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JEL : D1, F1, J3, R2

Keywords: Household welfare; Paraguay; Pass-through; Trade and Poverty

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In this paper I apply Porto (2006) to Paraguay using household level data. The aim is to assess the distributional impact of the preferential and multilateral trade liberalization in a small member country. I also follow Nicita (2009) assuming incomplete pass-through on prices of traded goods which in turn influence both household consumption and earnings of household members in the labour market. I estimate these effects highlighting the difference between the impact of the preferential trade agreement and the multilateral one. Finally, I am able to depict if and who trade integration has benefited.

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1 Introduction

Since many developing countries have recently started to implement trade reforms, analysing the effects of trade liberalization on poverty has become an important source of debate between economists. Due to the difficulties in measuring poverty, recent literature has focused on the channels which can affect it, namely, the participation and earnings of household members in labour markets (Pavcnik et al., 2004, Attanasio et al., 2004 and Edmonds et al., 2008), household production and household consumption (Deaton, 1989 and Friedman et al., 2002). Relating trade liberalization to these poverty channels can provide interesting results to whether increased openness benefits or not households living in the poorest regions of the world.

This paper contributes to shed some light on this topic by applying a general equilibrium framework to assess the distributional impact of preferential (MERCOSUR) and multilateral trade liberalization in Paraguay using household level data. The choice of applying a general equilibrium framework relies on the fact

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that “the very concepts of trade theory - relative costs and relative prices - call for consistent use of general equilibrium analysis” (Dixit et al., 1980).

The basic idea is simple: tariff reforms affect the domestic prices of traded goods, which in turn influence both household consumption and the earnings of household members in the labour market (Porto, 2006).

In the 1990s Paraguay turned from a self-sustained closed economy to an open one after its membership to MERCOSUR and the WTO. It is thus interesting to study how this trade shock affected the population. I am able to pursue this aim by applying a neoclassical trade theory model. Indeed Paraguay has a comparative advantage in low-skilled labour intensive goods (i.e. agricultural products) which it exports to the rest of the world in exchange of high-skilled labour intensive goods (i.e. manufactured products).

In the empirical application I first estimate how tariffs affect prices of traded goods allowing for both perfect and imperfect tariff pass-through on prices (Nicita, 2009 and Marchand, 2011). Then, I assess how prices of traded goods cause changes in the prices of non-traded goods, that is, I estimate the elasticity of the latter to the former. With these ingredients I am able to depict the *consumption effect of traded goods* and the *consumption effect of non-traded goods*. Hence, I find the effect of trade liberalization on household consumption. Price induced changes also affect factor returns, thus, workers wages. By estimating the wage elasticity to traded goods prices I find the *labour income effect* of trade liberalization.

Putting all the pieces together I am able to depict if and who trade liberalization has benefited; in all this, one of my concerns is to highlight the difference between the impact of the preferential trade agreement to the multilateral one. Then, the approach adopted in this paper extends the work of Borraz (2012) by accounting for the different impact of preferential and multilateral liberalization. Furthermore, the empirical application exploits waves of the Household and Labour Survey for Paraguay never used before.

The rest of the paper is structured as follows. Section 2 is dedicated to the theoretical model underlying the empirical part of the paper, while section 3 is devoted to the description of Paraguay’s trade liberalization process. In section 4 I will present results followed by concluding remarks.

2 The theoretical model

Porto (2006) extends Deaton (1989) and provides a general equilibrium framework in order to estimate the relationship between trade policies and poverty¹. His methodology is innovative because it considers the impact of trade liberalization both on household consumption and labour income through two links: in the first link, trade reforms cause the prices of traded goods to change, in the second, these price changes affect household as consumers and as income

¹Goldberg et al. (2004) provide a survey literature on the links between trade and poverty in DCs highlighting the difference between the partial and general equilibrium approach. For the purpose of my work I will only describe the general equilibrium approach introduced by Porto (2006).

earners. These effects on household welfare are measured by estimating compensating variations.

The initial assumption of the model is that total family income is equal to total family expenditure, which consists of factor incomes and some exogenous income:

$$e^j(p_i, p_k, u^j) = x_0^j + \sum_m w_m^j \quad (1)$$

where $e^j(\cdot)$ is the expenditure function of household j , that depends on a price vector of traded goods (p_i), non-traded goods (p_k) and desired household utility (u^j). Household's income is the sum of individual's m labour income w_m^j and exogenous income (x_0^j).

In a small open economy the domestic price of traded good i depends on exogenous international prices (p_i^*) and on the trade tariff rate (τ_i), such that²:

$$p_i = p_i^*(1 + \tau_i) \quad (2)$$

These goods are produced under constant returns to scale and competitive markets, therefore the prices of these goods are equal to unit production cost, $p_i = c_i(\mathbf{w})$, where c_i is the unit cost function and \mathbf{w} is the vector of factor prices. It is this system of equations that generates the general equilibrium relationship between the prices of traded goods and the prices of production factors described by the Stolper-Samuelson theorem³. The price of the non-traded goods k adjust endogenously so that the market is cleared.

At this point it is straightforward to see how changes in trade policies (through changes in τ_i) cause changes in the domestic price of traded goods, which produce two adjustments: changes in prices of traded and non-traded goods, called the *consumption effect* and changes in factor returns \mathbf{w} , called the *labour income effect* because labour is assumed the only production factor in this model.

Changes in household welfare are then computed with compensating variation (CV), that is, the income needed to compensate households for a change in tariff τ_i to attain the previous level of utility. From the household budget (equation 1) it is possible to derive the change in exogenous income x_0^j so that the family can achieve the pre-reform utility level. Taking total differential for an exogenous change in p_i :

$$dx_0^j = \frac{\partial e^j(\cdot)}{\partial p_i} dp_i + \sum_{k \in NT} \frac{e^j(\cdot)}{\partial p_k} \frac{\partial p_k}{\partial p_i} dp_i - \sum_m \frac{\partial w_m^j}{\partial p_i} dp_i \quad (3)$$

Since the change in the domestic price is induced by an exogenous change in tariff rate, $dp_i = \frac{\partial p_i}{\partial \tau_i} d\tau_i$, and dividing both sides of equation (1) by total expenditure $e^j(\cdot)$, the CV can be expressed in terms of total household welfare⁴:

²This is the perfect tariff pass-through framework.

³According to this relationship, as product prices change some sectors expand while others contract generating changes in relative factor demands, depending on the relative factor intensities used in the different sectors. Consequently, factor prices adjust.

⁴See Appendix A for complete derivation calculus.

$$\frac{dx_0^j}{e^j(\cdot)} = (s_j^i + \sum_{k \in NT} s_k^j \frac{\partial \ln p_k}{\partial \ln p_i} - \sum_m \theta_m^j \epsilon_{w_m p_i}^j) \frac{\partial \ln p_i}{\partial \ln \tau_i} d \ln \tau_i \quad (4)$$

where s_j^i is the budget share spent on traded good i by household j , s_k^j is the budget share spent on the non-traded good, θ_m^j is the share of the labour income of member m on total family income and lastly, $\epsilon_{w_m p_i}^j$ is the proportional change in the wage earned by member m caused by a change in the price of good i ⁵.

The above equation captures three welfare impacts: the consumption effect of traded goods ($s_j^i \frac{\partial \ln p_i}{\partial \ln \tau_i} d \ln \tau_i$), the consumption effect of non-traded goods ($s_k^j \frac{\partial \ln p_k}{\partial \ln p_i} \frac{\partial \ln p_i}{\partial \ln \tau_i} d \ln \tau_i$) and the labour income effect ($\theta_m^j \epsilon_{w_m p_i}^j \frac{\partial \ln p_i}{\partial \ln \tau_i} d \ln \tau_i$). Identifying these three components is the aim of the model.

After estimating the price change due to tariff reductions ($\frac{\partial \ln p_i}{\partial \ln \tau_i} d \ln \tau_i$), the first consumption effect is found by multiplying this term for the budget share s_j^i .

In order to find the second consumption effect we need information on s_k^j and on $\frac{\partial \ln p_k}{\partial \ln p_i}$; the latter is an elasticity which can be estimated by relating prices of non-traded goods with prices of traded goods.

As regards the labour income effect, the first step is to estimate the wage price elasticities ($\epsilon_{w_m p_i}^j$), then the weights should be computed with reference to the available data.

Summing the consumption effects (trade and non-traded) with the labour income effect, this model provides information on the total distributional impact of trade reforms on households well-being.

Porto (2006) applies this theoretical framework to study the distributional effects of MERCOSUR on Argentinian families. The results of the estimation suggest that MERCOSUR had a pro-poor distributional effect which indicates that trade has not been responsible for the increase in poverty and income inequality observed in Argentina during the 1990s.

Bikas (2009) applies the same model to evaluate the distributional impact of tariff reforms in India. The findings of the paper show that the overall distributional impact of tariff reforms in India have similar magnitudes for all income groups. Thus, there is no change in inequality due to trade reforms confirming Porto's outcome on Argentina.

The above mentioned papers assume that tariffs completely pass-through on prices, that is, the elasticity of prices of traded goods on tariffs is assumed to be unitary. But more recently economists have criticised this idea, suggesting that, aside tariffs, other variables (trade costs and exchange rates) can affect the prices of traded goods. Theory suggests that the change of tariffs should positively and significantly affect consumer prices.

Nicita (2009) allows for imperfect domestic price transmission in his work on Mexico's trade liberalization process. Another paper which comes to terms with the investigation of the relevance of tariff pass-through is Marchand (2011) for

⁵According to Deaton (1989), if we express the required compensation due to a price change as $\frac{dx_0^j}{dp_i}$, the latter will reflect the marginal effect of a tariff change (which in turn reflects prices) on a hypothetical social welfare function.

India. Once assessed the magnitude of the tariff pass-through, Nicita (2009) and Marchand (2011) apply Porto (2006): both find that the distributional effects of trade liberalization have diverse impact according to the region in which the individuals live, their consumption basket and the factors of production owned (whether skilled or unskilled labour).

On the same line Cherkaoui et al. (2011) finds for Morocco an overall positive effect of tariff reduction on household welfare after controlling for imperfect pass-through.

Although applied to different case scenarios, all authors find that there is no scope for complete tariff pass-through on prices: trade costs (proxied by distance from borders), domestic producer prices and exchange rate have to be taken into consideration when measuring the elasticity of domestic prices on tariffs. This is especially true when distributional effects of trade policies want to be assessed, because pass-through may vary according to the region to which the household belongs to. It is found that states nearer to the border are more affected by trade policies than households living in remote regions. It is from this argument that I also choose to control for imperfect pass-through, although data limitations inhibit me to control for other factors rather than tariffs.

The imperfect pass-through assumption is also considered in Borraz (2012). The author analysis the case of Uruguay and Paraguay and finds contrasting results for the two Latin American countries. While in the former preferential trade openness has benefited all in equal terms thus having zero effect on the income distribution, in the latter poverty was negatively affected although with an improvement in income distribution. The lesson to be learnt from this paper is that trade impacts differently regions and countries and that it should not be regarded as a growth-enhancing policy per se.

3 Paraguay's trade liberalization

Paraguay's most significant stage of trade liberalization can be traced back to the signing of the Asunción Treaty in 1991, together with Argentina, Brazil and Uruguay. The aim was of creating the Common Market of the South (MERCOSUR); one of its main pillars was the introduction of a Common External Tariff (CET), which was accomplished in 1994. Furthermore, Paraguay joined the GATT in 1993 and took part in the setting of the World Trade Organization acquiring its full membership in 1995.

This period of international economic integration, together with the new political stability achieved in 1989 with the end of the military dictatorship, had been successful in enhancing the country's GDP annual growth from 2.5% in 1991 to 5.5% in 1995. Moreover, inflation dropped from 24.2% in 1991 to 13.4% in 1995 and unemployment rates decreased from 6.4% in 1991 to 3.4% in 1995⁶.

Paraguay's economy relies mainly on agriculture. In addition, it is characterized by re-exports of imported consumer goods to neighbouring countries, as well as

⁶Source: World Development Indicators, 2010.

activities of thousands of microenterprises and street vendors. Manufacturing is focused on food and beverages, wood and paper products, hides and furs and non-metallic mineral products⁷. Thus, Paraguay's economic structure is mainly based on low-skilled labour intensive activities.

Table 1 reports Paraguay's total imports and imports from member countries for the traded goods classification adopted for this study⁸ during the years for which data on household expenditure is available. This data was downloaded from the WITS - UNCOMTRADE Database in 4-digit ISIC Rev. 3 product classification. Imports from MERCOSUR member countries is the sum of the imports from Argentina, Brazil and Uruguay. I group the import data in 4-digit codes according to the traded goods classification to illustrate the magnitude of the changes in trade flows in Paraguay. Although imports for Food & Beverages decreased from 1996 to 2000, the share coming from member countries increased by 6 percentage points. Since Paraguay's economy is based mainly on agriculture, it occurs as no surprise that imports for Food & Beverages decrease. Imports also decrease for the other types of traded goods and it is interesting to highlight that for Other Traded Goods imports from MERCOSUR member countries increase at the expense of those imported from the world, as if Paraguay has switched to suppliers belonging to the Common Market of the South. However, the share of MERCOSUR on world imports, as shown in column 3, increased for all types of goods suggesting that trade with the rest of the world remains significant for Paraguay.

To examine the change in trade policies in Paraguay I report in the same table the change in intrazone and applied MFN tariffs. This data was provided by ALADI⁹, the Latin American Integration Association, from 1995 to 2004 in 6-digit HS 1996 product code. I use the import data to calculate import weighted tariffs for the traded goods classification I use. The reduction in tariffs involved both the intrazone and the MFN applied tariff indicating that Paraguay pursued a deep liberalization process during the 1990s, mostly via the preferential agreement given that the changes in intrazone tariffs are stronger.

In the empirical application below I try to isolate the effects of trade policies on household welfare from those of other economic reforms. This task is pursued by estimating only the direct effects of tariff liberalization on consumer prices.

4 Empirical Application

In this section I apply Porto (2006) using household level data for Paraguay. The first step is to derive the change in traded goods prices due to trade reforms ($\frac{\partial \ln p_i}{\partial \ln \tau_i} d \ln \tau_i$ in equation (4)). My aim is to separate the price change stemming from the preferential trade agreement (MERCOSUR) from the one deriving from the multilateral one. Let τ_i^{MER} be the average intrazone tariff and τ_i^{MFN} the average MFN applied tariff. Porto (2006) assumes a unitary pass-through rate from tariff to prices; beside complying with this hypothesis, I will also allow for

⁷Source: <http://www.intracen.org>.

⁸For goods classification and other information on the data see Appendix B.

⁹I thank Alessia Lo Turco for passing me the tariff data on.

imperfect pass-through as in Nicita (2009).

Under the assumption of perfect pass-through the price changes have been computed in the following way. Firstly, I have calculated the import weighted average intrazone and MFN applied tariffs. Then I have calculated the change in the (logarithmic) price of good i stemming from the preferential and multilateral trade agreement:

$$dlnp_i = \Theta_i dlnp_i^{MER} + (1 - \Theta_i) dlnp_i^{MFN} \quad (5)$$

where Θ_i is the share of the imports of good i coming from MERCOSUR member countries on those coming from the rest of the world ($\Theta_i = \frac{MER Imp_i}{ROW Imp_i}$), $dlnp_i^{MER}$ and $dlnp_i^{MFN}$ are the price changes induced by the preferential and multilateral liberalization respectively.

Overall prices have decreased for the sample years in which expenditure data is available¹⁰. These induced price changes reflect exactly the tariff changes: when tariffs increase prices also increase and viceversa.

The assumption of imperfect pass-through implies estimating how prices change according to changes in tariffs. Thus, I regress the (logarithmic) price of traded goods on both the (logarithmic) intrazone and MFN applied tariffs according to the following model:

$$lnp_{ht} = \alpha_1 + \alpha_2 lnht^{MER} + \alpha_3 ln\tau_{ht}^{MFN} + \alpha_4 \gamma_t + \alpha_5 \varphi_h + \epsilon_{ht} \quad (6)$$

where lnp_{ht} is the logarithmic price of traded good h ¹¹, $ln\tau_{ht}^{MER}$ is the logarithmic simple weighted average intrazone tariff, $ln\tau_{ht}^{MFN}$ is the logarithmic simple weighted MFN applied tariff, γ_t is a vector of year dummies, φ_h is a vector of good dummies and finally, ϵ_{it} is the error term. In order to perform such regression I make use of the monthly price data provided by the Central Bank of Paraguay from 1995 to 2010¹² (base 2007:12=100). Prices are classified in 12 consumption goods¹³ into which I group the ALADI tariff data after excluding non-tradables. I constraint the estimation to years prior to 2001 since I have expenditure data up to 2000. Furthermore, I assume that the elasticity does not change over time.

Table 2 reports the estimation results: as expected the sign of the coefficients are positive. It is also interesting to see if and how the tariff pass-through changes once I account only for one tariff at the time. I do this and show the results in columns 2 and 3 of the same table. The coefficient of the logarithmic simple weighted average intrazone tariff is 0.086, higher than the one obtained if both tariffs are taken into consideration. The same applies if only the MFN applied

¹⁰The trade induced price changes under the perfect pass-through assumption are available upon request.

¹¹To have more accurate measures of elasticity I am using a different goods classification from the one adopted generally in the rest of the paper. More explanations on this classification will be provided further on.

¹²For more detail on the price data see Appendix B.

¹³The classification is formally defines as CCIF - Clasificación del Consumo Individual por Finalidades - and is adopted by all member countries plus Chile.

tariff is taken as an explanatory variable. It is thus important to stress the relevance of the multilateral liberalization when accounting for the impact of tariffs on prices. The latter represents one of the contributions of this paper to the literature, which typically considers only the effect of the preferential liberalization as in Borraz (2012).

Once assessed how changes in trade reforms affect prices of traded goods I am able to depict the consumption and labour income effects.

4.1 Consumption Effect of Traded Goods

I start by calculating the consumption effect of traded goods: since prices of tradables have changed due to tariff reforms, this in turn will impact household consumption.

I multiply the budget share of traded good i for each household j to the MERCOSUR induced price change. Consequently, I find the *MERCOSUR consumption effect of traded goods*. Substituting the MERCOSUR induced price change with the MFN induced price change yields the *MFN consumption effect of traded goods*.

The latter will be used to study the distributional effects of preferential and multilateral trade liberalization across the entire income distribution.

Nevertheless, a problem arises because of the need to summarize all this information in a useful way. Deaton (1989) suggests to estimate average consumption effects at different points along the per-capita expenditure spectrum, since they reflect the marginal effect of a price change on a hypothetical welfare function.

To compute these conditional averages I could estimate a parametric linear regression of the consumption effects (c^j) on the (logarithmic) per-capita expenditure (x^j). The problem with this procedure is that it assumes that the relationship between changes in household welfare and per-capita expenditure is linear. This might not be the case. For this reason it is more useful to adopt a non-parametric method, namely the local polynomial regression (Fan, 1992). The basic idea is to run different polynomial regressions of the consumption effect on the (logarithmic) per-capita expenditure using only local data points.

Specifically, given the model:

$$c^j = m(x^j) + \sigma(x^j)\epsilon_j \quad (7)$$

with unknown mean and variance function $m(\cdot)$ and $\sigma^2(\cdot)$ and symmetric errors ϵ^j with $E[\epsilon^j] = 0$ and $Var[\epsilon^j] = 1$, the aim is to estimate $m(x^0) = E[Y|X = x^0]$, making no assumptions about the functional form of $m(\cdot)$. Using the local polynomial regression I am able to estimate $m(x^0)$, weighted by a kernel function, of c^j on the polynomial terms $(x^j - x^0)$, $(x^j - x^0)^2$, .. $(x^j - x^0)^n$ for each point x^0 . The degree of the polynomial is specified by n . For my application the best option is $n=2$ and following Porto (2006) I choose the Gaussian kernel function.

I make use of this procedure to summarize the consumption effect of traded goods on the entire household per-capita expenditure distribution. The outcomes are compensating variations in percentage of household expenditure: negative values

stand for welfare losses while positive values suggest welfare gains.

I depict the consumption effect of traded goods for separate years, separating the MERCOSUR from the MFN effect. Furthermore, I consider both the perfect and imperfect pass-through¹⁴.

Figure 1 shows the consumption effect of traded goods for 1996 and 2000. The plots are depicted assuming an imperfect pass-through from tariff to prices. The solid lines represent the average welfare effect conditional on the level of per-capita household expenditure, while the dotted lines plot the 95% level confidence bands.

Figure 1a and 1b show that in 1996 both the MERCOSUR and MFN consumption effects are pro-poor; the same happens in 2000 as shown in figure 1c and 1d. Moreover, two facts emerge from the plots. Firstly, that in both years households have gained more from multilateral liberalization; this implies that accession of Paraguay to the WTO generated more advantages for households than its membership to MERCOSUR. Secondly, that these gains increase over time; this could mean that trade liberalization displays its effect in the medium term.

In conclusion, when I account for the imperfect pass-through rate from tariffs to prices, the plotted lines imply that for the entire sample period the consumption effect has been pro-poor and with overall welfare gains for the population. This suggests that poorer households have benefited from tariff reductions in traded goods since they spend a higher share of their income in these kind of goods.

In the next section I present results concerning the consumption effects of non-traded goods.

4.2 Consumption effects of non-traded goods

I turn now to the estimation of the *consumption effect of non-traded goods*. This requires to multiply the household budget share for non-traded goods to the pass-through rate and the elasticity of the prices of non-traded goods with respect to the prices of traded goods. The latter needs to be calculated; in order to do this I use the monthly price data described in the Appendix.

First of all, I want to check for cointegration in the series of prices. I apply the Engle-Granger cointegration test which embodies two steps: firstly, an augmented Dickey-Fuller (ADF) test to check for unit roots for all series of prices, then an OLS estimation to test whether its residuals are stationary or not. If we do not reject the unit root hypothesis in the first step and we reject that for the residuals there is evidence of cointegration.

For all series of prices the ADF null hypothesis is accepted both for the constant and trend included regression. Moreover, performing the same test on the OLS residuals and rejecting the null hypothesis leads to the conclusion that the series of variables considered show signs of cointegration.

Next it is necessary to establish the deterministic term and the rank of the coin-

¹⁴As I reckon more realistic the imperfect pass-through assumption I will show and comment here the corresponding plots for 1996 and 2000 for comparison purposes. Those for 1997 and for the perfect pass-through case are available upon request.

tegration matrix together with the most appropriate lag.

To select the lag I perform a VAR(12) for each cointegration regression; based on the information criterion two lags seem the best option. Choosing the deterministic trend is not based on a specific rule but it rather depends on the type of series examined and on the aim of the study. In this case I include a constant and a restricted trend: the cointegration relationship shows a trend but the first difference of the variables in question do not.

To determine the cointegration rank I use the Johansen test. The results of the test suggest that the cointegration matrix of prices for Services has rank two, the ones of prices for Transport and Communication and Health, Education and Entertainment have rank one.

Finally, for each price series I am able to estimate through a vector error correction model (VECM) the cointegration matrix: its elements can be interpreted as elasticities. The results are shown in table 3.

I can multiply these responses for the household budget shares of non-traded goods and the price change induced by tariff reforms to find the consumption effect of non-traded goods. Again, I separate the MERCOSUR effect from the MFN one applying the same non-parametric technique used for the consumption effect of traded goods.

The plots for 1996 shown in figure 2a and 2b are both downward sloping suggesting that both preferential and multilateral liberalization have pro-poor effects although characterized by general welfare losses.

The same pattern emerges in 2000 as shown in figure 2c and 2d but the welfare losses are lower. Thus, trade liberalization does generate a negative shock on household well-being at the time of its implementation, especially for the richest part of the population. Nevertheless, the losses gradually fade away.

In the next section I turn to analyse the labour income effect, which implies the estimation of the wage-price elasticity.

4.3 Labour Income Effect

In this section I calculate the *labour income effect*. This implies computing the wage-price elasticities and multiplying them for the individual's labour income share on total family income and for the change in prices generated by trade reforms.

The wage-price elasticities give information on how wages respond to changes in the price of traded goods. I expect that wages respond according to the amount of skilled and unskilled labour employed for the production of the specific traded good. For example, since the production of Food and Beverages is intensive in unskilled labour I await that their prices have a positive association with the wages of the less skilled workers.

I run a separate wage equation regression for high and low skilled workers such as:

$$\ln w^j = \sum_i \ln p_i \beta_i + \eta^j d + z^j \gamma + \mu^j \quad (8)$$

where w^j is the hourly wage, p_i^j is the price of traded good i , $\eta^{j'}$ is the j^{th} row of the matrix of individual characteristics (age, gender, age squared), $z^{j'}$ is the j^{th} row of the matrix of dummy variables (a set of dummies for the living location of the family and individual's branch of activity), β_i are the elasticities I am interested in finding, and μ^j is a disturbance error. The model can be consistently estimated using ordinary least squares since prices for traded goods are exogenously set in world markets.

In table 4 I report the β_i 's for the separate estimations between high and low skilled workers. The coefficient on prices do not exactly reflect my expectations. Indeed, since traded goods i in Paraguay employ a higher share of low-skilled labour, I would have expected all the coefficients in column 1 to be negative while those of column 2 to be positive. Further investigation is necessary in this direction.

The next step consists of multiplying the wage price elasticities just estimated for the share of the individual's labour income and the induced price change. This yields the labour income effect.

Again, I plot the results using local polynomial regression for each year and I separate the effects of the MERCOSUR with that of MFN trade liberalization. Figure 3a and 3b show that in 1996 the gains accruing from the labour channel of trade liberalization are very high, reaching almost an average of 110% for the multilateral agreement. In 2000, as shown in figure 3c and 3d, the effects are still positive but the plot is upward sloping, indicating that higher gains accrue to the richest part of the population. Thus, in the medium term the positive labour effects have been transferred to the rich, which may have moved from high-skilled jobs into less skilled ones to reap the benefits of increasing low-skilled labour returns.

From these observations I gather that trade liberalization has generated price changes in traded goods which have benefited both high and low income families through changes in the individual's wage. Since a large share of Paraguay's population is unskilled, I conclude that the induced MERCOSUR and MFN price changes have increased returns to low skilled-labour.

4.4 Total Effect

Taking the algebraical sum of the consumption and labour income effects I am able to depict the total effect, that is how trade liberalization has affected households welfare.

Observation of the related plots, shown in figure 4, leads to the following conclusions. Firstly, MFN trade liberalization always displays stronger effects than preferential liberalization. Secondly, while in 1996 MERCOSUR causes general welfare losses to households, in 2000 the negative effects give way to increases in well-being.

Summing up, in the short term preferential trade liberalization is detrimental for improving conditions in a small member country; only in the medium term can its effects turn from negative to positive. On the contrary, accession to the WTO spreads immediate positive effects on Paraguay's population, which fur-

ther develop in the medium term.

In the following section I will provide some concluding remarks on the overall findings of my study.

5 Concluding Remarks

In this paper I adopt a general equilibrium framework in order to assess the distributional impact of trade liberalization on households welfare.

The basic idea is that since tariffs influence border prices of traded goods these in turn influence the prices of non-traded goods and the earnings of individuals in the labour market. The former are referred to as the consumption effect of traded and non-traded goods, respectively, since induced price changes affect households as consumers. The latter is defined as the labour income effect since induced price changes influence individuals wages in accordance with the Stolper-Samuelson theorem. Summing up these effects I am able to trace if and who trade liberalization has benefited.

The first empirical application of this kind assumed a unitary pass-through rate from tariffs to prices; further on this hypothesis has been criticized based on the belief that prices of traded goods are not only influenced by tariffs but by other variables such as exchange rates, world prices, etc.

Using household level data for Paraguay my aim is to estimate the consumption effect of traded and non-traded goods and the labour income effect of trade liberalization on household welfare. I contribute to the related literature by accounting for both preferential and multilateral trade liberalization effects in a small developing country. In addition, I exploit survey waves which, to my knowledge, have never been used before.

Focusing on the imperfect pass-through scenario leads to the following conclusions. Firstly, membership to the MERCOSUR and accession to the WTO generated pro-poor consumption effects of traded and non-traded goods. The latter, nevertheless, generated welfare losses along all the per capita expenditure distribution. These results differ from the ones found in Porto (2006): MERCOSUR generated pro-rich effects in Argentina. It may be the case that trade liberalization has a different impact according to the specific characteristics of a country, such as market size, export structure, etc. Indeed, Borraz (2012) also finds for Paraguay a consumption effect of traded goods in favour of households located in the lowest part of the income distribution.

Secondly, the labour income effect turned from being pro-poor in 1996 to pro-rich in 2000. I give the following explanation to this phenomenon. Paraguay is a low-skilled labour intensive country, thus, according to the Stolper-Samuelson theorem, returns to low-skilled workers increase in reaction to trade driven specialization. In the short term these benefits accrue to the poorest, who are employed in jobs with lower demand for skills. In the long run, inter- and intra-industry reallocation of workers may take place; the richest, traditionally employed to perform high-skilled tasks or in high-skilled intensive industries, move to the less-skilled intensive ones in reaction to the latter's increasing returns. Once more, my findings differ from the ones found in Argentina, for which the

labour effect is pro-poor, confirming the hypothesis that countries with diverging political and economic characteristics react differently to trade liberalization. Thirdly, it is important to account also for multilateral trade liberalization effects on households well-being. In fact, I find that for both the consumption and labour channel the MFN trade agreement always has a stronger impact than MERCOSUR. This represents the most important result of my paper and it is crucial to further investigate it by considering other developing countries. To sum up, while membership to the MERCOSUR created welfare losses to households in the short term, accession to the WTO created welfare gains, especially for the poor. In the medium term both trade liberalization episodes are able to create advantages for Paraguay's population. The results stemming from my analysis are in support of economists who promote trade liberalization as an important factor to achieve development. Nevertheless, my work confirms the difficulty that trade economist encounter when trying to assess the link between trade liberalization and poverty. These difficulties arise mainly because household data for developing countries is limited and when it is available it does not include relevant information continuously overtime (such as expenditure, income and working hours). In light of these drawbacks I believe that the conclusions of my analysis could be improved in different ways: (i) using more detailed monthly data on expenditure and prices; (ii) allow other variables beside tariffs to influence the pass-through rate such as exchange rates, world prices and households living location, because families living nearer to the border will be more affected by trade reforms. In conclusion, further work is necessary to get more accurate results on how trade policy impacts on well-being. This is necessary in order to formulate adequate policy reforms that could avoid an unequal distribution of the benefits deriving from increased trade openness.

A Compensating Variation Measure

From equation (1) and assuming zero capital income, total household expenditure is defined as:

$$e^j(P_T, P_{NT}, w^j) = x_0^j + \sum_m w_m^j \quad (9)$$

Rearranging terms and differentiating for the exogenous change in traded goods prices results in:

$$x_0^j = e^j(P_T, P_{NT}, w^j) - \sum_m w_m^j \quad (10)$$

$$dx_0^j = \frac{\partial e^j}{\partial p_i} dp_i + \sum_{k \in NT} \frac{\partial e^j}{\partial p_k} \frac{\partial p^k}{\partial p_i} dp_i - \sum_m \frac{\partial w_m^j}{\partial p_i} dp_i \quad (11)$$

where $dp_i = \frac{\partial p_i}{\partial \tau_i} d\tau_i$, that is, an exogenous price change of traded goods is induced by an exogenous change in tariff rates. Substituting such equation in the previous yields:

$$dx_0^j = \frac{\partial e^j}{\partial p_i} \frac{\partial p_i}{\partial \tau_i} d\tau_i + \sum_{k \in NT} \frac{\partial e^j}{\partial p_k} \frac{\partial p^k}{\partial p_i} \frac{\partial p_i}{\partial \tau_i} d\tau_i - \sum_m \frac{\partial w_m^j}{\partial p_i} \frac{\partial p_i}{\partial \tau_i} d\tau_i \quad (12)$$

Finally, by dividing both sides of the above equation for total expenditure (e_j), measures of compensating variations for each household (c^j) are found:

$$\begin{aligned} cv_j &= \frac{dx_0^j}{e^j} = \frac{\partial e^j}{\partial p_i} \frac{\partial p_i}{\partial \tau_i} \frac{d\tau_i}{\tau_i} \frac{p_i}{e^j} \frac{\tau_i}{p_i} \\ &+ \sum_{k \in NT} \frac{\partial e^j}{\partial p_k} \frac{\partial p^k}{\partial p_i} \frac{\partial p_i}{\partial \tau_i} \frac{d\tau_i}{\tau_i} \frac{p_i}{p_k} \frac{p_k}{e^j} \frac{\tau_i}{p_i} \\ &- \sum_m \frac{\partial w_m^j}{\partial p_i} \frac{\partial p_i}{\partial \tau_i} \frac{d\tau_i}{\tau_i} \frac{p_i}{w_m^j} \frac{\tau_i}{p_i} \frac{w_m^j}{e^j} \end{aligned} \quad (13)$$

which results in (4), because, as regards the *consumption effects*:

$$\frac{\partial e^j}{\partial p_i} \frac{p_i}{e^j} = x_i^j \frac{p_i}{e^j} = s_i^j \quad (14)$$

$$\frac{\partial e^j}{\partial p_k} \frac{p_k}{e^j} = x_k^j \frac{p_k}{e^j} = s_k^j \quad (15)$$

which represent the budget share spent on traded good i by household j (s_i^j) and the budget share spent on traded good k by household j (s_k^j); the first part of both equations is obtained applying Shephard's Lemma. As for the *labour income effect*:

$$\sum_m \frac{w_m^j}{e^j} \frac{\partial w_m^j}{\partial p_i} \frac{p_i}{w_m^j} = \sum_m \theta_m^j \epsilon_{w_m p_i} \quad (16)$$

is the product between the share of labour income of member m on total family income (θ_m^j), and the wage-price elasticities ($\epsilon_{w_m p_i}$).

B Data Description

The household data used in this study was retrieved from three types of surveys: the Encuesta de Hogares (EH - for 1995 and 1996), the Encuesta Integrada de Hogares (EIH - for 1997/1998 and 2000/2001) and the Encuesta Permanente de Hogares (EPH - for 1999 and from 2002 to 2009). The collection of household level data is part of the MECOVI Program¹⁵ executed by the World Bank in cooperation with other international organizations¹⁶. The aim of the MECOVI is to generate high quality and detailed information about the living conditions of the country concerned. It was formally launched in 1996 in Asunción (Paraguay). The surveys I use have improved year to year and they all contain detailed data on the living conditions of households. Moreover, they are the main source of labour market information. On the overall period the surveys cover 69,657 households across urban and rural areas.

For 1996, 1997 and 2000/2001 it contains data on yearly expenditure at the household level on several types of goods. For simplicity, I classify them in seven groups defining each of the minor categories of goods as traded or non-traded. Traded goods are Food and Beverages (including Tabacco), Clothing and Footwear (Textiles, Apparel and Footwear), House Equipment and Maintenance Goods (Beauty products, Transport Equipment and Domestic appliances) and Other Traded Goods (Chemicals and Farmaceutical products). Non-traded goods include Services (Water and Electricity, Financial Services), Transport and Communication and Health, Education and Entertainment (Housekeeping, Hotels, Restaurants and other Leisure activities).

Some basic features of the expenditure data are as indicated in table 5. In 1996 Paraguayan households spent on average most on Food and Beverages and House Equipment and Maintenance Goods with a share of 23.38% and 30.39% respectively. As for non-traded goods the largest amount of expenditure goes to Health, Education and Entertainment with a percentage of 20.63%. The following year Food and Beverages and House Equipment and Maintenance Goods fall both to approximately 20% losing their lead position in favour of Other Traded Goods with a share of 21.88%. In 2000, Food and Beverages and House Equipment and Maintenance Goods regain their first position with a share of 20.04% and 20.95% respectively. Clothing and Footwear reach 13.14% of per-capita expenditure from the initial 2.74% in 1996. Health, Education and Entertainment drops to 17.12% but still remains the non-tradable with the highest share of per-capita expenditure.

In sum, Paraguayan households spent most of their income in traded goods with an overall percentage of 69.79%, 67.3% and 71.46% in 1996, 1997 and 2000 respectively. This is an important piece of information because it gives some hint in predicting how price induced changes can affect household welfare. Since poor

¹⁵Program for the Improvement of Surveys and the Measurement of Living Conditions in Latin America and the Caribbean.

¹⁶IDB, CEPAL as well as specialized institutions or agencies in countries participating at the program.

families spend their highest share of income in essential goods¹⁷ which are traditionally tradables (Food and Beverages, Clothing and Footwear), trade reforms will have a direct impact on the poor. Conversely, the wealthy families spend a higher share of their income in luxury goods which are non-tradables (Entertainment, Holidays) thus, they will be indirectly affected by trade reforms according to how prices of non-traded goods respond to changes in prices of traded goods. The section on Employment and Wages contains information on monthly hours worked and income, educational attainment, type of occupation and branch of activity in which the individual is employed. Using this data I compute an hourly wage and I am able to classify workers according to their skills. The latter are based on the individual's type of occupation. Low skilled workers are Farmers, Vehicle Drivers, Artisans and any other related craftworker; high skilled workers include Professionals, Managers and Directors, Clerks and Salesman and any other occupation related to the latter. As regards educational attainment I adopt a synthetic classification identifying five levels of schooling: No education, Prior to School (including Special Education), Primary, Secondary, High School and University (including Military and Teaching Traineeships). Table 6 reports the hourly wage (expressed in logarithms). For each year I observe that high skilled workers earn more than low skilled ones which is consistent with the related literature. Moreover, wages for the least skilled workers drop between 2003 and 2005 gaining then points in the last years of the period considered.

This data is used to estimate the wage price elasticity thus, another piece of information that I require are monthly price indexes of the four traded goods. The Central Bank of Paraguay¹⁸ provides yearly price indexes (Base 1994=100) from 1991 to 2009. Since the product classification is different from the one I adopt¹⁹ I need to calculate weighted price indexes using gross value of production²⁰. Table 7 reports the yearly price indexes (in logarithm) for traded goods, since we are only interested in how wages react to changes in the prices of the tradables. All prices increased substantially along the entire period with only a minor drop for Food and Beverages, Clothing and Footwear in 2009.

From the same source I obtain monthly price indexes (Base December 2007=100) from January 1995 to December 2010. This more detailed data is useful to estimate the cross price elasticities between traded and non-traded goods as well as the imperfect pass-through rate. Again, the price indexes are available for another type of good classification as the one used here²¹ therefore, I calculate the

¹⁷According to Engel's Law poor families spend a higher share of their income on essential goods.

¹⁸Banco Central del Paraguay.

¹⁹Price indexes are available for the following groups of products: Agricultural, Livestock, Forestry, Fishing, Mining, Meat, Oils and Condiments, Dairy, Milling and Bakery, Sugar, Other food, Beverages and Tobacco, Clothing and Textile, Footwear and Leather, Wood, Paper, Oil refining, Chemicals, Non-metals, Machinery and Equipment, Other manufacturing, Water and Electricity, Construction, Trade, Transport, Communication, Financial intermediation, Rental housing, Business services, Restaurants and Hotels, Services to households, Government services.

²⁰This information was also provided by the Central Bank of Paraguay.

²¹Namely, the Common Classification System (CCIF) adopted by all MERCOSUR member countries. The goods are: Food and Beverages (excluding alcohol), Alcoholic Beverages,

weighted price indexes using a weighting factor provided by the Central Bank of Paraguay. These price indexes are reported (in logarithm) in table 8. For conciseness I only report price indexes for January and December of each year for both traded and non-traded goods. All price indexes increase reflecting the trend in the yearly price indexes reported above.

tabacco and drugs, Clothing and Footwear, Accomodation, water, electricity, gas and other fuel, Furniture, house equipment and mantanance goods, Health, Transport, Communication, Entertainment and leisure activities, Education, Restaurants and Hotels, Other Goods and Services.

C Tables and Figures

Table 1: Imports and changes in tariffs

	<i>Row Imp</i> (1,000 \$)	<i>MER Imp</i> (1,000 \$)	<i>MER Imp/</i> <i>Row Imp</i>	<i>Change in</i> <i>MER tariffs (%)</i>	<i>Change in</i> <i>MFN tariffs (%)</i>
<i>FB</i>					
1996	697,702.90	501,381.50	0.72	-10.72	-6.07
1997	765,883.90	547,079.40	0.71	-1.94	10.55
2000	463,733.90	363,841.90	0.78	-3.85	-2.87
<i>CF</i>					
1996	152,686.10	91,362.74	0.60	-18.50	-20.34
1997	155,447.20	94,288.12	0.61	-11.29	-1.14
2000	93,439.81	61,336.92	0.66	-14.34	5.14
<i>H</i>					
1996	1,529,402	728,752.90	0.48	0.04	-8.71
1997	1,578,313	763,058.40	0.48	-1	4.72
2000	910,867.60	485,072.90	0.53	-2.83	3.02
<i>OT</i>					
1996	959,333.10	347,083.30	0.36	-3.01	-3.98
1997	951,636.10	372,592.00	0.39	-0.47	1.44
2000	846,520.90	502,895.40	0.59	-0.27	2.19

Note: FB= Food and Beverages, CF=Clothing and Footwear, H=House Equipment and Maintenance Goods, OT=Other Traded Goods, ROW Imp= imports coming from the rest of the world, MER Imp= imports coming from member countries, MER Imp/ ROW Imp= share of imports coming from member countries on imports coming from the rest of the world.

Source: Own calculations based on WITS UNCOMTRADE data and ALADI tariff data. Both intrazone and MFN applied tariffs are import weighted averages.

Table 2: Trade induced price change - Imperfect pass-through

	(1)	(2)	(3)
$\ell n\tau_{ht}^{MER}$	0.055*** [0.0107]	0.086*** [0.0097]	
$\ell n\tau_{ht}^{MFN}$	0.507*** [0.0822]		0.704*** [0.0741]
γ_{1996}	0.108*** [0.0080]	0.113*** [0.0082]	0.102*** [0.0081]
γ_{1997}	0.178*** [0.0085]	0.193*** [0.0084]	0.163*** [0.0082]
γ_{1998}	0.243*** [0.0154]	0.322*** [0.0087]	0.199*** [0.013]
γ_{1999}	0.338*** [0.0168]	0.426*** [0.0094]	0.284*** [0.0133]
γ_{2000}	0.436*** [0.0189]	0.533*** [0.0108]	0.367*** [0.0123]
φ_2	1.696*** [0.2044]	0.439*** [0.0131]	2.14*** [0.1881]
φ_3	0.054* [0.0283]	0.2181* [0.01]	-0.0104 [0.0259]
φ_4	0.564*** [0.0204]	0.466*** [0.0131]	0.565*** [0.0208]
φ_7	0.319*** [0.0132]	0.371*** [0.0105]	0.286*** [0.0116]
φ_8	0.363*** [0.0295]	0.533*** [0.0110]	0.317*** [0.0287]
φ_9	0.488*** [0.0144]	0.43*** [0.0112]	0.488*** [0.0147]
φ_{11}	0.694*** [0.0411]	0.0451*** [0.0124]	0.755*** [0.0401]
φ_{12}	0.057*** [0.0145]	0.014 [0.0131]	0.0364** [0.0142]
<i>Const.</i>	1.967*** [0.2064]	3.236*** [0.014]	1.523*** [0.1911]
R^2	0.9503	0.9473	0.9482
<i>No. Obs.</i>	648	648	648

Note: (1) Estimated model as in equation 6. Standard-error in square brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Cointegration matrix

	(1)	(2)	(3)	(4)
<i>log price S</i>	1 [.]	0 [.]		
<i>log price TC</i>			1 [.]	
<i>log price HE</i>				1 [.]
<i>log price FB</i>	0 [.]	1 [.]	2.177*** [0.3388]	1.818*** [0.6261]
<i>log price CF</i>	1.944*** [0.6498]	-2.815*** [0.7070]	-6.065*** [1.2021]	-3.742* [2.2136]
<i>log price H</i>	1.211* [0.7082]	1.867** [0.7705]	4.663*** [1.2962]	-2.430 [2.3607]
<i>log price OT</i>	-2.634*** [0.7987]	-0.61* [0.8689]	-3.764*** [1.3673]	-0.151 [2.4901]
<i>Trend</i>	-0.005** [0.022]	-0.006** [0.0024]	-0.012*** [0.0044]	0.007 [0.008]
<i>Const.</i>	-6.229 [.]	0.0024 [.]	10.9 [.]	15.116 [.]
<i>Log likelihood</i>	3337.556	3337.556	3259.159	3425.703
<i>No. Obs.</i>	190	190	190	190

Note: FB= Food and Beverages, CF=Clothing and Footwear, H=House Equipment and Maintenance Goods, OT=Other Traded Goods, S= Services, TC= Transport and Communication, HE= Health, Education and Entertainment. (1) and (2) VECM with 2 lags, rank=2 including a constant and trend; (3) VECM with 2 lags, rank=1 including a constant and trend; (4) VECM with 2 lags, rank=1 including a constant and trend. Standard-error in square brackets. *** p<0.01, ** p<0.05, * p<0.1.

Source: Own calculation based on data from Banco Central del Paraguay.

Table 4: Wage equation regression results

	(1)	(2)
<i>log price FB</i>	1.021*** [0.1970]	0.501*** [0.1163]
<i>log price CF</i>	-1.547*** [0.3904]	0.330* [0.1911]
<i>log price H</i>	-6.923*** [0.3142]	-10.801*** [0.1753]
<i>log price OT</i>	8.885*** [0.4647]	12.659*** [0.5284]
<i>fem</i>	-0.206*** [0.0148]	-0.177*** [0]
<i>age</i>	0.0671*** [0.0025]	0.047*** [0.0117]
<i>age</i> ²	-0.001*** [0.000]	-0.001*** [0.000]
<i>Const.</i>	1.755*** [0.4497]	-5.855 [0.2950]
<i>R</i> ²	0.3439	0.2210
<i>No. Obs.</i>	25224	70810

Note: FB= Food and Beverages, CT=Clothing and Textiles, H=House Equipment and Maintenance Goods, OT=Other Traded Goods, S= Services, TC= Transport and Communication, HE= Health, Education and Entertainment. (1) High skilled (2) Low skilled. Standard errors in square brackets. *** p<0.01, ** p<0.05, * p<0.1.

Source: Own calculation based on data from Banco Central del Paraguay.

Table 5: Budget shares for traded and non-traded goods

<i>YEAR</i>	<i>FB</i>	<i>CF</i>	<i>H</i>	<i>OT</i>	<i>S</i>	<i>TC</i>	<i>HE</i>	<i>Total</i>
1996	23.38%	2.74%	30.39%	13.28%	7.48%	2.10%	20.63%	100%
1997	19.90%	5.26%	20.26%	21.88%	4.63%	3.28%	24.79%	100%
2000	20.04%	13.14%	20.95%	17.33%	6.13%	5.29%	17.12%	100%

Note: FB= Food and Beverages, CF=Clothing and Footwear, H=House Equipment and Maintenance Goods, OT=Other Traded Goods, S= Services, TC= Transport and Communication, HE= Health, Education and Entertainment.

Source: Own calculations based on the Encuesta de Hogares 1996 and the Encuesta Integrada de Hogares 1997, 2000/2001.

Table 6: Hourly wages by skills (in logarithm)

<i>YEAR</i>	<i>low skilled</i>	<i>high skilled</i>	<i>sample size</i>
1995	7.165	7.750	21,910
1996	7.472	7.728	11,470
1997	7.154	7.709	20,664
1999	7.212	7.635	24,193
2000	7.882	8.949	37,437
2001	7.243	8.543	17,600
2003	6.894	8.170	43,161
2004	6.829	8.042	34,636
2005	6.908	8.161	19,579
2006	7.917	9.172	22,733
2007	8.114	9.179	21,053
2008	8.239	9.256	19,416
2009	8.200	9.364	18,419

Source: Own calculations based on the Encuesta de Hogares and the Encuesta Integrada de Hogares.

Table 7: Yearly price indexes for traded goods (in logarithm)

<i>YEAR</i>	<i>log price FB</i>	<i>log price CF</i>	<i>log price H</i>	<i>log price OT</i>
1991	4.159	4.134	4.189	4.305
1992	4.251	4.273	4.330	4.389
1993	4.404	4.448	4.489	4.477
1994	4.605	4.605	4.605	4.605
1995	4.718	4.759	4.745	4.718
1996	4.826	4.855	4.851	4.819
1997	4.819	4.966	4.936	4.893
1998	4.916	5.098	5.073	5.012
1999	5.001	5.155	5.175	5.092
2000	5.122	5.192	5.261	5.185
2001	5.166	5.241	5.374	5.263
2002	5.278	5.315	5.526	5.338
2003	5.456	5.467	5.690	5.470
2004	5.533	5.561	5.762	5.518
2005	5.602	5.608	5.847	5.591
2006	5.700	5.665	5.901	5.657
2007	5.837	5.704	5.977	5.732
2008	6.014	5.741	6.065	5.846
2009	6.001	5.714	6.109	5.866

Note: FB= Food and Beverages, CT=Clothing and Textiles, H=House Equipment and Maintenance Goods, OT=Other Traded Goods.

Source: Own calculations based on data from Banco Central del Paraguay.

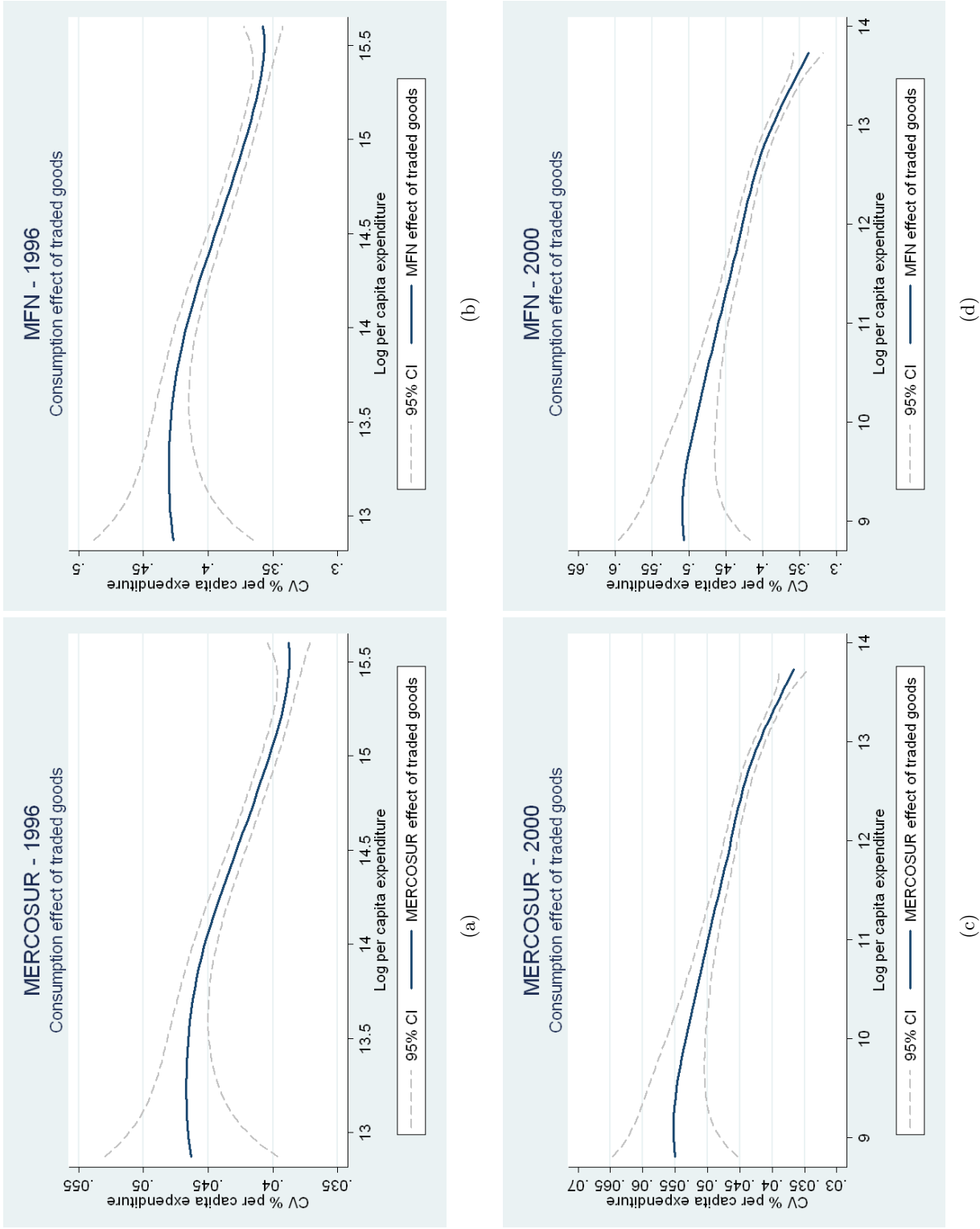
Table 8: Monthly price indexes for traded and non-traded goods (in logarithm)

<i>Month - YEAR</i>	<i>log price FB</i>	<i>log price CF</i>	<i>log price H</i>	<i>log price OT</i>	<i>log price S</i>	<i>log price TC</i>	<i>log price HE</i>
Jan 1995	3.414	3.989	3.640	3.740	3.571	3.149	3.589
Dec 1995	3.449	4.060	3.759	3.813	3.718	3.269	3.715
Jan 1996	3.473	4.063	3.766	3.822	3.728	3.28	3.73
Dec 1996	3.491	4.106	3.829	3.902	3.852	3.357	3.838
Jan 1997	3.497	4.109	3.837	3.914	3.865	3.393	3.842
Dec 1997	3.531	4.140	3.877	3.936	3.953	3.438	3.932
Jan 1998	3.549	4.130	3.890	3.947	3.955	3.438	3.94
Dec 1998	3.681	4.209	4.022	4.052	4.034	3.613	4.092
Jan 1999	3.679	4.211	4.024	4.054	4.038	3.613	4.107
Dec 1999	3.705	4.236	4.093	4.117	4.071	3.705	4.185
Jan 2000	3.727	4.237	4.091	4.119	4.074	3.745	4.187
Dec 2000	3.780	4.261	4.127	4.156	4.197	3.918	4.246
Jan 2001	3.789	4.263	4.138	4.167	4.203	3.987	4.245
Dec 2001	3.851	4.303	4.225	4.263	4.270	4.029	4.323
Jan 2002	3.868	4.304	4.233	4.267	4.270	4.031	4.331
Dec 2002	4.001	4.369	4.397	4.372	4.428	4.187	4.42
Jan 2003	4.065	4.377	4.412	4.399	4.447	4.255	4.433
Dec 2003	4.182	4.437	4.409	4.422	4.432	4.256	4.448
Jan 2004	4.183	4.440	4.414	4.427	4.437	4.264	4.451
Dec 2004	4.176	4.474	4.428	4.459	4.469	4.379	4.478
Jan 2005	4.187	4.476	4.438	4.464	4.473	4.383	4.48
Dec 2005	4.288	4.524	4.534	4.502	4.53	4.571	4.515
Jan 2006	4.317	4.528	4.548	4.514	4.532	4.571	4.516
Dec 2006	4.522	4.570	4.574	4.558	4.556	4.587	4.563
Jan 2007	4.495	4.573	4.576	4.557	4.558	4.587	4.566
Dec 2007	4.605	4.605	4.605	4.605	4.605	4.605	4.605
Jan 2008	4.637	4.607	4.618	4.619	4.608	4.614	4.615
Dec 2008	4.678	4.638	4.710	4.676	4.666	4.701	4.681
Jan 2009	4.689	4.642	4.710	4.688	4.661	4.674	4.685
Dec 2009	4.723	4.651	4.738	4.702	4.683	4.648	4.711
Jan 2010	4.748	4.653	4.739	4.709	4.684	4.653	4.713
Dec 2010	4.830	4.677	4.782	4.728	4.749	4.707	4.768

Note: FB= Food and Beverages, CF=Clothing and Footwear, H=House Equipment and Maintenance Goods, OT=Other Traded Goods, S= Services, TC= Transport and Communication, HE= Health, Education and Entertainment.

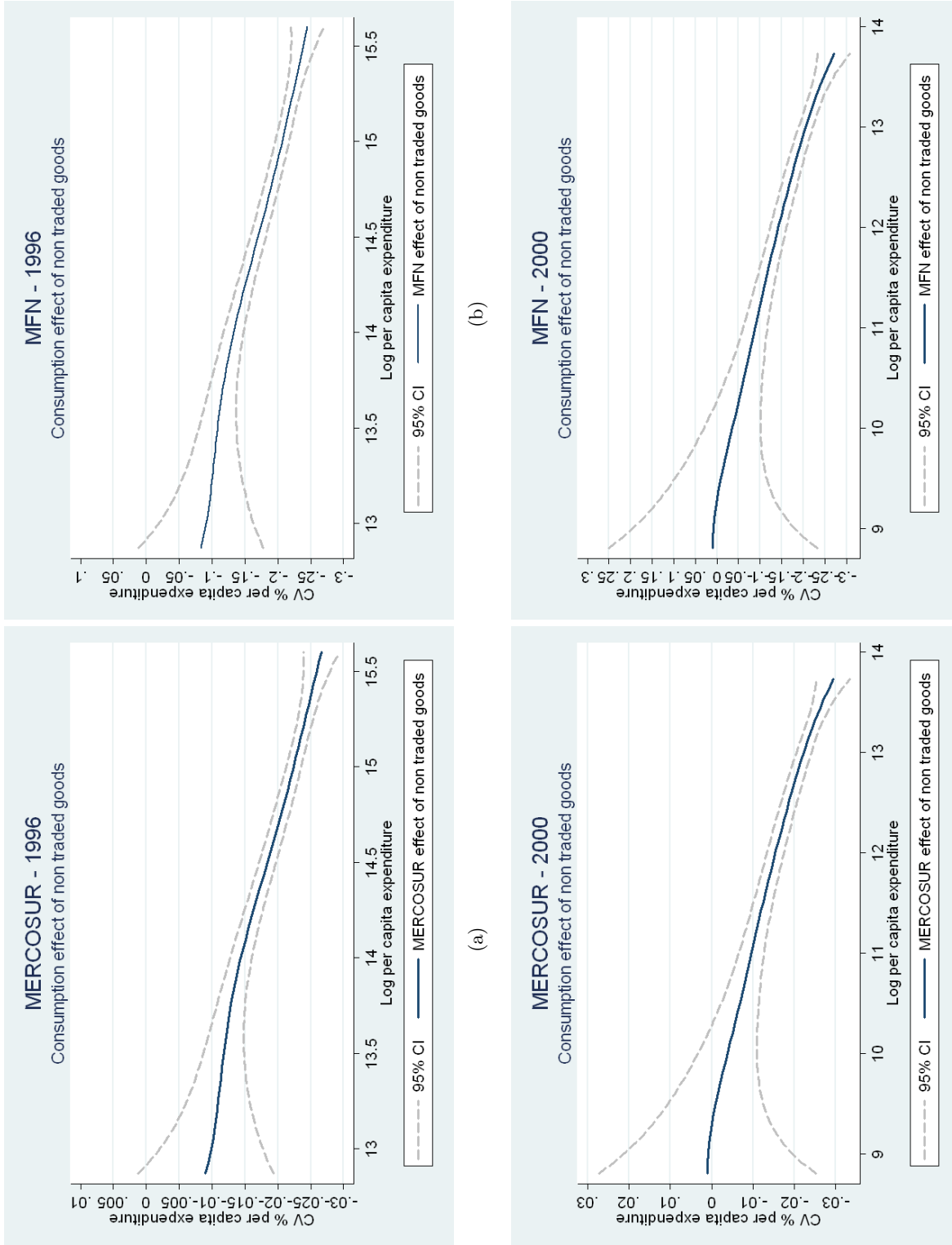
Source: Own calculations based on data from Banco Central del Paraguay.

Figure 1: Consumption Effect of Traded Goods - Imperfect pass-through



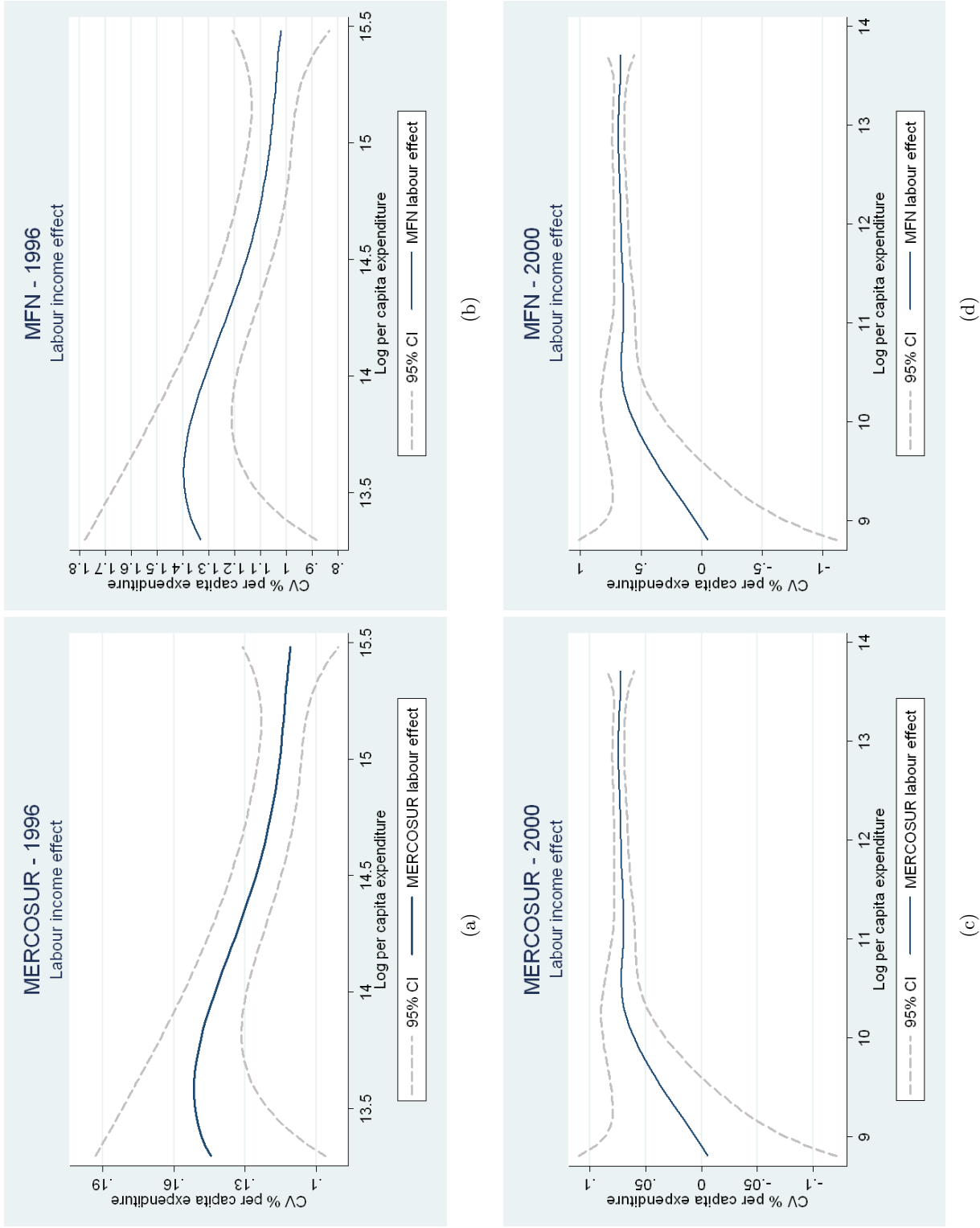
Note: The solid lines show the average consumption effects of traded goods. The curve is estimated using local polynomial regression. The dotted lines report the 5% confidence bands of the average consumption effects.

Figure 2: Consumption Effect of Non Traded Goods - Imperfect pass-through



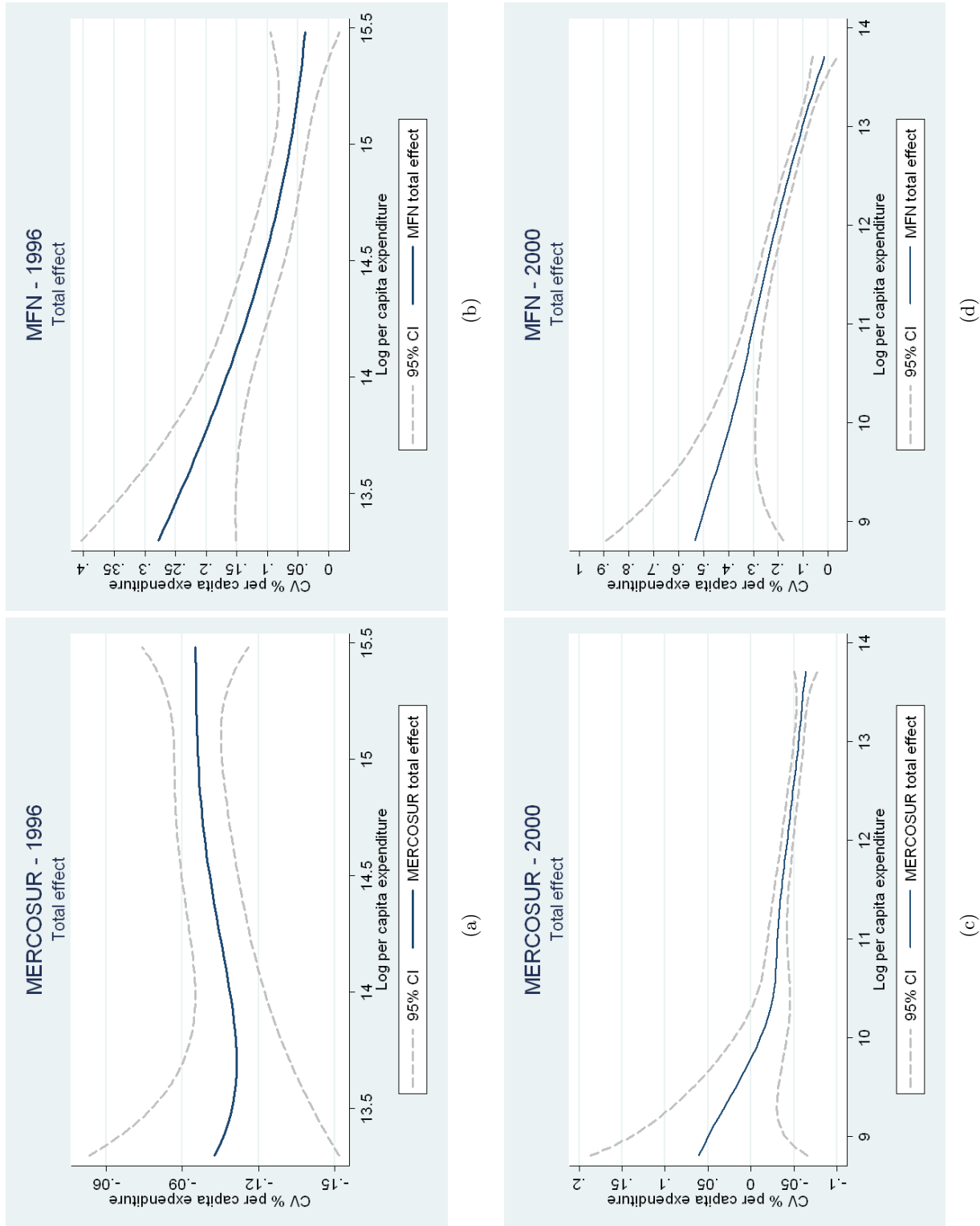
Note: The solid lines show the average consumption effects of traded goods. The curve is estimated using local polynomial regression. The dotted lines report the 5% confidence bands of the average consumption effects.

Figure 3: Labour Income Effect - Imperfect pass-through



Note: The solid lines show the average consumption effects of traded goods. The curve is estimated using local polynomial regression. The dotted lines report the 5% confidence bands of the average consumption effects.

Figure 4: Total Effect - Imperfect pass-through



Note: The solid lines show the average consumption effects of traded goods. The curve is estimated using local polynomial regression. The dotted lines report the 5% confidence bands of the average consumption effects.

References

- Attanasio, O., Goldberg, P., Pavcnik, N., 2004, *Trade reforms and income inequality in Colombia*, Journal of Development Economics, 74, pp. 331-366.
- Sourabh Bikas, P., 2009, *Distributional Effects of Tariff Reforms in India*, University of British Columbia, Vancouver.
- Borraz, F., 2012, *Distributive Effects of Regional Trade Agreements on the “Small Trading Partners”: Mercosur and the case of Uruguay and Paraguay*, Journal of Development studies.
- Cherkaoui, M., Khellaf, A., Nihou, A., 2011, *The price Effect of Tariff Liberalization in Morocco: Measuring the Impact on Household Welfare*, ERF Working Paper No. 637.
- Deaton, A., Muellbauer, J., 1980, *An almost ideal demand system*, The American Economic Review, 70(3), pp. 312-326.
- Deaton, A., Muellbauer, J., 1980, *Economics and consumer behaviour*, Cambridge University Press.
- Deaton, A., 1989, *Rice prices and income distribution in Thailand: a non-parametric analysis*, Economic Journal, 99, pp. 1-37.
- Deaton A., 2003, *Measuring poverty in a growing world (or Measuring growth in a poor world)*, NBER Working Paper 9822.
- Dixit A., Norman, V., 1980, *Theory of International Trade. A Dual, General Equilibrium Approach*, Cambridge Economic Handbooks.
- Edmonds, E., Pavcnik, N., 2005, *The effects of trade liberalization on child labor*, Journal of International Economics, 65, pp. 401-419.
- Edmonds, E., Pavcnik, N., Topalova, P., 2008, *Trade Adjustments and Human Capital Investments: Evidence from Indian Tariff Reform*, NBER Working Paper No. 12884.
- Fan, J., 1992, *Design-adaptive non-parametric regression*, Journal of the American Statistical Association, 87, pp. 998-1004.
- Friedman, J., Levinsohn, J. A., 2002, *Distributional impacts of Indonesia’s financial crisis on household welfare: a rapid response methodology*, World Bank Economic Review, 16, pp. 397-423.
- Goh, C., Javorcik, B. S., 2005, *Trade Protection and Industry Wage Structure in Poland*, NBER Working Paper 11143.
- Goldberg, P., Pavcnik, N., 2004, *Trade, inequality, and poverty: what do we know? Evidence from recent trade liberalization episodes in developing countries*, NBER Working Paper 10593.

- Hasan, R., Jandoc, Karl Robert L., 2004, *Trade Liberalization and Wage Inequality in the Philippines*, UP School of Economics, Discussion Paper No. 2010-06.
- Kis-Katos, K., Sparrow, R., 2009, *Child Labor and Trade Liberalization in Indonesia*, IZA Discussion Paper No. 4376.
- Kumar, U., Mishra, P., 2011, *Trade Liberalization and Wage Inequality: Evidence from India*, Working Paper.
- Leyaro, V., Morissey, O., Owens, T., 2009, *Food Price Changes and Consumer Welfare in Tanzania*, CREDIT Research Paper 10/01.
- Marchand, B.U., 2011, *Tariff pass-through and the effect of trade liberalization on household welfare*, University of Alberta, Department of Economics.
- Nicita, A., 2009, *The price effect of trade liberalization: Measuring the impact on household welfare*, Journal of Development Economics, 89, pp. 19-27.
- Noria, G. L., 2010, *The Effect of Trade and FDI on Inter-Industry Wage Differentials: The Case of Mexico* Banco de México Working Papers No. 2011-10.
- Pavcnik, N., Blom, A., Goldberg, P., Shady, N., 2004, *Trade liberalization and industry wage structure: evidence from Brazil*, The World Economic Review, 18, pp. 319-344.
- Porto, G.G., 2006, *Using survey data to assess the distributional effects of trade policy*, Journal of International Economics, 70, pp. 140-160.
- Ravallion, M., 2003, *The debate on globalization, poverty, and inequality: why measurement matters*, World Bank Policy Research Working Paper 3038.
- Revenge, A., 1997, *Employment and wage effects of trade liberalization: the case of Mexican Manufacturing*, Journal of Labor Economics, Vol. 15, pp. S20-43.
- Simler, K. R., 2010, *The Short Term Impact of Higher Food Prices on Poverty in Uganda*, World Bank Policy Research Working Paper No. 5210.
- Tiezzi, S., 2005, *The welfare effects and the distributive impact of carbon taxation on Italian households*, Energy Policy, 12, pp. 1597-1612.
- Vu, S., Glewwe, P., 2008, *Impact of rising food prices and welfare in Vietnam*, University of Minnesota.