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Households' food consumption behavior in Argentina: A quadratic demand system with demographic effects

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The objective of this paper is to analyze household's food consumption behavior in Argentina by comparing two cross sectional estimations of a quadratic demand system (QES). We employ data from the National Expenditure Survey at household level (2004-05 and 2012-13). The estimated system is augmented with demographical variables in order to examine changes across different household types. We estimate quality adjusted prices and we account for any selectivity bias in our data. Additionally, we propose an exercise that consists on calculating equivalence scales from estimated expenditures for each household type. Results allow us to analyze and discuss welfare changes over the last decade. In particular, changes in food consumption are led by alterations in relative prices; inflation process unequally affects consumption of food categories for different types of households, implying that households' budget is being reallocated.

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1. Introduction and Motivation

Household surveys' data availability is a relatively recent phenomenon that has widen empirical welfare analysis, *casting light on a range of policy issues,* as Deaton (1997) highlighted. In Argentina, the first consumption survey of national scope was carried out in 1996-97, the second during 2004-05 and the last one in 2012-13. However, these entire micro-data sets have only been available for the last two years, which promotes new interesting questions, as well as opportunities, to deepen the analysis of changes in food consumption behavior.

The contexts in which the last two national surveys were conducted were significantly different. After 2001's crisis and devaluation, consumer prices increased by 41% in 2002 and real wages dramatically dropped. However, during 2004-05 the country exhibited a lower inflation rate (13%), even though real wages were significantly lagged behind inflation. In contrast, 2012-13's survey was carried out in a more complex and stressed out macroeconomic setting. Since 2007, the decade was characterized by an increasing inflation process and, consequently, the economy showed relevant changes in relative prices. The upward trend in consumer prices followed international food commodities prices. Furthermore, inflationary pressures were reinforced by trade unions, as they strongly advocated for improvements to recover salaries' purchasing power, and by an active public policy of cash transfers to households.

In this sense, consequences of macroeconomics fluctuations frequently imply significant changes in prices and income, which may affect household's expenditure behavior (Darko and Eales, 2013). This potential impact is even more relevant when analyzing food expenditure, because its importance in household budget. Furthermore, due to Argentina's inflationary history and its often-macroeconomic crisis, it has particular weight and consequences upon household welfare and nutrition levels.

We argue that macroeconomic contexts influence asymmetrically the consumption of different food categories, and that consumer behavior depends on household size and composition. The main objective of this paper is to analyze household's food consumption behavior by comparing two cross sectional (2004-05 and 2012-13) estimations of a quadratic demand system (QES) with the inclusion of demographic effects in order to examine changes across different types of households. This paper attempts to shed light on how Argentinean households respond to macroeconomic setting, changes in relative prices of different food categories, and how their demographic structure conditions their behavior.

In order to assess this, demand systems present themselves as a valid method to capture and analyze the impact these changes have on households' food consumption. As Lewbel (1997,

pp.167) indicated, "*one very active area of demand system research concerns welfare and cost effects of changes in (…) demographic characteristics or other attributes of households"*.

Demand systems provide estimates for demographic effects, and therefore their use become appropriate to our purpose. We estimate a QES (Quadratic Expenditure System), proposed by Pollak and Wales (1978) and Howe *et al*. (1979). We introduce demographic profiles (household types) following the procedure defined by Pollak and Wales (1981) known as *translation, i.e.* demographic effects modify quantities demanded by a household additively in the utility function.

Although in Argentina estimation of a complete demand system for food has been scarce, some studies with different functional forms are found. Among them, the LA-AIDS system (Linear Approximation to Almost Ideal Demand System) estimated by Rossini *et al* (2008), the LES system (Linear Expenditure System) by Berges and Casellas (2002), the LINQUAD system (Linear-in-Income, Quadratic-in-Prices Demand) by Depetris Guiguet *et al* (2008) and Lema *et al,* and the QUAIDS system (Quadratic Almost Ideal Demand System) by Pace Guerrero *et al* (2012). Only the last two systems are quadratic in the expenditure logarithm, as Banks *et al* (1997) suggested. Previous research estimated demand systems either with data from the first survey (1996-97) or with a data subset (confined to a specific region) from 2004-05 survey.

Consequently, there is no evidence for Argentina of a demand system estimation for food employing the QES and both 2004-05 and 2012-13 entire data sets. By estimating with the two surveys, we can compare consumer behavior between periods and assess which factors do explain changes in consumption. Furthermore, studies frequently estimate demand system with the objective of analyzing consumer behavior through price or income elasticities. Here, we propose a distinct exercise; we calculate equivalence of scales, *i.e.* the relation between estimated food expenditures for different household types -with a couple as a reference-. Equivalence of scales can have particular relevance when elaborating public policies oriented to improve household well-being.

This paper is organized as follows. First section presents our data source and the food groups defined for the estimation. Second section describes the methodology adopted; system model, demographic variables -types of households-, adjusted prices estimation and the bias correction method employed. Third section analyzes descriptive statistics. Fourth section presents our estimation results, which are discuss in terms of household well-being. Finally, conclusions are drawn with an emphasis on the most relevant factors that determine changes in food consumption behavior as well as challenges left for future research.

2. Data: National Household Expenditure Survey

We estimate a demographically extended Quadratic Expenditure System (QES) based on the National Household Expenditure Survey (ENGH) conducted by Argentina's National Institute of Statistics and Census (INDEC).

This survey is aimed at households located in both urban and rural area, in cities of 5,000 or more inhabitants across the country. It provides data on quantities and expenditures during a one-week period as well as demographic, occupational and educational variables that account for household members' characteristics. The sample used for this analysis includes 7,819 observations for 2004-05 and 5,868 for 2012-13. These subsets of the data were defined according with the type of households selected to estimate the equivalence scales.

In particular, food consumption was aggregated into the following groups[1]: (G1) food away from home (hereafter, FAFH); (G2) non-alcoholic beverages; (G3) alcoholic beverages; (G4) coffee, tea and other infusions; (G5) eggs; (G6) dairy products -except milk-; (G7) milk; (G8) fats and oils; (G9) poultry; (G10) meat -all except poultry-; (G11) bread and cereals; (G12) vegetables and fruits; (G13) sugar and sweets; (G14) meals ready to eat.

3. Methodology

We estimate a well-behaved demand system, *i.e*., a system that satisfies the conditions imposed by economic theory. We employed the Quadratic Expenditure System proposed by Pollak and Wales (1978) and Howe *et al*. (1979).

The choice of the parametric form depends on the properties of the data set and on the implementation approach[2]. In particular, if used for welfare analysis, this choice should be guided through the examination of consumption Engel curves -which are the reduced expression, with respect to prices, of a demand system- (Kohn and Missong, 2002). The QES is quadratic in income, so it allows us to capture the non-linearity of Engel's curve, which constitutes a more adequate representation of the consumer's expenditure behavior-because the share of each good in total expenditure may vary as the household's income varies (Schulte, 2007). Empirical evidence (Barnes and Gillingham, 1984; Banks, *et. al*, 1997; Kohn and Missong, 2002; Galvis Ciro, 2012) suggests that the quadratic form is preferred to linear models for most goods.

[1] G6 includes cheese, cream, butter, yogurt; G7 fluid milk and powder; G8 animal and vegetable oils and fats; G10 beef, pork, lamb, fish, seafood and meat derivatives; G11 wheat flour, rice, pasta, pizza; G13 candies, chocolates, ice cream, honey, marmalades.

[2] A recent experimental comparison between different demand systems can be found in Kakhki*et al*. (2010).

Furthermore, evidence for Argentina (Pizzolitto, 2007; Pace Guerrero, 2013; Echeverría and Berges, 2013) indicates that a non-linear specification of Engel curves provides a better fit.

This system is derived from an indirect utility function which satisfies theoretical conditions, that is, homogeneity of degree zero in prices and income, continuous in prices and non-decreasing in income. The system's equations expressed in expenditure form (multiplying each demand equations by p_i) are the following:

$$p_i x_i = p_i b_i + a_i \left(y - \sum_{k=1}^{n} p_k \, b_k \right) + (p_i c_i - a_i \sum_{k=1}^{n} p_k \, c_k) \prod_{k=1}^{n} p_k^{-2a_k} \left(y - \sum_{k=1}^{n} p_k \, b_k \right)^2 \qquad (1)$$

Where *k =1,…,n* indicates the aggregate food groups; for each *i* of those *n* groups, *p* is the price, *x* is quantity demanded, *y* is total income level; *a, b* and *c* are the parameters of interest. In particular, *b* is the subsistence quantity demanded for each good and *a* and *c* are the linear and quadratic parameters, respectively, of income. If *c* = 0, there is no quadratic term, hence, the equation is reduced to the Linear Expenditure System (LES).

3.1. Household Types

The QES is demographically extended by introducing household characteristics (*z*) into the demand functions, which implies that some parameter must depend on vector *z*. Pollak and Wales (1981) have identified and studied alternative procedures to include these covariates in any demand system.

We apply the *translating method*, which assumes fixed costs for every new member in the household. In (1), these displacement parameters are the subsistence quantities, b_i. Hence, the demographic effects are introduced allowing each b_i linearly depending on z, so that each b_i is replaced for b_i^z ($b_i^z = b_i + \theta_i^z$). Additive parameters θ_i^z are different for each expenditure group, *i.e.*, these factors are specific for each commodity group and each household type. Under this procedure, changes in demographic characteristics operate only through b_i parameters (Pollak and Wales, 1992).

We define six household types according to their demographic profile. In particular, categories were constructed in order to: a) capture the most representative household structure in the country, which allow us to compare results across surveys; b) facilitate the analysis of the impact of an additional member in household expenditure's composition (focusing on children); and c) evaluate the extend of economies of scale (with respect to household size) in food consumption.

Therefore, attention is confined to the following household types: adults couple with no child -reference household- (H1); single adult (H2); adults couple with one child (H3); adults couple with two children (H4); adults couple with three children (H5) and adults couple with more than three children (H6). [3]

3.2. Quality Adjusted Prices

The survey contains data on quantities and expenditures at a household level, but not on prices. Implicit prices or unit values (ratio expenditures to quantities) could be calculated, however some correction should be made in order to account for any quality and regional differences in the commodities purchased by households (Deaton, 1988). Therefore, we estimate quality adjusted prices following Cox and Wohlgenant (1986). Under this procedure, price adjustments are performed by regressing the implicit prices on a vector of covariates, which includes regional, social and demographic characteristics of households.

The variables included are (based on Berges and Casellas, 2002): indicator variables for each trimester[4], geographic region[5], household head's educational level (low if he/she has elementary school, medium if high school and high for college education), head's gender, low income quintile (if the households belongs to the first or second quintile); number of members (household size) and food expenditure share in supermarkets. In addition, for commodity group FAFH we replaced this last covariate for food expenditure share in bar/restaurant and school/work cafeteria.

We estimate the quality adjusted prices by OLS only for households with positive (non-zero) consumption levels. Therefore, when either expenditure or quantity was zero, the adjusted price equals the intercept plus the corresponding regional and trimester coefficients[6]. In addition, this regression admits the possibility that some predicted values may be negative. This situation suggests that, after controlling for quality differences in prices, a household would have to be paid in order to consume that commodity. We deal with this by following the same criteria employed for zero quantities/expenditure observations. Regression results are reported in Table N° 1 while Table N° 2 shows the mean and standard deviation for both implicit and adjusted prices.

3.3. Dealing with Selectivity

[3] Age of children 0 -18 years.
[4] The survey is conducted over four consecutives trimesters.
[5] Argentina's regions are Buenos Aires, Pampeana, Northwest, Northeast, Cuyo y Patagónica.
[6] This procedure allows us to obtain price estimates for households with zero consumption, which do not depend on household characteristics.

Our data exhibits a selectivity problem due to zero household expenditure in certain food groups -dependent variables-. There are several reasons for this to happen: a) infrequency of purchase related to the relatively too short survey period (a week); b) consumers preferences; and c) consumers do not purchase at current prices and income levels (*i.e.*, corner solution).

As reported in Table N° 3, the censoring problem is severe in our samples. Thus, zero expenditure observations involve an empirical difficulty; if non correction is made, we would obtain biased and inconsistent coefficients. In order to address this censoring problem, we used the procedure presented by Shonkwiller and Yen (1999), which is an extension of Heckman's two step technique (1979). In the first step we estimate the consumption probability of each household with a Probit regression for each commodity and obtain the standard normal distribution density $\phi(w_{ij}^{'}\hat{\gamma}_i)$ and cumulative function $\Phi(w_{ij}^{'}\hat{\gamma}_i)$. W_i is a vector of regressors related to the decision to purchase, which includes: household head's gender and age, educational level, geographic region, household total income, squared of income, household size and an interaction between members and income.

In the second step, the demand system (1) is augmented by the estimated normal cumulative function and, in addition, the density function is added as a new explanatory variable. Then, our final specification (2) accounts for any bias resulting from zero values in the dependent variables.

$$p_i x_i = \Phi(w_{ij}^{'}\hat{\gamma}_i)\left[p_i b_i^z + a_i(y - \sum_{k=1}^{14} p_k\, b_k^z) + (p_i c_i - a_i \sum_{k=1}^{14} p_k\, c_k) \prod_{k=1}^{14} p_k^{-2a_k} (y - \sum_{k=1}^{14} p_k\, b_k^z)^2\right] + \delta_i \phi(w_{ij}^{'}\hat{\gamma}_i) \quad (2)$$

We also include two more additive parameters through b_i: an indicator variable for north region[7] (if the household belongs to northwest or northeast region) and low income quintile (if the households belongs to the first or second quintile). Thus, $b_i^z = b_i + \theta_i^z + \theta^{nr} + \theta^{lq}$. Coefficients θ^{nr} (north region) and θ^{lq} (low quintile) do not vary neither across household types nor commodity groups.

Maximum likelihood estimation is applied for the thirteen commodity groups defined. In order to avoid singularity of the variance-covariance matrix of the disturbance terms, we excluded equation "meals ready to eat" from the system. Additive property of demand requires

[7] Indicator variables for the others regions were not significant. Therefore, final specification includes only a north regional indicator.

$\sum_{k=1}^{n} a_k = 1$ (Howe *et al*., 1979) as well as the inclusion of total expenditure in food as an independent variable -instead of household income level[8].

After estimating the system, we construct two groups of equivalence scales. On one hand, a unique scale for each household derived from the ratio between total estimated expenditure for each household type and the reference household. On the other hand, a commodity-specific scale for each household type, which captures expenditure behavior over each commodity considered.

4. Descriptive Data

In this section we present relevant descriptive statistics in order to characterize our data. Sample composition, detailed by household types, is shown in Table N° 4. In both data sets, the most frequent composition is single adult and adult couple with one and two children. Note that family size from H1 to H5 is straightforward. However, composition of H6 indicates that in 2012-13 (2004-05) survey, 52% (47%) of households have four children, 24% (25%) five children, 14% (15%) six children and 10% (13%) more than six. On average, households in H6 have seven members -five children-.

In 2004-05, 49, 6% of observations belong to the lowest tail of Argentina's income distribution[9] and in 2012-13, it increases to 53, 5%. In particular, in 2012-13 (2004-05) survey, H2, H5 and H6 (H2 and H6) exhibit a greater percentage of households in the two lowest income quintiles.

Furthermore, household types not only differ in their composition but also in their consumption behavior. Table N° 5 presents each commodity share in total food expenditure[10].

As expected, food share in total expenditure is relatively high for all household types (table's last row). Naturally, it increases with household size but not proportionally. This might be indicative of some extend of economies scales in food consumption as well as the reallocation or substitution of expenditure in total outlay.

Food groups with a higher share are meat (G10), bread and cereals (G11) and fruits and vegetables (G12), independently of household composition. Additionally, some expenditures increase with the number of children such as bread and cereals, sugar and sweets and milk while

[8]For future works, we will consider improving our estimation by using instrumental variables in order to account for any endogeneity problem.

[9] Note that total number of observations include in the surveys are 29,138 for 2004-05 and 20,954 for 2012-13. Some observations had to be eliminated because they exhibit some degree of inconsistency. Additionally, we confine our analysis to the six household types defined.

[10] Shares allow us to compare between periods. We do not present here the mean expenditure of each food group due to the distortion introduced by the high inflation rate between our surveys.

food away from home, meals ready to eat and alcoholic beverages (and dairy products in 2004-05) decrease. These last groups, as well as infusions, exhibit higher shares in a single adult household. Other commodity groups are less sensitive to the presence of children, which implies that shares are relatively similar across household types (*e.g.*, non-alcoholic beverages, eggs, infusions, fruits and vegetables).

Consumption behavior -analyzed in terms of shares- is somehow different for household type H6 (couple with more than three children) compare to household with one, two and three children. For H6, milk and dairy products shares (typically increasing with children) are lower. This could be explained by the fact mentioned above; H6 has a higher proportion of observations in the lowest income quintiles.

Between periods, shares for food away from home, alcoholic beverages and oils and fats decreased while non-alcoholic beverages, poultry, meat and meals ready to eat increased. These changes in food consumption could be a consequence of changes in preferences and relative prices. Despite this, total food share for each household type was relatively constant between surveys. We observe a reduction in food share only for H6, which could be related to the larger proportion of observations in H6 that belong to the lowest income quintile-in survey 2012-13 relative to 2004-05-.

5. Estimation results

Our system estimates a total of 126 parameters. For each of the 14 food groups; subsistence quantities for the reference household (b_i^{H1}), expenditure coefficients –lineal (a_i) and quadratic (c_i)-, dummies coefficients for the 1 - 6 households types defined (θ_i^Z), and coefficients for the variable introduced (the normal density estimated from the probit) to adjust cero consumption bias (δ_i). Additionally, there are 2 dummies coefficients which indicate if the household belongs to the lowest two income distribution quintiles (θ^{lq}) and the northern region (θ^{nr}). A total of 76% parameters are significant at a 0.05 probability level, as shown in Table N° 6 and Table N° 7.

Most of subsistence quantities -except for meals ready to eat (G14) in both estimations and for milk (G7) in 2012/13- are negatives. Though this result did not have the expected sign, it suggests that families need to be subsidized to consume at a zero income level. Consumption of all food groups rises as the total food expenditure increases, so they are normal goods for all households -as it is expected considering the wide definition of our groups-. According to the magnitude of expenditure coefficients, households increase relatively more their consumption of food away from home (G1), poultry (G9), meat (G10), alcoholic beverages (G3), dairy products

(G6) and meals ready to eat (G14) -the latter only in 2012-13-. However, consumption of these goods rises with income less than proportionally, as it is indicated by quadratic estimates. On the other hand, those goods whose linear coefficients are relatively lower have positive quadratic expenditure terms; they increase at an increasing rate. This is the case of non-alcoholic beverages (G2), fruits and vegetables (G12), bread and cereals (G11) and sweets (G13).

The low quintile income coefficient has a positive sign, so subsistence quantities for these families are higher -or less negative-. This is explained by the relatively lower adjusted prices estimated for these families: they consume goods whose quality composition corresponds to lower prices. The same explanation can be suited for the positive sign of the northern region indicator in the 04-05 estimation.

Demographic effects included (six types of households) exhibit the expected signs, although not all of them are significant in every food category. A single adult household (H2), compared with a married couple (H1), has a higher consumption in FAFH but a lower consumption in the remaining categories. Meanwhile, a couple with one (H3), two (H4), three (H5) or more (H6) children have -in general- a higher consumption in all food groups. However, their consumption does not increase proportionally with the number of children. Furthermore, it is possible to observe a lower expenditure level in the case of certain goods, as meals ready to eat. Evidence suggests that household's consumption behavior exhibits economies of scales as well as substitution effects among food groups.

Both findings taken together can be better described by equivalence scales (relation between estimated expenditures for each household type defined, with a couple without children as a reference) obtained from the estimated mean expenditures. Table N° 8 presents the equivalence scales for each food group, and a total scale that captures the estimated equivalence in the overall food expenditure (last row). We report scales as an exercise to further discuss food consumption behavior captured by the system mean estimates.

Scales indicate that a single adult household spends 34% less than a married couple sharing their budget, but the extend economies of scale vary according to the food group considered. In fact, FAFH expenditure is 11% higher and alcoholic beverages consumption is almost the same. However, meat and fruit and vegetables expenditures are about half.

The presence of one child in the household increases food expenditures of a couple by 10% and 8%, in 2004-05 and 2012-13, respectively. Despite food expenditure is one of the budget items that increases with family size, a child implies additional expenditures but not additional income, so the same household budget must be redistributed. In both periods, estimated scales are higher

in milk (50%), sugar and sweets (30%), bread and cereals (15%), non-alcoholic beverages (32%), dairy products (31%), eggs (16%) and meat (14%). Scales for the last four categories are lower (13%, 18%, 11% and 7%, respectively) in 2012-13. Since scales for the other food groups are lower or closer to one, our evidence suggests that the mentioned categories probably are 'child-oriented'.

Additionally, a higher number of children in the household does not consistently increase food budget in the first survey. In particular, one child implies a 10% additional food expenditure while two, three and more children 19%, 20% and 13%, respectively. This is not a surprising result because the period 2004-2005 was two years after Argentina's great depression (after 2001's devaluation) and real wages had not yet recovered. In contrast, estimations for the last survey indicate that in households with two, three and more than three children, food expenditures increase by 23%, 28% and 30%, respectively.

Some categories like non-alcoholic beverages, dairy products, poultry, meat and fruits, and vegetables exhibit important variations between periods. This can be explained by the changes in relative adjusted prices -related to Argentina's inflationary process. Table Nº 9 presents relative adjusted prices for each surveys (we consider "bread and cereals" adjusted price as the reference) as well as the adjusted price mean percentage change.

As it can be observed, price alterations during these 8 years have been particularly relevant. The adjusted prices that exhibited major increases are non-alcoholic beverages (629%), food away from home (495%), fruit and vegetables (466%), while oils and fats (197%), poultry (299%) and meals ready to eat (281%) are the categories that increased less. In light of calculated relative prices, changes in scales between periods can be seen as the result of substitution effects between food categories. Larger households, as H5 y H6, consume relatively more poultry, oils and fats, bread and cereals and dairy products.

A significant consideration to better understand consumption behavior behind the estimated equivalence scales is the income distribution across household types. We calculate the same scales after segmenting the sample into low and high income (Table N° 10). Evidence suggests that relatively poorer families exhibit lower scales for food expenditures. Those families not only spend a larger food share of their budget, as Engel's Law predicts, but they also have less options to modify their consumption in favor of cheaper goods -because they probably are already consuming them. Furthermore, this regressive effect is stronger in a context of high inflation rates, leaving households more vulnerable to macroeconomic context, which has no desirable consequences upon their nutrition level.

7. Final Remarks

The objective of this paper was to analyze household's food consumption behavior in Argentina by comparing two cross sectional estimations of a quadratic demand system (QES). We employed data from the National Expenditure Survey at household level (2004-05 and 2012-13). The estimated system was augmented with demographic variables in order to examine changes across different household types. Additionally, we estimated quality adjusted prices and we accounted for any selectivity bias in our data.

Our estimates indicate that differences in consumption behavior are explained by household composition, prices, income level and geographical region. In particular, we focus our attention in two determining factors.

On one hand, we analyze how demographic characteristics affect household expenditure. We find evidence of economies of scales in consumption; household expenditures increase less than proportionally with family size but its magnitude depends on the food category. In addition, we observe a significant substitution effect among food groups, which implies that households reallocate their budget as family size modifies. In order to extend this analysis we construct equivalence of scales from the estimated expenditures for each household type.

Our evidence suggests that food share increases according to household size and composition, which is expected because food groups are necessity goods. However, this effect is greater for families with a large number of children. Equivalence scales estimated for different food group expenditures show that if the number of children in the household rises to two, three and more than three, food expenditures increase by a 23, 28 y 30%, respectively. Additionally, we find that some categories are child-specific because they are rather sensitive to an increasing number of children. In particular, the most sensible categories are bread and cereals, sweets, eggs, milk and oils and fats (these expenditures have increases from 30 to 70%), while FAFH, meals ready to eat and alcoholic beverages decrease. It may be hypothesized that children nutrition basically depends on bread and cereals, sweets, eggs, milk, oils and fats and chicken, despite other food categories -like meat or fruits and vegetables- have better quality proteins or less fatter.

In this sense, in Argentina there is a variety of public policies oriented to ameliorate the condition of the most vulnerable households, such as the Universal Child Allowance (which consist of a constant cash transfer for each child in families with a low income) or meals at school in public education institutions located in poorest neighborhoods. These programs may have contributed to alleviate their current situation. However, new lines for future research should be oriented on better investigate if these public policies truly translate into more nutrient

dense food consumption and thus if it increases children's diet quality. Furthermore, it remains interesting to explore how revealed consumption behavior affect nutrition levels when budget constrain is operative, focusing on children and households in the lowest income quintiles.

On the other hand, we analyze how relative prices and inflation process imply different estimates in our surveys, and hence condition equivalence scales. We find that changes in food consumption in Argentinean households between periods are led by changes in the main food groups' relative prices. In addition, our results indicate that even though prices of all food categories have risen –and, even more, the increase in the Food Price was greater than the General Price Index-, inflation unequally affects consumption of different food groups.

Our results indicate that macroeconomic context strongly affects household consumer behavior. We note that changes in scales are the result of strong variations in prices, through the mechanism of substitution effects between food categories. When comparing scales for 04-05 and 12-13 (scales for 04-05 are relatively lower), we observe that our estimates do not exhibit great increases with family size in a setting with a modest and lagged-behind-inflation real wage growth. Hence, substitution effect under this context implies that families, practically regardless of their demographic composition, respond to chances in prices and to uncertainties by adjusting their purchases and by reallocating their budget without significantly increasing it. In 2012-13 scales are higher, and thus this reallocation process was more relaxed. Even though food prices exhibited substantial increases during this last period, this was probably compensated by the recovery of real wages, compared to 2004-05, and by public policies of cash transfer programs. In future research we could analyze the immediate effects macroeconomic setting has over nutrition levels in the most vulnerable population.

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Table N° 1 - Adjusted Price Regression (OLS) for 2004-05 and 2012-13 (next page)

Variables	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14
Region: Buenos Aires	-0.044	0.059	0.025	-0.923***	-0.003*	0.020	-0.076***	-0.071	-0.122	0.514***	0.406***	0.169***	0.499**	-0.200
	(0.162)	(0.060)	(0.067)	(0.297)	(0.001)	(0.143)	(0.024)	(0.051)	(0.082)	(0.070)	(0.035)	(0.024)	(0.251)	(0.317)
Region: Northwest	-1.157***	-0.149***	-0.291***	0.151	0.009***	-1.087***	0.151***	-0.231***	-0.204***	-0.578***	-0.554***	-0.357***	-1.647***	-1.77***
	(0.171)	(0.048)	(0.059)	(0.377)	(0.001)	(0.16)	(0.046)	(0.041)	(0.074)	(0.060)	(0.026)	(0.017)	(0.190)	(0.306)
Region: Northeast	-0.524*	-0.079	-0.419***	-2.453***	0.011***	-0.686***	0.153***	-0.168***	-0.344***	-1.390***	-0.377***	-0.149***	-1.431***	-1.19***
	(0.269)	(0.059)	(0.058)	(0.283)	(0.002)	(0.205)	(0.049)	(0.051)	(0.080)	(0.062)	(0.034)	(0.023)	(0.239)	(0.417)
Region: Cuyo	-0.716***	-0.350***	-0.104	1.794***	0.013***	-0.0551	0.297***	-0.005	0.0153	-0.159**	-0.449***	-0.254***	-1.076***	1.006**
	(0.225)	(0.053)	(0.085)	(0.481)	(0.002)	(0.184)	(0.073)	(0.057)	(0.100)	(0.067)	(0.032)	(0.020)	(0.245)	(0.465)
Region: Patagónica	1.147***	0.229***	0.576***	-0.0245	0.037***	0.413**	0.174***	0.109	0.471***	1.157***	0.438***	0.423***	1.282***	2.093***
	(0.331)	(0.073)	(0.103)	(0.444)	(0.002)	(0.202)	(0.043)	(0.071)	(0.101)	(0.090)	(0.044)	(0.031)	(0.326)	(0.477)
Low quintile	-0.849***	-0.310***	0.073	-0.591**	-0.002*	-0.181	0.027	-0.142***	-0.331***	-0.755***	-0.368***	-0.125***	-1.374***	0.470**
	(0.126)	(0.036)	(0.045)	(0.237)	(0.001)	(0.111)	(0.029)	(0.032)	(0.054)	(0.045)	(0.021)	(0.014)	(0.158)	(0.233)
Head's gender	0.026	-0.183**	-0.158**	0.168	-0.002	0.272	0.057*	-0.0477	-0.108	-0.135*	-0.113***	-0.013	-0.703***	-0.614*
	(0.174)	(0.076)	(0.077)	(0.329)	(0.001)	(0.158)	(0.032)	(0.054)	(0.087)	(0.069)	(0.035)	(0.022)	(0.256)	(0.371)
Household size	-0.260***	-0.0433***	0.019	-0.0469	-0.001***	-0.198***	-0.012	-0.046***	-0.102***	-0.204***	-0.0926***	-0.042***	-0.286***	0.163**
	(0.031)	(0.009)	(0.012)	(0.0569)	(0.0003)	(0.033)	(0.007)	(0.008)	(0.014)	(0.011)	(0.004)	(0.003)	(0.033)	(0.064)
High educ level	0.464***	0.081	0.181***	-0.0551	0.0005	0.127	0.041	0.162***	0.281***	0.513***	0.408***	0.109***	1.012***	0.218
	(0.154)	(0.066)	(0.066)	(0.349)	(0.001)	(0.146)	(0.033)	(0.060)	(0.087)	(0.071)	(0.037)	(0.022)	(0.261)	(0.298)
Low educ level	-0.279**	-0.146***	-0.109**	-0.529**	0.002*	0.018	0.003	-0.0919***	-0.149***	-0.365***	-0.197***	-0.028*	-0.692***	0.337
	(0.139)	(0.039)	(0.049)	(0.252)	(0.001)	(0.12)	(0.029)	(0.035)	(0.056)	(0.047)	(0.021)	(0.015)	(0.162)	(0.255)
Food share in supermarkets	-	0.066	0.157**	0.295	-0.003**	-0.599***	-0.002	0.028	-0.077	0.158**	0.0973**	0.0823***	-0.249	-0.148
		(0.054)	(0.067)	(0.275)	(0.001)	(0.133)	(0.028)	(0.043)	(0.076)	(0.065)	(0.042)	(0.020)	(0.185)	(0.330)
First trimester	-0.257	-0.111**	0.030	-0.772**	-0.006***	0.0314	-0.054	0.0537	-0.037	-0.200***	-0.091***	-0.150***	-0.334	-0.277
	(0.165)	(0.049)	(0.059)	(0.309)	(0.001)	(0.144)	(0.037)	(0.044)	(0.076)	(0.061)	(0.029)	(0.019)	(0.215)	(0.301)
Second trimester	-0.196	0.048	0.040	0.604*	0.008***	0.688***	-0.005	0.0389	-0.114	-0.0453	0.00966	-0.172***	-0.472**	0.378
	(0.163)	(0.052)	(0.057)	(0.319)	(0.001)	(0.146)	(0.035)	(0.046)	(0.071)	(0.061)	(0.030)	(0.020)	(0.208)	(0.313)
Third trimester	0.279	-0.017	0.138**	0.296	0.0128***	0.7292***	0.038	-0.0280	0.204***	0.124**	-0.032	-0.140***	-0.120	0.605*
	(0.171)	(0.051)	(0.062)	(0.322)	(0.001)	(0.151)	(0.035)	(0.044)	(0.074)	(0.059)	(0.029)	(0.019)	(0.219)	(0.323)
Constant	5.819***	3.171***	1.607***	7.534***	0.193***	7.995***	1.502***	3.292***	5.307***	7.988***	3.078***	1.690***	7.657***	7.173***
	(0.268)	(0.098)	(0.098)	(0.503)	(0.002)	(0.234)	(0.054)	(0.074)	(0.127)	(0.100)	(0.051)	(0.033)	(0.371)	(0.505)
Observations	2,138	2,251	6,015	2,859	4,402	5,079	3,571	2,339	3,208	6,999	7,477	7,013	5,010	4,441
Adj. R Squared	0.118	0.100	0.035	0.050	0.106	0.036	0.025	0.073	0.071	0.265	0.308	0.211	0.095	0.027

Notes: i) Standard errors reported in brackets; ii) dependent variables are implicit prices for each commodity group.

Variables	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14
Region:	-5.310***	0.673	1.995	1.893	0.006	1.348	-0.792***	-0.0642	-1.308**	0.647	0.739**	-0.200	-3.125	2.234
Buenos Aires	(1.529)	(1.082)	(1.460)	(1.853)	-0.018	0.995)	(0.205)	(0.356)	(0.580)	(0.602)	(0.292)	(0.183)	(2.252)	(1.663)
Region:	-5.322***	-2.047***	0.086	9.686***	0.039***	-2.846***	0.583***	1.153***	-1.309***	-1.513***	-2.545***	-1.854***	-7.238***	-4.743***
Northwest	(1.353)	(0.748)	(0.709)	(1.583)	-0.011	0.766)	(0.221)	(0.244)	(0.377)	(0.400)	(0.183)	(0.122)	(1.650)	(1.210)
Region:	2.502	-3.960***	0.534	-1.668	0.008	-5.477***	1.674***	0.751***	-2.747***	-7.452***	-2.912***	-1.134***	-5.950***	-7.083***
Northeast	(1.588)	(0.747)	(0.724)	(1.319)	-0.012	0.807)	(0.256)	(0.258)	(0.388)	(0.397)	(0.187)	(0.132)	(1.808)	(1.231)
Region:	-1.417	3.827***	0.529	6.778***	-0.026**	2.265**	1.074***	-0.579*	-1.022**	-1.478***	-2.549***	-1.179***	-8.897***	-1.612
Cuyo	(1.877)	(1.147)	(0.906)	(1.914)	(0.013)	0.968)	(0.396)	(0.304)	(0.478)	(0.459)	(0.213)	(0.158)	(1.857)	(1.540)
Region:	1.477	2.092**	2.664**	0.480	0.226***	3.931***	0.483*	0.679	2.160***	6.480***	0.720***	1.416***	5.114**	7.180***
Patagónica	(1.760)	(1.053)	(1.054)	(1.739)	(0.018)	1.048)	(0.281)	(0.512)	(0.623)	(0.605)	(0.273)	(0.189)	(2.345)	(1.756)
Low quintile	-4.578***	3.329***	-3.047***	-1.776*	-0.015*	-2.516***	0.553***	-0.0852	-1.198***	-3.062***	-1.565***	-0.589***	-5.159***	-0.829
	(0.968)	(0.539)	(0.572)	(1.062)	-0.008	0.537)	(0.190)	(0.175)	(0.263)	(0.274)	(0.124)	(0.0821)	(1.143)	(0.828)
Head's gender	0.999	-0.730	0.233	-2.252*	-0.001	0.291	0.295	-0.521**	0.0567	0.474	-0.253	0.0813	0.190	-0.0409
	(1.113)	(0.651)	(0.797)	(1.356)	-0.009	0.635)	(0.191)	(0.255)	(0.328)	(0.352)	(0.159)	(0.0994)	(1.481)	(1.018)
Household size	-1.188***	0.652***	-0.425***	-0.852***	-0.006***	-1.653***	0.221***	-0.0705	-0.444***	-1.085***	-0.367***	-0.188***	-1.514***	-0.220
	(0.295)	(0.171)	(0.145)	(0.268)	-0.002	0.160)	(0.0641)	(0.0516)	(0.0739)	(0.0776)	(0.0320)	(0.0221)	(0.327)	(0.224)
High educ level	1.318	-0.925	2.365***	0.487	0.006	-0.129	-0.162	0.724***	0.957***	1.795***	1.146***	0.512***	6.530***	2.291**
	(1.013)	(0.573)	(0.736)	(1.306)	-0.010	0.641)	(0.200)	(0.265)	(0.358)	(0.352)	(0.170)	(0.111)	(1.537)	(0.976)
Low educ level	0.235	-0.098	-0.712	-1.280	-0.007	0.395	0.0356	0.0753	-0.704***	-1.698***	-0.976***	-0.235***	-3.795***	0.674
	(1.240)	(0.614)	(0.547)	(1.118)	-0.008	0.601)	(0.222)	(0.172)	(0.267)	(0.293)	(0.119)	(0.0849)	(1.054)	(0.971)
Food share in	-	-0.193	0.413	-0.965	-0.008	0.103	-0.0486	-0.227	-0.384	-0.256	0.410***	0.323***	-0.0621	0.288
supermarkets		(0.600)	(0.342)	(0.606)	-0.007	0.478)	(0.123)	(0.214)	(0.279)	(0.238)	(0.141)	(0.0987)	(0.656)	(0.841)
First trimester	-5.479***	-0.501	-0.568	-1.052	-0.116***	-1.708**	-1.077***	-0.975***	-2.285***	-2.276***	-1.311***	-1.707***	-0.0819	-3.814***
	(1.270)	(0.686)	(0.685)	(1.407)	-0.010	0.706)	(0.226)	(0.233)	(0.351)	(0.369)	(0.164)	(0.109)	(1.533)	(1.140)
Second trimester	-3.140**	-0.129	0.296	1.046	-0.037***	-0.006	0.176	-0.598***	-2.389***	-1.177***	-1.103***	-1.111***	-1.225	-1.659
	(1.332)	(0.696)	(0.697)	(1.422)	(0.0101)	0.711)	(0.263)	(0.215)	(0.347)	(0.355)	(0.163)	(0.102)	(1.437)	(1.159)
Third trimester	-3.003**	-0.016	-0.430	-1.126	-0.030***	-0.413	-0.304	-0.338	-0.824**	-0.979***	-0.631***	-0.0239	-1.378	-1.409
	(1.387)	(0.696)	(0.643)	(1.310)	(0.009)	0.709)	(0.237)	(0.233)	(0.341)	(0.356)	(0.160)	(0.106)	(1.503)	(1.145)
Constant	36.21***	10.16***	16.11***	36.26***	0.901***	37.18***	5.886***	9.538***	23.55***	41.39***	15.41***	9.710***	37.07***	31.89***
	(2.019)	(1.108)	(1.147)	(2.071)	(0.017)	1.112)	(0.360)	(0.384)	(0.581)	(0.580)	(0.277)	(0.178)	(2.686)	(1.710)
Expenditure share in	-2.139**													
bar/restaurant	(0.855)	-	-	-	-	-	-	-	-	-	-	-	-	-
Expenditure share in	-0.253													
school/work cafeteria	(0.286)	-	-	-	-	-	-	-	-	-	-	-	-	-
Observations	1,114	4,750	1,486	2,070	2,846	4,111	2,789	1,717	3,477	5,123	5,618	5,178	3,642	3,864
Adj. R Squared	0.116	0.032	0.075	0.050	0.133	0.076	0.055	0.056	0.080	0.254	0.239	0.234	0.065	0.039

Notes: i) Standard errors reported in brackets; ii) dependent variables are implicit prices for each commodity group.

Table N° 2 - Price Statistics

Commodity Groups	2004-05				2012-13			
	Unit values		Adjusted Prices		Unit values		Adjusted Prices	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
FAFH (G1)	4.45	2.86	5.23	0.93	26.90	15.26	31.11	4.48
Non-alcoholic Bev (G2)	1.58	1.71	1.60	0.31	12.11	16.92	11.67	3.07
Alcoholic Bev (G3)	2.63	0.90	2.97	0.30	14.64	10.03	16.14	1.85
Infusions (G4)	6.75	5.99	7.13	1.27	32.64	22.49	37.05	5.81
Eggs (G5)	0.20	0.04	0.20	0.01	0.85	0.21	0.88	0.09
Dairy Products (G6)	7.46	3.76	7.66	0.74	29.35	16.25	31.21	5.06
Milk (G7)	1.59	0.77	1.59	0.12	7.41	4.66	6.77	1.14
Edible oils & fats (G8)	2.91	0.79	3.14	0.21	8.97	3.48	9.36	0.77
Poultry (G9)	4.61	1.52	5.00	0.46	18.87	7.38	19.94	2.40
Meat (G10)	6.60	2.08	6.75	1.13	33.98	10.50	34.78	5.62
Bread & Cereals (G11)	2.37	1.07	2.40	0.60	11.12	4.88	11.25	2.43
Fruits & Veg. (G12)	1.33	0.66	1.36	0.31	7.58	3.14	7.69	1.53
Sugar & Sweets (G13)	4.45	5.50	5.40	1.95	25.16	31.63	28.09	7.95
Meals ready to eat (G14)	7.50	7.48	7.37	1.24	27.66	24.29	28.11	4.93

Table N° 3 - Observations with zero value (as percentages)

Groups	2004-05	2012-13
FAFH (G1)	72.7	81
Non-alcoholic Bev (G2)	23.1	19.1
Alcoholic Bev (G3)	71.2	74.7
Infusions (G4)	63.4	64.7
Eggs (G5)	43.7	51.5
Dairy Products (G6)	35	29.9
Milk (G7)	54.3	52.5
Edible oils & fats (G8)	70.1	70.7
Poultry (G9)	59	40.7
Meat (G10)	10.5	12.7
Bread & Cereals (G11)	4.4	4.3
Fruits & Veg. (G12)	10.3	11.8
Sugar & Sweets (G13)	35.9	37.9
Meals ready to eat (G14)	43.2	34.2

Table N° 4 - Household Types

Household Types	Description	2004-05	2012-13
H1	Adults couple no child (reference household)	14.3%	16.9%
H2	Single adult	19.3%	24.3%
H3	Adults couple with one child	18.7%	21.1%
H4	Adults couple with two children	21.7%	21.1%
H5	Adults couple with three children	12.7%	10.2%
H6	Adults couple with more than three children	13.3%	6.5%
Total		7,819	5,868

Note: Age of children 0-18 years

Table N° 5 - Shares by household types (as percentages)

Commodity Groups	2004-05						2012-13					
	H1	H2	H3	H4	H5	H6	H1	H2	H3	H4	H5	H6
FAFH (G1)	12.5	20.1	9.0	8.3	6.9	5.0	6.6	10.5	6.3	5.0	4.0	2.6
Non-alcoholic Bev (G2)	6.4	6.8	7.8	7.6	7.5	6.6	7.9	8.8	8.3	8.2	8.0	7.9
Alcoholic Bev (G3)	3.3	4.4	2.4	2.0	2.1	2.0	2.8	3.9	1.8	1.9	1.6	1.4
Infusions (G4)	1.9	2.2	1.7	1.6	1.5	1.6	2.1	2.4	1.8	1.6	1.6	1.7
Eggs (G5)	1.5	1.3	1.6	1.7	1.7	1.9	1.3	1.2	1.4	1.3	1.4	1.5
Dairy Products (G6)	6.0	5.6	7.1	6.5	5.8	4.5	5.9	5.5	6.4	6.5	5.9	5.2
Milk (G7)	2.3	1.9	3.3	3.5	3.5	2.8	2.0	2.1	2.8	3.0	2.9	2.1
Edible oils & fats (G8)	1.4	1.3	1.5	1.4	1.6	1.8	1.0	0.9	1.0	0.9	1.1	1.3
Poultry (G9)	6.0	4.2	5.5	5.4	5.2	5.1	6.9	5.8	7.3	8.0	8.4	9.5
Meat (G10)	24.9	19.6	25.8	26.8	27.7	29.1	26.3	20.5	26.3	26.7	26.1	27.1
Bread & Cereals (G11)	13.9	12.2	14.8	15.9	17.7	20.9	13.4	12.2	14.3	15.2	17.4	19.8
Fruits & Veg. (G12)	11.2	9.2	10.3	10.2	10.1	10.5	12.3	10.1	11.3	10.9	11.6	11.0
Sugar & Sweets (G13)	3.1	3.1	3.6	4.0	4.3	4.3	3.0	2.9	3.6	3.7	3.9	4.0
Meals ready to eat (G14)	5.5	8.2	5.4	5.0	4.5	3.7	8.3	13.3	7.4	7.1	5.9	4.7
Food	35	35.4	37.2	38.3	41.1	48.3	35.6	35.4	37.5	37.9	41.3	45.7

Table N° 6- System Results for 2004-05

Groups	$\widehat{a_\iota}$	$\widehat{b_\iota}$	$\widehat{\theta_\iota^{H2}}$	$\widehat{\theta_\iota^{H3}}$	$\widehat{\theta_\iota^{H4}}$	$\widehat{\theta_\iota^{H5}}$	$\widehat{\theta_\iota^{H6}}$	$\widehat{c_\iota}$	$\widehat{\delta_\iota}$	$\widehat{\theta}^{nr}$	$\widehat{\theta}^{lq}$	Adjusted R Squared
G1	0.1433*** (0.003)	-27.487*** (1.19)	2.930*** (1.051)	-2.931*** (1.014)	0.128 (0.983)	1.808 (1.19)	8.888*** (1.165)	-0.0001*** (1.94E-5)	-4.512 (4.371)	0.5602*** (0.0467)	0.1486*** (0.0343)	0.347
G2	0.015*** (0.001)	-29.268*** (1.27)	-3.818*** (1.053)	5.072*** (0.8967)	8.129*** (0.847)	9.706*** (0.936)	11.315*** (0.990)	0.0003*** (1.73E-5)	26.382*** (3.460)	-	-	0.286
G3	0.149*** (0.003)	-44.690*** (1.314)	-0.661 (0.682)	0.173 (0.622)	1.188** (0.620)	2.863*** (0.787)	6.729*** (0.902)	-0.000813*** (3.56E-5)	22.974*** (2.587)	-	-	0.357
G4	0.033*** (0.001)	-0.4317 (0.271)	-0.343** (0.154)	0.123 (0.133)	0.258** (0.126)	0.3201** (0.144)	0.505*** (0.147)	3.87E-6*** (0.000)	-31.598*** (2.226)	-	-	0.102
G5	0.014*** (0.0007)	-56.026*** (5.632)	-13.022*** (2.835)	5.448** (2.307)	12.046*** (2.265)	13.388*** (2.613)	22.680*** (3.0269)	-0.000773*** (0.0000812)	1.723 (1.569)	-	-	0.107
G6	0.0731*** (0.0018)	-10.153*** (0.349)	-1.115*** (0.214)	0.649*** (0.184)	0.922*** (0.172)	0.778*** (0.200)	0.844*** (0.222)	-9.97E-5*** (7.37E-6)	19.115*** (2.018)	-	-	0.366
G7	0.0230*** (0.001)	-19.626*** (1.404)	-2.671*** (1.036)	5.473*** (0.794)	7.939*** (0.754)	8.843*** (0.808)	8.471*** (0.833)	-7.58E-5*** (0.0000184)	6.3561 (1.673)	-	-	0.152
G8	0.079*** (0.0018)	-27.152*** (0.842)	-1.785*** (0.389)	0.7132** (0.319)	1.539*** (0.300)	2.652*** (0.333)	4.652*** (0.387)	-0.0004*** (0.0000185)	25.753*** (2.125)	-	-	0.332
G9	0.2264*** (0.004)	-40.198*** (0.955)	-2.492*** (0.445)	0.505 (0.372)	1.731*** (0.348)	2.808*** (0.409)	5.145*** (0.465)	-0.000781*** (0.0000336)	60.511*** (3.785)	-	-	0.454
G10	0.119*** (0.002)	-21.099*** (0.883)	-3.231*** (0.700)	0.496 (0.577)	2.787*** (0.531)	3.599*** (0.615)	5.203*** (0.671)	8.75E-6 (0.000009)	-74.689*** (9.171)	-	-	0.497
G11	0.045*** (0.0008)	-22.437*** (0.935)	-4.828*** (0.783)	1.892** (0.676)	6.299*** (0.617)	9.732*** (0.732)	16.6*** (0.784)	0.000044*** (8.41E-6)	-6.286 (11.892)	-	-	0.447
G12	0.0256*** (0.0009)	-11.998*** (1.329)	-6.283*** (1.100)	-1.333 (0.931)	0.513 (0.886)	0.375 (1.034)	1.721 (1.178)	0.00017*** (0.0000147)	-71.064*** (5.718)	-	-	0.323
G13	0.023*** (0.0008)	-3.129*** (0.281)	-0.215 (0.199)	-0.208 (0.173)	0.131 (0.167)	0.180 (0.194)	-0.274 (0.244)	-3.89E-6 (0.00000292)	-18.040*** (2.622)	-	-	0.285
G14	0.0293 -	17.043*** (0.861)	-0.0223 (1.011)	1.715** (0.882)	0.790 (0.805)	0.378 (0.923)	-2.793*** (0.927)	-0.0005*** (0.0000214)	-	-	-	-

Note: i) Standard errors reported in brackets; ii) low income quintile ($\hat{\theta}^{lq}$) and north region ($\hat{\theta}^{nr}$) coefficients are the same for all household types and commodity groups, as explained above; iii) the system does not provide standard errors for $\widehat{a_{14}}$ and estimates for δ_{14}because equation G14 is residual in our system in order to compel with the additive condition required in demand theory.

Table N° 7 - System Results for 2012-13

Groups	$\widehat{a_i}$	$\widehat{b_i}$	$\widehat{\theta_i^{H2}}$	$\widehat{\theta_i^{H3}}$	$\widehat{\theta_i^{H4}}$	$\widehat{\theta_i^{H5}}$	$\widehat{\theta_i^{H6}}$	$\widehat{c_i}$	$\widehat{\delta_i}$	$\widehat{\theta}^{nr}$	$\widehat{\theta}^{lq}$	Adjusted R Squared
G1	0.1420*** (0.003)	-28.807*** (1.312)	2.195** (0.981)	3.700*** (0.953)	5.152*** (0.927)	9.207*** (1.257)	14.827*** (1.455)	0.0002 (0.000)	63.199*** (21.91)	-0.0249 (0.0520)	0.1632*** (0.0437)	0.189
G2	0.019*** (0.001)	-11.912*** (1.084)	-0.048 (0.874)	1.130 (0.806)	2.589*** (0.792)	3.277*** (0.877)	5.219*** (0.967)	0.0003*** (0.000)	-66.183*** (24.08)	-	-	0.308
G3	0.118*** (0.005)	-27.826*** (1.429)	1.264* (0.737)	-0.268 (0.773)	2.499*** (0.777)	4.136*** (1.085)	8.056*** (1.713)	-0.0005*** (0.000)	0.758 (14.19)	-	-	0.189
G4	0.020*** (0.001)	-8.030*** (0.295)	0.070 (0.149)	-0.066 (0.148)	0.197 (0.147)	0.729*** (0.175)	1.434*** (0.195)	0.0000 (0.000)	193.116*** (10.89)	-	-	0.273
G5	0.014*** (0.001)	-81.464*** (7.885)	-10.065*** (2.522)	4.933 (3.109)	9.740*** (3.159)	16.465*** (3.703)	28.750*** (4.599)	-0.0006*** (0.000)	25.994*** (7.609)	-	-	0.108
G6	0.069*** (0.002)	-6.870*** (0.417)	-0.467*** (0.209)	0.134 (0.196)	0.388*** (0.196)	0.327 (0.241)	0.509 (0.322)	-0.0001*** (0.000)	16.913 (13.671)	-	-	0.378
G7	0.005*** (0.000)	27.123*** (1.538)	0.740 (0.82)	0.213 (0.665)	-0.685 (0.679)	-2.195*** (0.748)	-7.818*** (0.887)	0.0001*** (0.000)	-231.75*** (12.919)	-	-	0.234
G8	0.008*** (0.001)	-17.037*** (0.213)	-0.951*** (0.5)	0.444 (0.439)	1.497*** (0.442)	3.246*** (0.499)	5.278*** (0.584)	0.0001*** (0.000)	88.027*** (9.778)	-	-	0.11
G9	0.136*** (0.006)	-27.454*** (1.394)	-1.805*** (0.592)	1.576*** (0.515)	3.731*** (0.533)	5.281*** (0.64)	8.749*** (0.793)	-0.0005*** (0.000)	215.268*** (27.792)	-	-	0.317
G10	0.138*** (0.006)	-19.211*** (1.175)	-2.237*** (0.793)	0.700 (0.734)	2.698*** (0.714)	3.691*** (0.829)	6.915*** (1.012)	0.000 (0.000)	-134.98*** (48.361)	-	-	0.537
G11	0.045*** (0.001)	-15.294*** (1.192)	-2.879*** (0.859)	1.554** (0.824)	5.214*** (0.81)	10.027*** (0.917)	17.86*** (1.13)	0.0001*** (0.000)	-328.32*** (38.367)	-	-	0.477
G12	0.025*** (0.001)	-10.643*** (1.578)	-3.889*** (1.26)	-0.026 (1.152)	1.318 (1.128)	3.543*** (1.354)	5.286*** (1.61)	0.0004*** (0.000)	-280.06*** (24.958)	-	-	0.366
G13	0.027*** (0.001)	-1.618*** (0.281)	0.080 (0.181)	-0.069 (0.166)	-0.047 (0.172)	-0.630 (0.217)	-0.561** (0.291)	0.000*** (0.000)	-89.381*** (13.375)	-	-	0.202
G14	0.227 -	4.337*** (1.592)	-2.313* (1.376)	-0.536 (1.315)	-1.105 (1.259)	-3.901** (1.546)	-7.406*** (1.787)	-0.0019*** (0.000)	-	-	-	-

Note: i) Standard errors reported in brackets; ii) low income quintile ($\hat{\theta}^{lq}$) and north region ($\hat{\theta}^{nr}$) coefficients are the same for all household types and commodity groups, as explained above; iii) the system does not provide standard errors for $\widehat{a_{14}}$ and estimates for δ_{14}because equation G14 is residual in our system in order to compel with the additive condition required in demand theory.

Table N° 8 - Equivalence Scales

Households types / Food Groups	H1 Couple (C)		H2 1 Adult		H3 C+ 1 Ch		H4 C+ 2 Ch		H5 C+ 3 Ch		H6 C+ Ch>3	
	E1	E2	E1	E2	E1	E2	E1	E2	E1	E2	E1	E2
FAFH (G1)	1	1	1.11	1	0.79	1.11	0.80	1.03	0.69	0.95	0.50	0.64
Non-alco Bev (G2)	1	1	0.71	0.80	1.32	1.13	1.37	1.27	1.34	1.25	1.12	1.27
Alcoholic Bev (G3)	1	1	0.90	0.99	0.78	0.68	0.71	0.81	0.75	0.7	0.71	0.61
Infusions (G4)	1	1	0.78	0.85	1.01	0.9	0.98	0.91	0.93	0.95	0.85	1
Eggs (G5)	1	1	0.58	0.65	1.16	1.1	1.29	1.19	1.27	1.27	1.37	1.37
Dairy Products (G6)	1	1	0.64	0.66	1.31	1.18	1.31	1.34	1.14	1.27	0.84	1.17
Milk (G7)	1	1	0.60	0.69	1.57	1.51	1.79	1.82	1.76	1.84	1.34	1.32
Oils & fats (G8)	1	1	0.65	0.68	1.15	1	1.16	1.13	1.25	1.37	1.37	1.47
Poultry (G9)	1	1	0.49	0.62	0.99	1.1	1.04	1.36	1.01	1.45	0.93	1.68
Meat (G10)	1	1	0.52	0.56	1.14	1.07	1.28	1.23	1.31	1.23	1.29	1.30
Bread & Cereals (G11)	1	1	0.61	0.66	1.16	1.14	1.34	1.36	1.46	1.58	1.58	1.77
Fruits & Veg. (G12)	1	1	0.55	0.59	1	0.98	1.07	1.08	1.05	1.14	1.02	1.09
Sugar & Sweets (G13)	1	1	0.68	0.69	1.29	1.26	1.52	1.51	1.67	1.6	1.60	1.66
Meals ready to eat (G14)	1	1	1	1.13	1.1	0.95	1.1	1.04	0.97	0.88	0.74	0.72
Total food	1	1	0.66	0.67	1.10	1.08	1.19	1.23	1.19	1.28	1.13	1.3

Notes: i) E1 and E2 denote estimations for survey 2004-05 and 2012-13, respectively; ii) a couple is the reference household.

Table N° 9 - Relative Prices

Food Groups	Relatives Prices		Adjusted Price Mean % Variation E2/E1
	E1	E2	
FAFH (G1)	2,18	2,77	495,0
Non-alcoholic Bev (G2)	0,67	1,04	629,9
Alcoholic Bev (G3)	1,24	1,43	443,0
Infusions (G4)	2,97	3,29	419,9
Eggs (G5)	0,08	0,08	337,9
Dairy Products (G6)	3,19	2,78	307,6
Milk (G7)	0,66	0,60	324,7
Edible oils & fats (G8)	1,31	0,83	197,9
Poultry (G9)	2,08	1,77	298,9
Meat (G10)	2,81	3,09	415,6
Bread & Cereals (G11)	1,00	1,00	368,6
Fruits & Vegetables (G12)	0,57	0,68	466,5
Sugar & Sweets (G13)	2,25	2,50	420,2
Meals ready to eat (G14)	3,07	2,50	281,2

Notes: i) Estimated Adjusted Prices are presented in Table N° 2; ii) relative prices are calculated considering "bread and cereals" adjusted price as the reference.

Table N° 10 - Equivalence Scales (ES) by income quintiles

Scales	H1	H2	H3	H4	H5	H6
ES (Q1 and Q2) E1	1	0.72	1.13	1.21	1.21	1.24
ES (Q3, Q4 and Q5) E1	1	0.68	1.11	1.26	1.33	1.36
ES (Q1 and Q2) E2	1	0.74	1.10	1.19	1.21	1.13
ES (Q3, Q4 and Q5) E2	1	0.77	1.10	1.23	1.30	1.33

Notes: i) ES are the estimated equivalence scales across households and Q1 y Q2 are the lowest two quintiles of the country's income distribution; ii) Although the percentages of each household type in each income quintile are not presented, H2 and H6 have a larger proportion of households in Q1 y Q2.