may be associated to either higher income inequality or a more equal income distribution. It is broadly accepted that economic researchers and policy-makers should be concerned about both indicators of social welfare, when evaluating alternative policies.

Various studies have described the stylized facts of income distribution and poverty for Uruguay in the time horizon that we are considering. Bucheli and Rossi (1994) concluded that inequality was quite constant during the period 1984-1992. They concluded that inequality was quite constant during that period. Moreover, Rossi (2001) examined the evolution of inequality² and poverty in Uruguay between 1989 and 1997. His results show that wage inequality increased since 1991 and poverty levels increased between 1993 and 1997. This result is confirmed both for Montevideo and the rest of the urban country, especially since 1991. Also, Miles and Rossi (1999) and Gradin and Rossi (2000) obtained results indicating higher levels of inequality in Uruguay along the nineties.

With respect to poverty, the evolution for the 1989-1997 period, based in the headcount ratio, shows that poverty decreased before 1993 and then (slightly) increased (Rossi, 2001). Authors attributed that increases in poverty levels along the nineties could be related to growth problems, increased openness of the Uruguayan economy or to the process of decentralization in wage negotiation. Men and women show similar evolutions but women have an increase in their poverty relative men. Finally, poverty is more intensive in cities outside Montevideo than in the capital city. The poverty (headcount ratio) shows stability between 1997-2001, an increasing trend until 2004 and then a decreasing trend up to now (Vigorito 2007).

The figures show that the period of relative stability in tariffs (the eighties) coincides with period of relatively unchanged income distribution. As trade liberalization occurred (the nineties), wage and income inequality grew. Additionally, trade liberalization

² Rossi used the Gini coefficient, the Theil index and the coefficient of variation to measure inequality.

coincided with a period of increase in poverty in Uruguay. It is fundamental that we may investigate whether there is a statistical relation between changes in import tariffs and changes in income distribution and poverty. In particular, proper econometric analysis will allow us to identify the direction in which causality runs.

According to this study these changes in poverty and income distribution would not be associated with the opening to trade

IV. Methodology

A) Effects of National Trade Reform

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.

The project 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.

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.

To analyze the distributional impact of Mercosur on Uruguayan households we use a model based on Dixit and Norman (1980). The variation in exogenous income (Y^0) need to compensated household i to keep the same utility after a change in the price of trade good k ($k=1, \dots, 4$) because of the trade reform can be approximated by the following equation:

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

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 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.

The first term in equation (1) shows that for a given increase in the price of the trade good k , the higher the share 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.

i) Impact of tariffs on prices of traded goods

Initially, the project 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 Kernel function, bandwidth and finally the procedure selected to compute the standard errors (bootstrap).

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

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

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.

ii) 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:

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

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).

iii) 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.

$$\ln(w_i) = \alpha + \sum_k \beta_k \ln(p_i^k) + \gamma s_i + \delta z_i + \sum_k \lambda_k \ln(p_i^k) s_i + \sum_k \phi_k \ln(p_i^k) \text{Region}_i + u_i \quad (4)$$

B) Effects of External Trade Reform

In order to analyze the impact of external trade reforms over the Uruguayan economy, we focus a major exported good: beef. Although we only analyze how changes in the global market for beef affect specific variables of the local economy, we believe that these results could be generalized to other exportable-goods items. Specifically, we will quantify the impact of trade liberalization in the global beef markets over labor income, employment and poverty levels in Uruguay. First, we estimate how the change in global price impacts the price level in the local market. We follow a methodology similar to that developed by Porto (2003) in order to identify different effects across education levels and industries. Second, using results obtained in the first stage, we estimate the impact of alternative scenarios of trade liberalization over labor income, employment 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

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.

Given the fact that Uruguay is a geographically small and homogeneous country, we do not consider that it is necessary to work with prices per region. So, we work with an average national price. We estimate the following regression:

$$\ln(P_t) = \beta_0 + \ln(P_t^*) \beta_1 + u_t \quad (5)$$

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:

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

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:

$$\text{months}_n = \beta_1 - (\beta_1 - \delta)(1 + \gamma)^n \quad (7)$$

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 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, exogenous individual

variables, specific variables indicating geographic location of the household (per Department), and the log prices of traded goods interacted with a sub-group of independent variables.

We estimate the following model at the individual level:

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

where w_i is the logarithm of real wage per hour, p indicate domestic beef prices, D indicate Geographic variables (per Department) 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.

Since the dependent variable, w_i , is a zero-censored variable the estimation of (4) 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.

V. Estimation

A) Estimation of the effects of National Trade Reform

i) Impact of Tariffs on Traded Goods

Table 3 shows the evolution of tariff in Uruguay since 1985. By the mid-eighties, the tariff levels in Uruguay ranged between 43% and 55%. The early years of the nineties, implied a drastic reduction in tariffs: rates went down to an average of 22% in 1992³. In 1996, Mercosur imposed a sharp reduction in the intra-zone tariff and a slightly decrease in the non Mercosur tariff. The most significant decrease in the intra-zone tariff rate was in FB category (from 21% in 1992 to 5% in 1996). The reduction in the “other traded goods” category was the smallest, from 23% in 1992 to 11% en 1996. In

³ In those years, tariff rates differentials across imported goods became significantly more uniform.

1999, only four years after the initial Mercosur intra-zone tariff reduction, for all the categories of goods the intra-zone tariff was approximately zero. 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 common external tariff (extra-zone tariff), where the reduction was minor. Only for FB we observed an important reduction in the extra-zone tariff following Mercosur, from 21% in 1992 to 15% in 1996. We expect this decrease to cause an important improvement in income distribution and poverty alleviation because poor households have a higher consumption share for FB than the rich households. For the other three categories of goods we observe a minor reduction (around 3 points) in the extra-zone tariff. However in 1999, we observe a reversal in the trend of reduction of the extra-zone tariff and the tariff for CF, HE and OG return to their pre-Mercosur levels. There is a reversal in the trend toward integration to the world economy. In the FB sector the extra-zone tariff increase only one two points from 15% in 1996 to 17% in 1999. In this case we expect the effect of the extra-zone tariff reduction on income inequality and poverty because of the small tariff reduction. In 2006 Uruguayan extra-zone tariff was 14% for FB and approximately 18% for the other categories of goods.

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 highest decrease was for the other traded goods (6.1) and the lowest was for house equipment (4.7%).

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. However, for FB, HE and OG the consumption effect is pro poor. For the poor individuals the consumption gain is higher than for richer individuals. Figure 2 shows the pro poor consumption effect of traded goods.

ii) 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 stationarity 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 between both prices.

Figure 3 shows that the consumption effect of non traded goods is pro-rich. This fact can be explained by the effect of the change of the price of traded goods in the housing price.

iii) Wage-Price Elasticities

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.

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 market 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 is pro-poor. This fact can be explained by the effect of the change of the price of traded goods has the highest impact in the wage of the low income individuals.

iv) 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

v) 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. In Table 7 we observe a reduction in poverty for low educated persons located in the border and in the central regions of Uruguay. We do not observe differences by gender. 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.

B) 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.

B.1 Price Transmission

We aim to determine whether there is a permanent and long-term relationship between domestic prices (paid to producers) and global prices in the beef sector. 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 beef producer; the log of the export price in Brazil; the log of the export price in New Zealand. 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 Uruguay; domestic prices and export prices in Brazil; domestic prices and export prices in New Zealand; In Table 10 we present results for the cointegration test of (real) domestic prices and the (real) export prices in Uruguay. 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 $-\beta_1$, from equation (1), is 0.76-, the relationship is statistically significant at 1% level.

We also analyzed the short-term price dynamics. We find that adjustment to the long-term equilibrium price level takes 4 years. We note that after 3 months that the external shock has appeared, only a third of the total impact has occurred; only 2/3 of the total impact takes place after one year from the shock. We conclude the price adjustment occurs, but definitely at a pretty low pace.

B.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 beef prices over wage levels have opposite signed for the cases of men and women. Export prices negatively affect female average wage levels while it positively impacts wage levels among men (the impact over male wage is marginally more important). In both cases results are statistically significant. As we pay attention to the selection variable, we find that the impact is positive both for men and women. Again, the marginal effect is stronger among men. Total effect is also affected by interactions of different variables and beef prices.

B.3. Global price variations: Simulations

In this document, we consider thres scenarios suggested by Olarreaga (2006).

- Scenario 1: Doha Agreement (favorable), price increase of 3.9%
- Scenario 2: Free Trade Agreement with Europe, price increase of 5.6%
- Scenario 3: Free Trade Agreement with USA, price increase of 7.6%

We analyze the impact of an increase in the price of beef under the above mentioned scenarios. In general terms, we find that only in scenarios 2 and 3 there are statistically significant effects. For example, under Scenario 3 (Free Trade Agreement with USA) the impact of beef price changes over men and women are qualitatively different. In the case of men, there is a positive impact in labor income across education levels and industry. In particular, those who are highly educated and work in the agro-industrial sector are highly benefited in this scenario. In the case of women, there is a positive effect for labor income for those working in agricultural sector and related industries. Still, that effect is clearly lower than in the case of men. For women working in other industries, Scenario 3 implies a marked negative impact on wage levels.

We conducted simulations in order to evaluate the impact of variations in prices over poverty and inequality levels. We found that none of the considered scenarios imply a clear impact on poverty levels⁴ (Table 11). Instead, we observe changes on income inequality indicated by changes in the Gini and Theil coefficients under scenarios 2 and 3. In those cases, income becomes more evenly distributed among men and more concentrated in the case of women.

Table 12 presents the change in the probability of being employed under Scenario 3 (Free Trade Agreement with USA). In general, we observe that variations are minor (less than 1%). For the case of men employed in the agricultural sector we see a negative change in the probability of being employed. This result is also observed for the case of women across a broad range of economics activities.

⁴ We calculated the poverty line by dividing the average income of the referred year by 2 (for each scenario).

Conclusions and Policy Implications

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).

In our work we focus on the poverty and inequality effects of tariff reduction in Uruguay for the 1986-2006 period. We measure 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.

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 were 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: (1) the decrease of tradable goods’ prices largely benefited the lower-income segment of the Uruguayan population; (2) the dynamics of the non-tradable goods’ prices had a clear pro-rich impact and (3) trade liberalization had a clear positive impact for both the highly paid and for those with the lower positions in the salary distribution⁵. Going further, one could say that the evolution of the prices of housing, health and education negatively affected the lower income population, while the decrease of the “food and beverages” prices positively affected them. We think that these findings could have clear policy implications: as tariffs are reduced, the price of non-tradable goods became burdensome for the poor; if public

⁵ This explains the U-shaped curve in figure 5.

authorities aim to develop pro-poor policies, then efforts should target the housing, health and education categories⁶.

We also analyze results at the aggregate level (when changes of the prices of tradable and non-tradable goods and labour income are considered together). Results show that average income (actually, compensating income – as defined in equation (1)) increased along the liberalization process across the entire income distribution. We think that this result is important, indeed. For the case of Uruguay, talking about the income effect of trade liberalization should not be associated with the typical “winners and losers” scheme. Evidently, specific groups obtained higher benefits than others, but we could not find any evidence about absolute losers resulting from Mercosur. In sum, the question about the impact of trade liberalization over poverty and income can be answer with a common place: (mild) gains from trade. While not evenly distributed among the income distribution, benefits from trade spread in every Uruguayan household.

With respect to external trade reform we focus in the most important Uruguayan export: the beef sector. The adjustment of local beef prices after an external shock to the worldwide price levels is imperfect. Estimations indicate that 76% of a certain shock to the export prices is transmitted to the price paid to the local producers. Short-term local price dynamics show that the transmission is pretty low paced. One year after the shock, only 2/3 of the long term effect has occurred. Price changes after trade liberalization (under alternative scenarios) imply that men become better off (in terms of earned real wages), in particular those who are highly educated and work in the agricultural sector. For the case of women, increases in labor income after trade liberalization are mild (or negative, in specific cases). We do not observe poverty impacts after trade liberalization (in the three proposed scenarios). Additionally, changes in employment levels are almost immaterial. Yet, we find that there are specific inequality effects under some scenarios. In particular, for Scenarios 2 and 3, we conclude that income concentration is lower in the case of men and higher for the case of women.

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⁶ The negative impact for the poor through the non-tradable goods' prices is explained by the evolution of the housing prices.

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Tables and Figures

Table 1. Trade Openness Coefficient

In constant terms. In %.	
1970-1979	39.6
1980-1989	47.4
1990-1999	76.8
1995-2004	80.5

Source: Central Bank of Uruguay

Table 2		
Intra and Extra MERCOSUR trade flows		
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 3
Tariff Structure. Uruguay
<i>Simpled average</i>

	Food and Beverages	Clothing and Foot	House Equipment and Electronics	Other Traded Goods
Intrazone				
1985	43	55	53	49
1992	21	23	21	22
1996	4	7	5	11
1999	0	0	0	0
2006	0	0	0	0
Extrazone				
1985	43	55	53	49
1992	21	23	21	22
1996	14	21	19	19
1999	15	22	21	22
2006	12	19	18	17
Weighted average by expenditure shares				
	Food and Beverages	Clothing and Foot	House Equipment and Electronics	Other Traded Goods
Intrazone				
1985	44	53	48	50
1992	21	24	21	23
1996	5	9	6	11
1999	0	0	0	0
2006	0	0	0	0
Extrazone				
1985	44	53	48	50
1992	21	24	21	23
1996	15	21	18	18
1999	17	23	21	21
2006	14	20	18	17

Source: ALADI and Secretaría del Mercosur.

Table 4
Prices Change from MERCOSUR

Category	Tariff 1992	Consumption Share 1994-95	Intrazone	Extrazone	Price Change from MERCOSUR
			Tariff 1996	Tariff 1996	
Food and Beverages	21	62	5	15	-5.1
Clothing and Footwear	24	15	9	21	-4.8
House Equipment	21	13	6	18	-4.7
Other Traded Goods	23	10	11	18	-6.1

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

Table 5

**Unit-root test: Tradable and non-tradable prices
ADF performed with 12 lags**

	Tradable Goods				Non-tradable Goods			
Level	FB	CF	HQ	OT	HE	TC	H	ON
Constant and Trend	-1,73	-2,11	-1,50	-1,67	-2,43	-1,42	-1,40	-1,66
Constant	-2,30	-2,10	-1,74	-1,69	-2,77*	-3,29**	-1,08	-1,80
None	0,03	-11,00	0,41	0,38	0,91	1,52	-0,58	0,19

Log Difference

Constant and Trend	-3,05	-2,57	-3,90**	-2,08	-3,65**	-3,21*	-1,75	-3,23*
Constant	-1,86	-3,43***	-4,13***	-4,39***	-3,74***	-3,13**	-2,76*	-4,99***
None	-2,81***	-4,33***	-4,59***	-5,38***	-4,70***	-3,89***	-4,48***	-6,43***

* 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
ADF performed with 12 lags**

	Constant and Trend
Health and Education	-6,07***
Transport and Communications	-4,25***
Housing	-4,16**
Other Non Tradable	-4,85***

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

Table 7. Poverty: Before and After Trade Reform**Headcount Ratio**

	Before	95% Confidence Interval	After (New Poverty Line)	95% Confidence Interval
1.- Men				
Total	0.126	0.125-0.128	0.106	0.104-0.107
Education<=6	0.238	0.234-0.242	0.202	0.199-0.205
Education 7-12	0.103	0.101-0.105	0.085	0.082-0.087
Education >12	0.015	0.014-0.016	0.011	0.010-0.012
Montevideo	0.041	0.039-0.041	0.033	0.032-0.034
Border	0.302	0.297-0.307	0.253	0.248-0.258
South	0.114	0.111-0.117	0.096	0.093-0.099
Central	0.276	0.269-0.283	0.233	0.227-0.340
2.- Women				
Total	0.072	0.071-0.073	0.057	0.056-0.058
Education<=6	0.146	0.143-0.149	0.119	0.116-0.121
Education 7-12	0.051	0.050-0.053	0.038	0.037-0.039
Education >12	0.002	0.002-0.003	0.001	0.001-0.001
Montevideo	0.013	0.012-0.014	0.008	0.008-0.009
Border	0.215	0.211-0.220	0.176	0.171-0.180
South	0.053	0.050-0.055	0.039	0.037-0.041
Central	0.146	0.140-0.152	0.117	0.112-0.122

Note: Authors estimation.

Table 8. Income Inequality: Before and After Trade Reform				
Gini Index				
	Before	95% Confidence Interval	After	95% Confidence Interval
1.- Men				
Total	0.277	0.277-0.278	0.277	0.276-0.278
Education<=6	0.21	0.209-0.212	0.21	0.209-0.211
Education 7-12	0.225	0.224-0.226	0.225	0.224-0.226
Education >12	0.239	0.237-0.241	0.239	0.239-0.241
Montevideo				
Border	0.244	0.243-0.245	0.244	0.243-0.245
South	0.246	0.244-0.248	0.246	0.244-0.249
Central	0.228	0.226-0.230	0.228	0.226-0.230
Central	0.247	0.243-0.250	0.247	0.243-0.250
2.- Women				
Total	0.229	0.228-0.230	0.229	0.228-0.230
Education<=6	0.194	0.193-0.195	0.194	0.193-0.195
Education 7-12	0.198	0.197-0.199	0.198	0.197-0.199
Education >12	0.189	0.188-0.191	0.189	0.188-0.191
Montevideo				
Border	0.201	0.200-0.202	0.201	0.201-0.202
South	0.198	0.195-0.199	0.198	0.196-0.199
Central	0.188	0.187-0.190	0.188	0.187-0.190
Central	0.19	0.188-0.193	0.19	0.188-0.193

Note: Authors estimation.

Table 9. Unit-root test – ADF		
	Levels	Differences
Domestic price paid to producer	-3.01	-5.47***
Export prices	-1.63	-3.86***
Export prices in Brazil	-1.99	-7.43***
Export prices from New Zeland to USA	-1.6	-10.48***

Note: *** null hypothesis is rejected at 1% significance level, ** null hypothesis is rejected at 5% significance level, * null hypothesis is rejected at 10% significance level, al 1%.
Critical values are -3.14 at 10%; -3.43 at 5% and 4.00 at 1%.
The number of lags was estimated using Akaike

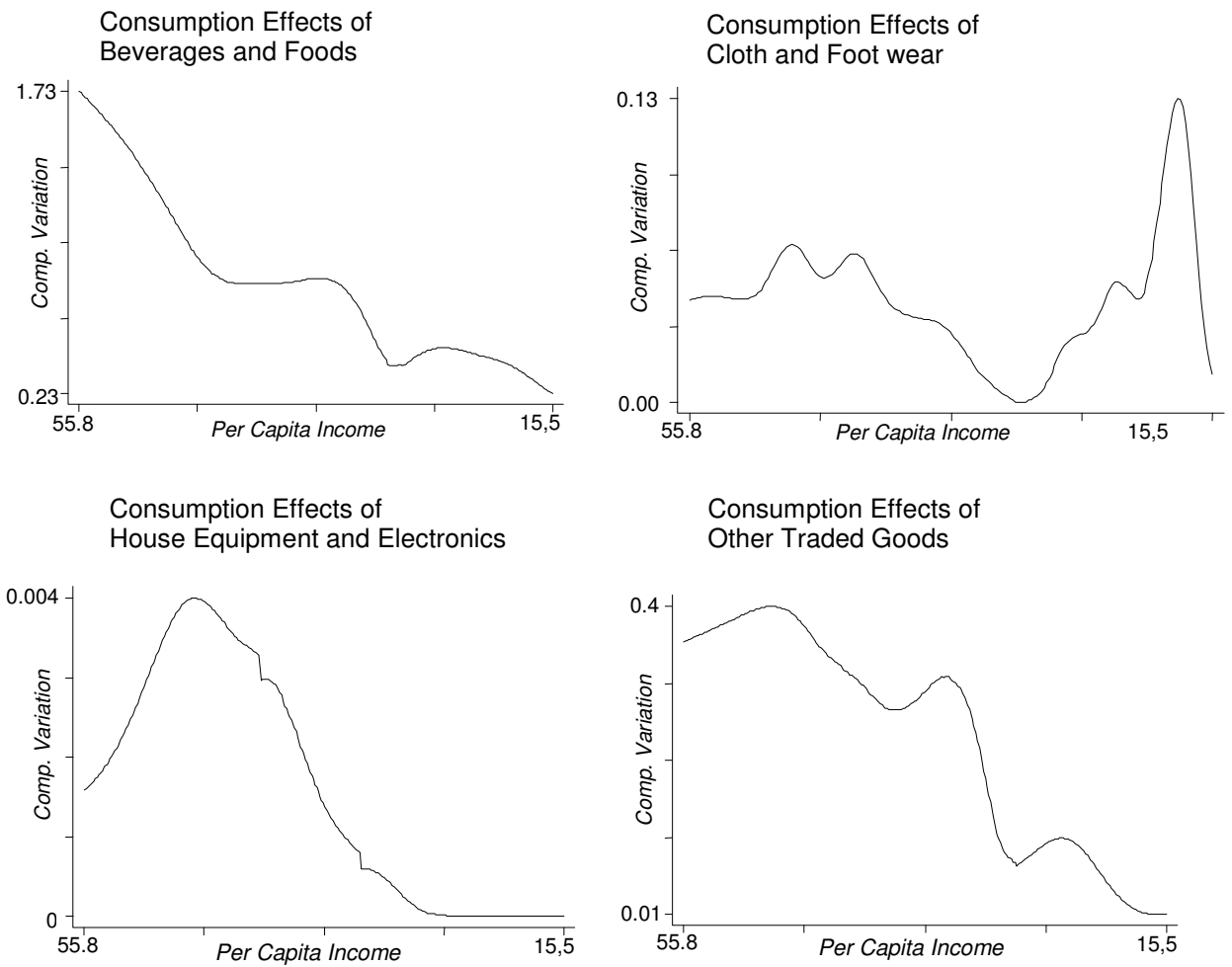
Table 10. Engle-Granger: Cointegration Test				
<i>Dependent Variable: average domestic price paid to producer</i>				
Variable	Coefficient	Std. Error	Ratio-t	Prob.
Constant	0.35	0.10	3.45	0.0007
Export Prices in Uruguay	0.76	0.04	21.35	0
ADF Teston residuals			-6.10	0.0000
Critical value at 1% level is 4.				
Error Correction Model				
Constant	0.00	0.00	0.89	0.38
Short-term adjustment	0.22	0.06	3.91	0.00
Long-term adjustment	-0.06	0.04	-1.69	0.09
Speed of adjustment				
3 months	0.32			
6 months	0.40			
1 year	0.51			
1 and a half years	0.59			
2 years	0.65			
3 years	0.71			
4 years	0.75			

Table 11: Poverty and Inequality effects of Liberalization in the Beef International Trade				
Alternative Scenarios				
	Base Scenario	Scce. 1 3.9%	Scce. 2 5.6%	Scce. 3 7.6%
<i>Inequality</i>				
Gini Men	0.4052	0.402	0.401*	0.399*
Theil Men	0.2662	0.262	0.260*	0.258*
Gini Women	0.3513	0.355	0.3565*	0.359*
Theil Women	0.2004	0.204	0.206*	0.209*
Poverty				
Poverty ratio (P0)	0.296	0.296	0.296	0.297
Poverty Gap (P1)	0.116	0.117	0.117	0.117
Poverty Gap – Squared (P2)	0.060	0.061	0.061	0.061
Note: * indicates that result is statistically different from the base scenario at 5% significance level.				

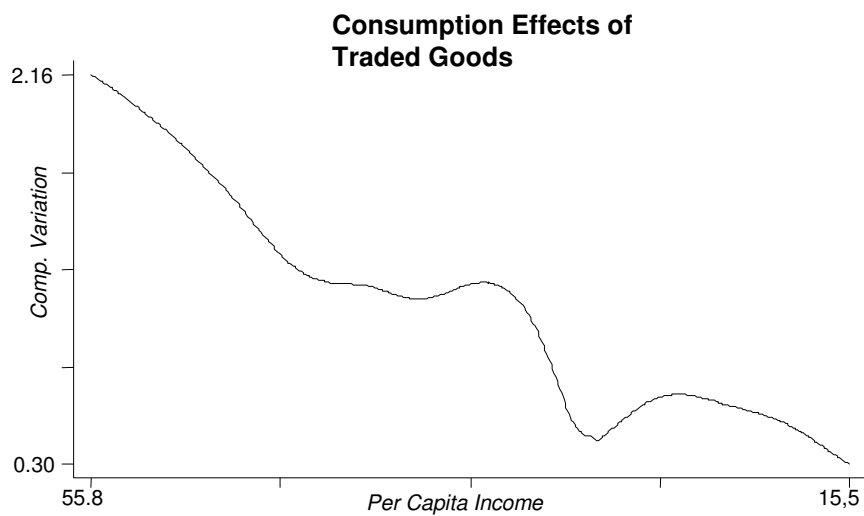
Table 12: Change in the probability of being employed alter a Free Trade Agreement with USA

By activity sector and educational level			
	Education		
	Low	Medium	High
<i>Men</i>			
<i>Industry / Sector</i>			
Agroindustrial	-0.28	-0.24	-0.13
Beef – Industry	0.15	0.05	0.00
Other – Industry	0.30	0.20	0.13
Other Sector	0.22	0.15	0.14
<i>Women</i>			
<i>Industry / Sector</i>			
Agroindustrial	0.29	0.15	0.03
Beef – Industry	0.47	0.34	0.09
Other – Industry	0.61	0.50	0.28
Other Sector	-0.04	-0.13	-0.24

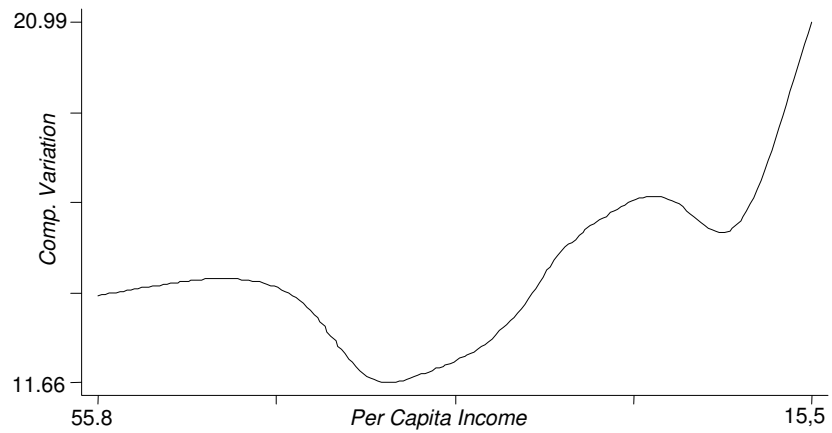
**Figure 1. Compensating Variation as % of Income by Income Distribution (\$U)
by Traded Good**



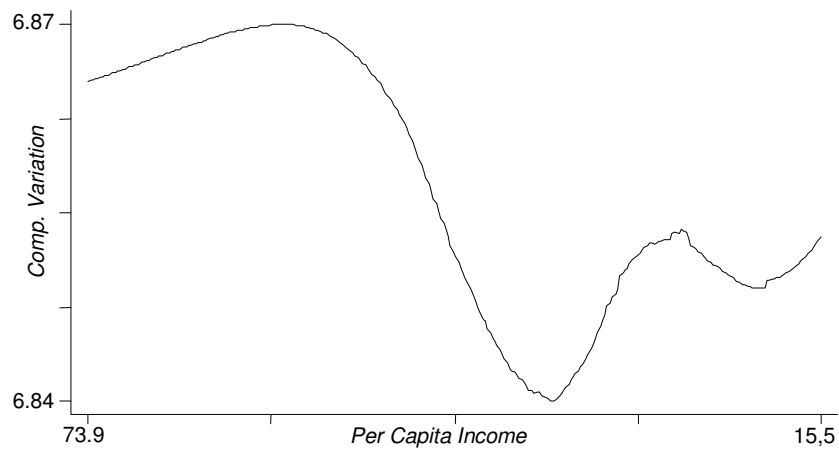
**Figure 2. Compensating Variation as % of Income by Income Distribution (\$U)
Traded Good**



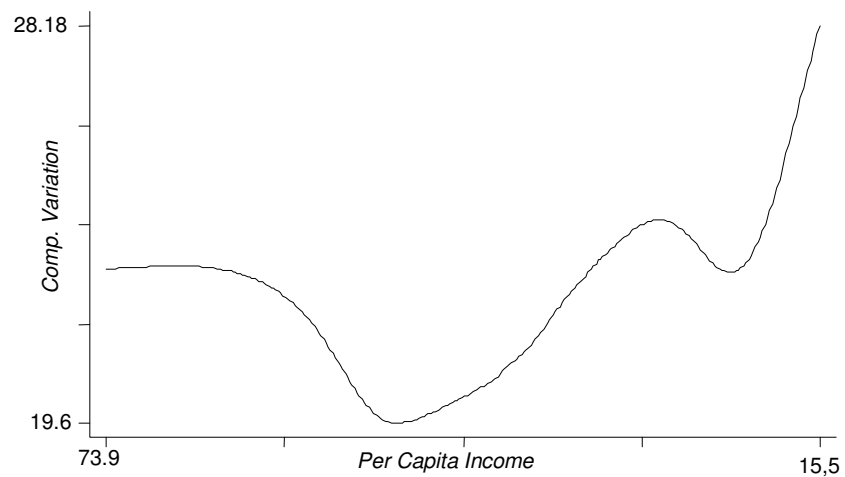
**Figure 3. Compensating Variation as % of Income by Income Distribution (\$U)
Non Tradeable Goods Effect**



**Figure 4. Compensating Variation as % of Income by Income Distribution (\$U)
Labor Income Effect**



**Figure 5. Compensating Variation as % of Income by Income Distribution (\$U)
Total Effect**



Appendix A: Data

To undertake this study we use the annual Uruguayan national household survey, Encuesta Continua de Hogares (ECH), conducted by the Instituto Nacional de Estadística (INE). Each survey wave contains approximately 56,000 persons from about 18,000 households. The ECH is administered throughout the year with the purpose of generating an accurate picture of the urban Uruguayan employment situation along with the socio-economic characteristics of the population. We use ECH data for estimating the price-wage elasticity for the 1990-2001 period.

We also use data from Encuesta Nacional de Gastos e Ingresos de los Hogares (ENGIH), the national household expenditure and income survey (we use the 1996 wave). This survey identifies the consumption structure of an average family in Uruguay. The survey is conducted every 10 years 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). ENGIH also contains socio-economic information about Uruguayan 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) and Uruguay's Ministry of Finance (MF) 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 desagregation 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 levels⁷. Additionally, ALADI and The Central Bank of Uruguay (BCU) 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 INE.

⁷ For information about the composition of each product category see appendix B.

Statistical Information

Series	Period	Source
Trade Flows	1985	ALADI
	1992	CBU
	1996	CBU
	1999	CBU
	2006	CBU
Tariffs	1985	ALADI
	1992	Marcel Vaillant (2000)
	1996	SM
	1999	Marcel Vaillant (2000)
	2006	MF
Expenditure Structure	1996	ENGIH (INE)
Income	1991-2000	ECH (INE)
CPI	1991-2000	INE

Appendix B: Tradable goods' categories

	Tariff 1992	Consumption Share 1996	MERCOSUR Import Share	Intrazone Tariff 1996	Extrazone Tariff 1996
Food and Beverages					
Bread, cookies	22	13.23	0.81	11	17
Flour, rice and cereals	20	1.42	0.68	0	10
Pasta	21	2.33	0.59	12	16
Bovine and ovine meat	23	9.56	0.45	0	10
Fish and shellfish	19	1.49	0.15	0	11
Pork meat	17	0.40	0.98	0	10
Poultry meat	18	2.25	0.00	0	11
Preparations of meat	22	3.88	0.68	2	12
Dairy products	19	8.74	0.37	5	18
Eggs	22	1.20	0.71	0	12
Vegetable oils	17	1.12	1.00	7	14
Fats	24	0.62	1.00	18	19
Fresh vegetables, legumes	20	6.75	0.27	3	10
Chilled and frozen vegetables	24	0.67	0.43	3	12
Fresh fruits	22	4.19	0.19	1	11
Preparations of fruit	24	0.41	0.71	3	12
Sugar	21	0.87	0.89	5	17
Coffee	21	0.63	0.87	0	13
Tea	15	0.31	0.47	0	10
Yerba mate	14	1.21	1.00	0	10
Cocoa and cocoa preparations	22	0.15	0.75	10	16
Fruit juices	23	0.56	0.79	0	14
Water and soft drinks	22	9.27	0.63	9	20
Alcoholic beverages	23	3.54	0.36	6	19
Elaborated or semi-elaborated food	21	20.82	0.74	8	16
Others (jams, sweets, etc)	20	4.38	0.42	1	11
Clothing and Footwear					
Knitted clothes	24	7.13	0.56	9	22
Leather clothes	21	4.89	0.10	0	20
Not knitted clothes	24	45.84	0.30	6	22
Underwear	24	7.21	0.41	2	21
Babie's clothes	24	2.20	0.38	7	22
Textiles	22	4.71	0.25	11	21
Footwear	24	28.01	0.41	17	20
Housing Equipment					
Furniture	24	15.51	0.59	8	18
Carpets	24	1.61	0.26	5	20
Mattress, curtains, towels	24	14.75	0.70	4	20
Electrical appliances	19	41.97	0.14	10	18
Table and kitchen ware	23	3.63	0.33	0	19
Light bulbs and batteries	20	2.53	0.55	7	9
Non-durable products	19	20.00	0.72	2	11
Other Tradable Goods					
Personal care products	24	47.61	0.72	15	18
Tobacco	22	30.73	0.75	4	18
Entertainment products	22	21.67	0.75	4	18

Source: ALADI, SM and INE.