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Welfare impacts of increasing food prices in Mexico: an application of unrestricted Engel curves and LA/EASI demand system

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Welfare impacts of increasing food prices in Mexico: an application of unrestricted Engel curves and LA/EASI demand system

Abstract

In this paper the impacts of rising food prices on poverty and welfare of Mexican households are examined by using a linearized version of the Exact Affine Stone Index (EASI) demand system. The estimated monetary measures of welfare effects from food price changes differ considerably for the two reference household types, especially in the case of staple goods such as corn tortilla. Particularly, the lower-income rural reference household welfare loss for a given price increase of tortilla is twice that for the higher-income urban reference household. This fact has potential implications in terms of food poverty for vulnerable population groups.

Keywords: Food Prices, Welfare Analysis, EASI Demand System, Mexico.

Introduction

According to the National Council for Evaluation of Social Development Policy (CONEVAL, Spanish acronym), the proportion of Mexican population living below the food poverty line increased from 13.8% in 2006 to 18.8% in 2010. Likewise, the proportion with income below the general poverty line increased from 42.7% to 51.3% over the same period (Figure1) (CONEVAL 2011). This outcome is believed to be the result of several factors including the increase in local and global food prices.

Several studies have focused on evaluating the impact of rising global food prices on poverty, especially in developing countries. Ivanic and Martin (2008) pointed out that despite widespread concern about the impacts of high food prices on poverty and on social stability; little information appears to be available on actual impacts. The authors calculated first-order welfare changes in households for nine low-income countries. Among the findings they describe that overall impact of higher food prices on poverty is adverse especially for net consumers of food. They found that the welfare impact varies by commodity and by country.

As for studies that have focused on Mexico, Porto (2010) found that increase in price of corn, one of the most important food products consumed in rural in Mexico, leads to consumption loss. Poor households tend to suffer higher losses since they consume more corn than rich households. Chavez Martin del Campo et al. (2008) concludes that the recent upsurge in global food prices has more than proportionately affected the poorer sectors of the population. However, they find that the substitution ability of households helps to cushion the wealth loss of society's poorest segments. Using a subsample from the 2006 ENIGH Mexican

household survey and an Almost Ideal Demand System (AIDS), Wood, Nelson and Nogueira (2012) predicted the number of Mexican households falling below the food poverty line because of recent high food prices. In particular, a 50% increase in the price of cereal and meat is estimated to cause an increment of up to 6.0% in poverty. They calculated compensating variations for food groups, accounting for differences between urban and rural population and poverty status. The authors indicated the need for estimating a complete food demand system that accounts for substitution in order to obtain accurate measures of welfare and poverty effects due to food price escalation.

The objective of this research is to analyze the impact of rising food prices on poverty and welfare of Mexican households by accounting for the substitution among food commodity groups and relaxing the assumption of linear Engel curves. This paper presents an application of the Exact Affine Stone Index (EASI) demand system developed by Lewbel and Pendakur (2009). This estimation approach helps to solve several longstanding problems in consumer demand estimation: (a) EASI allows for complex Engel curves which vary across goods; (b) the error term can be interpreted as unobserved preference heterogeneity; and (c) an approximate model can be estimated by linear methods.

The Model

The analysis is performed using the Exact Affine Stone Index (EASI) implicit Marshallian demand system. This approach is superior to Almost Ideal Demand System in the sense that EASI demand can have any rank and its Engel curves for every commodity are not constrained by Gorman rank restrictions. Moreover, EASI error terms can be interpreted as random utility

parameters that represent unobserved heterogeneity of preferences. Further, EASI demand functions are linear in parameters, a property that parallels AIDS in terms of convenience at estimation (Lewbel and Pendakur 2009).

The model, without two-way interactions between variables y, $\boldsymbol{z}$ and $\boldsymbol{p}$, is specified as follows:

$$w^j = \sum_{r=1}^{R} b_r^j (y)^r + \sum_{t=1}^{T} g_t^j z_t + \sum_{k=1}^{J} a^{jk} ln\, p^k + \varepsilon^j \qquad (1)$$

Where w^j, the budget share of good j; z_t is a vector of demographic characteristics of the households; $ln\, p^k$ is the log of prices of good k; ε^j is a vector of unobserved preference heterogeneity parameters for the consumer; while b_r^j, g_t^j, and a^{jk} are parameters to be estimated. The parameters b_r^j define the shape of the Engel curve. The implicit utility, y, is given by

$$y = \ln x - \sum_{j=1}^{J} w^j ln\, p^j + \frac{1}{2} \sum_{j=1}^{J} \sum_{k=1}^{J} a^{jk} ln\, p^j\, ln\, p^k$$

which can be approximated with $\tilde{y} = \ln x - \sum_{j=1}^{J} w^j ln\, p^j$, and can be elevated to the r power –to generate a polynomial of degree r. The estimation is performed by iterated 3SLS and standard demand restrictions, such as adding up, homogeneity and symmetry are imposed as described in Lewbel and Pendakur (2009).

Using this model, elasticities are estimated and welfare effects of shocks in food prices are assessed. In particular, the Hicksian (compensated) price semi-elasticities for the implicit Marshallian demand system (1) is calculated as follows:

$$\frac{\partial w^j}{\partial lnp^k} = a^{jk} \qquad (2)$$

A more complicated expression is obtained in case the model included two-way interactions among $y, \boldsymbol{z}\ and\ \boldsymbol{p}$.

As mentioned by Lewbel and Pendaku (2009) in this framework price effects are most easily evaluated by analyzing budget-share semi-elasticities. However, ordinary elasticities of budget shares can be calculated by dividing the budget-share semi-elasticity by the budget share.

Furthermore, as specified by Pendakur (2008), the EASI demand system is dual to cost function and consumer surplus measures originated from price changes are not complicated to calculate. It is assumed that the expenditure reported by a given household is the minimum nominal expenditure to attain a utility level u, giving a vector of prices $\boldsymbol{p}$. Let $C(\boldsymbol{p}_0, u, \boldsymbol{z}, \varepsilon)$ be the cost function of a household reporting budget shares $\boldsymbol{w}_0$ and implicit utility level $y = u$, and unobserved utility parameters ε, the welfare change measure for the price change from $\boldsymbol{p}_0$ to $\boldsymbol{p}_1$ is the log cost of living index and can be written in terms of observables as:

$$\ln\left[\frac{C(\boldsymbol{p}_1, u, \boldsymbol{z}, \varepsilon)}{C(\boldsymbol{p}_0, u, \boldsymbol{z}, \varepsilon)}\right] = \sum_{j=1}^{J} w_0^j \left(lnp_1^j - lnp_0^j\right) + \frac{1}{2}\sum_{j=1}^{J}\sum_{k=1}^{J} a^{jk}\left(lnp_1^j - lnp_0^j\right)\left(lnp_1^j - lnp_0^j\right) \quad (3)$$

This cost of living index has captures two effects: 1) first-order effect is driven by expenditure shares, and 2) the second term captures substitution effects –second-order effects- (Lewbel and Pendakur 2009).

The Data

The data used in this study was obtained from the National Household Income and Expenditure Survey (ENIGH, Spanish acronym) collected by the Mexican Statistical Institute (INEGI) during the third quarter of 2010. ENIGH is a survey of a nationally representative sample of Mexican households, which collects detailed information on household composition, income and expenditure. The dataset provides detailed information on food consumption (at home and away from home) and the money value of food consumed during one week for 30,169 households. The ENIGH 2010 dataset contains a socioeconomic module, which provides a statistical overview of the variables needed for multidimensional measurement of poverty. This module allows a detailed analysis of the amount, structure and distribution of household income, as well as information on household composition, access to health, education, social security, food security, quality of living spaces and economic activity of each of its members. From this dataset, six food commodity groups that represent the Mexican diet were created – from a disaggregated list of about 250 commodities- to estimate a complete food demand system. The food groups used in our analysis are: corn tortillas, cereals, meats, dairy, fruits and vegetables and other foods. Our final sample consists of 26,856 households, which purchased at least one of the foods during the week of data collection.

Results

The summary statistics of the variables in the model are presented in Table 1. With respect to budget shares of the food groups under study we observe that the average food budget share devoted to corn tortilla is 10%, higher than the corresponding budget share for the cereal group, which is 8%. This is consistent with the importance of corn tortilla in Mexican diet.

As for the shape of Engel curves, there is evidence of non-linearity for most commodity groups, which justifies the use of a model that accounts for unrestricted Engel curves, such as the EASI model, to consistently estimate elasticities and welfare effects. In particular, the package developed by Hoareau et al. (2012) was used to graph the Engel curves for the six food groups, finding more linear curves with respect to the output found when using a locally-weighted regression. In Figure 2, Engel curves from the EASI package of Hoareau et al. (2012) are presented. An advantage of the EASI model is that one does not need to know nor impose in advance the shape of Engel curves, but instead we let the data show the underlying shape.

It is worth noting that, since we are working with aggregated food commodity groups, censoring is not an issue. The percentage of zeroes in budget shares is around or less than 5 percent for each food category and it assumed that it does not cause a problem in estimation.

The EASI model allows us to take into consideration reference households. In this paper we will consider two reference households for estimation and welfare impact assessment: one rural household with average household income and one urban household with high income,

with income at the 95 percentile. The first reference household is a household that lives in a town with population less than 2,500, and we will refer to this household as a "rural reference household" in this paper.

The vector of demographic variables, $\boldsymbol{z}$, for the rural reference consumer are: 1) $z1$ is a dummy variable that indicates if the household is located in a rural or urban area, with urban=1 and rural=0; 2) $z2$ is a dichotomous variable that indicates the gender of the head of the household, with male=1 and female=0; 3) $z3$ is a discrete variable for household size representing the number of household members, here the variable take on value zero is the household has four members –the median size of a household in the sample- and the difference with respect to four otherwise; $z4$ is a continuous variable that measures household total income in thousands of pesos, this variable has value of zero for the reference household type, which is the case of a rural household with average income. In summary, following Lewbel and pendakur (2009), the vector of demographic variables for the reference type is a vector of zeroes. That is, for the reference type the vector of unobserved preference characteristics satisfies $\boldsymbol{\varepsilon} = 0$. Summary statistics for the described demographic variables for the rural reference household can be found in Table 1.

Likewise, prices are normalized with respect to the price vector that the reference household faces. In this case this is a female-headed household in a rural town, with average income and that has four members faces a price vector that is (1,1,1,1,1,1). In other words, these observations define the base price vector. For log prices this vector is (0,0,0,0,0,0). The

descriptive statistics for the normalized log of prices and normalized log of food expenditure for the rural reference household are presented also in Table 1.

Utilizing the data and the model described in (1), parameter estimates were obtained. Table 2 contains parameter estimated for the LA/EASI model for the rural reference household. Variable y presents the parameters for the implicit utility, which is followed by a number that represents the exponent of the polynomial. It is worth noting that the parameters of $y4$ are significant, which implies that the Engel curves in this case can be represented as polynomials of degree 4. As usual in demand estimation the last equation -other foods-, was dropped from the system to avoid a singular covariance matrix for the errors.

Regarding semi-elasticities of the budget shares for the rural reference household, these were calculated using equation (2) and are reported in Table 3. Most of them are large and statistically significant. The own-price compensated semi-elasticity for the cereal budget share is 0.015. This implies that a 10% increase in the price of cereal would be associated with a budget share 0.15 percentage points higher once expenditure is increased to reach the original level of utility. On the other hand, if the tortilla price rises by 10%, the tortilla budget share would be 0.08 percentage points lower, once expenditure is increased to compensate for the price increment and to reach the original level of utility. We found that the demand for tortilla is inelastic and this result is consistent with the findings of the existing literature.

Note that that one of the own-price semi-elasticities is positive and significant. This does not imply that the concavity of cost function is violated. In order to test this, a concavity test conducted using the package developed by Hoareau et al. (2012). We found that the EASI cost function is concave in more than 90% of the sample.

As for cross-price effects, the fact that most of the cross-price semi-elasticities are significant suggest that substation effects are important. As an example, we can describe the case of tortillas with respect to fruits and vegetables, whose compensated cross-price semi-elasticity is 0.014. This implies that an increase of 10% in the price of fruits and vegetables is associated with an increase of 0.14 percentage points in the budget share for tortillas.

The estimation was replicated, using the full sample, but changing the reference household to an urban reference type, which is a household with high income, male household head and four members, and resides in a city with population of more than 100,000 . Table 4 includes the parameter estimates for the urban reference type and Table 5 provides the semi-elasticities estimates for this urban reference household.

We found some differences in the elasticity estimates for urban reference household compared to the estimates for the rural reference household. More specifically, we found larger cross-price semi-elasticity between tortilla and meat, which implies a larger degree of substitutability compared to the rural counterpart. On the other hand, the cross-price semi-elasticities for 'tortilla and dairy' and 'tortilla and fruits and vegetables' are lower for the urban reference household. These results imply that given a price increase in tortilla the rural reference household increases the budget of dairy and fruits and vegetables in a larger proportion than the urban reference household.

Welfare Analysis

The welfare effects of increased food prices are calculated using equation (3). We are considering scenarios where food prices increase in order to evaluate the welfare effects on the two reference household types. In particular, a 25 percent increase in the price of every food category with respect to the base level is considered for both types of reference households. It is important to point out that the average weekly expenditure on food for the rural reference household is 390 pesos whereas for the urban high-income reference household the corresponding amount is 1,300 pesos.

First, we will assume an increase of 25% in the price of tortillas, holding all other prices constant. Following equation (3) the monetary measure of the corresponding welfare effect for the rural reference household, which spends 15.4% of its food budget on tortillas, is 13.89 pesos per week. This is the amount of money necessary to bring the consumer back to the original utility level when the consumers faced a vector price p_0. Since this measure takes substitution effects into consideration it is less than the hypothetical monetary effect in the absence of substitution, which in this case would have been 15.80 pesos per week. This value was obtained by simply multiplying the budget share by the increase in tortilla prices.

On the other hand, since the urban reference household spends only 2.2% of its food budget share on tortillas, the welfare impact due to the tortilla price increase is just 6.99 pesos per week. Given that the urban reference household type has a more diversified diet, almost 50% of the food budget share is devoted to other foods including prepared foods and food away from home versus 24 percent in the case of rural reference household, the price increase

of a single staple good, such as tortillas, has minimum welfare effect on this type of high income household.

Similar to the approach described above for tortillas we increased the prices of each of the food commodity groups separately and did the analysis. Table 6 provides the results of the analysis of welfare effects for single price variations. Each line in the table represents the estimates for an increase of 25% in the price of the corresponding commodity, *Ceteris paribus,* for both reference household types.

Finally, for welfare analysis relative to poverty, we considered the rural reference group with monthly per capita income of 1,090 pesos. This income level is 293 pesos above the corresponding food poverty line, which is 979 pesos per capita, defined by CONEVAL for a rural household. Table 7 includes the combined welfare effect from a price increase of 25% in tortilla and fruits and vegetables, which is 35 pesos per capita per month. This loss in purchasing power would bring the rural reference household 12% closer to the food poverty line.

Conclusions

In this paper an LA/EASI demand system was estimated in order to calculate the parameters needed for welfare effects due to food price increments for specified reference household types in Mexico. Two reference household types were considered: 1) a rural, middle-income, female-headed household and, 2) an urban, high-income, male-headed household.

The estimated monetary measures of welfare effects of some hypothetical food price changes differed considerably for the two reference household types we considered, especially

in the case of staple goods such as corn tortillas. In the case of tortilla price increase, the welfare loss for the lower-income reference household is two-fold that for the higher-income reference household. The magnitudes of the welfare effects for the rural (lower-income) reference household group have implications in terms of reducing the gap with respect to the food poverty line.

Further analyses are needed to better understand the effect of food price changes on vulnerable segment of the population.

Although the question of whether compensating the consumers or not after a price change is a normative one, the fact that it is feasible to estimate welfare effects in monetary terms, tailored for vulnerable population groups, has important implications and relevance for public policy in Mexico.

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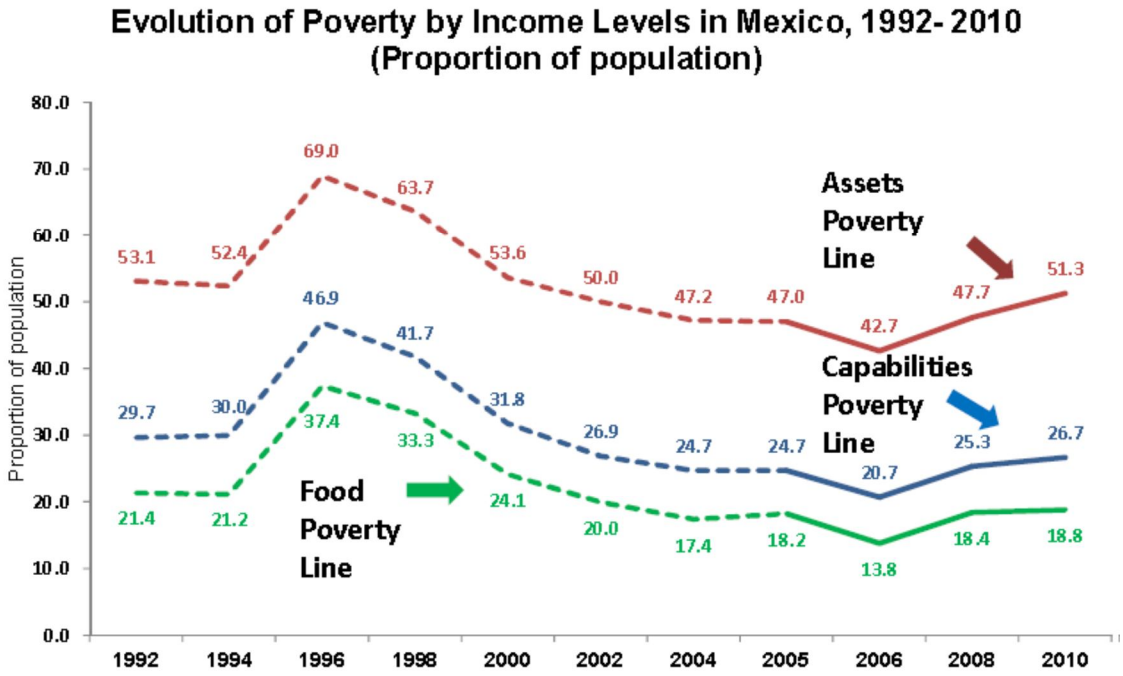
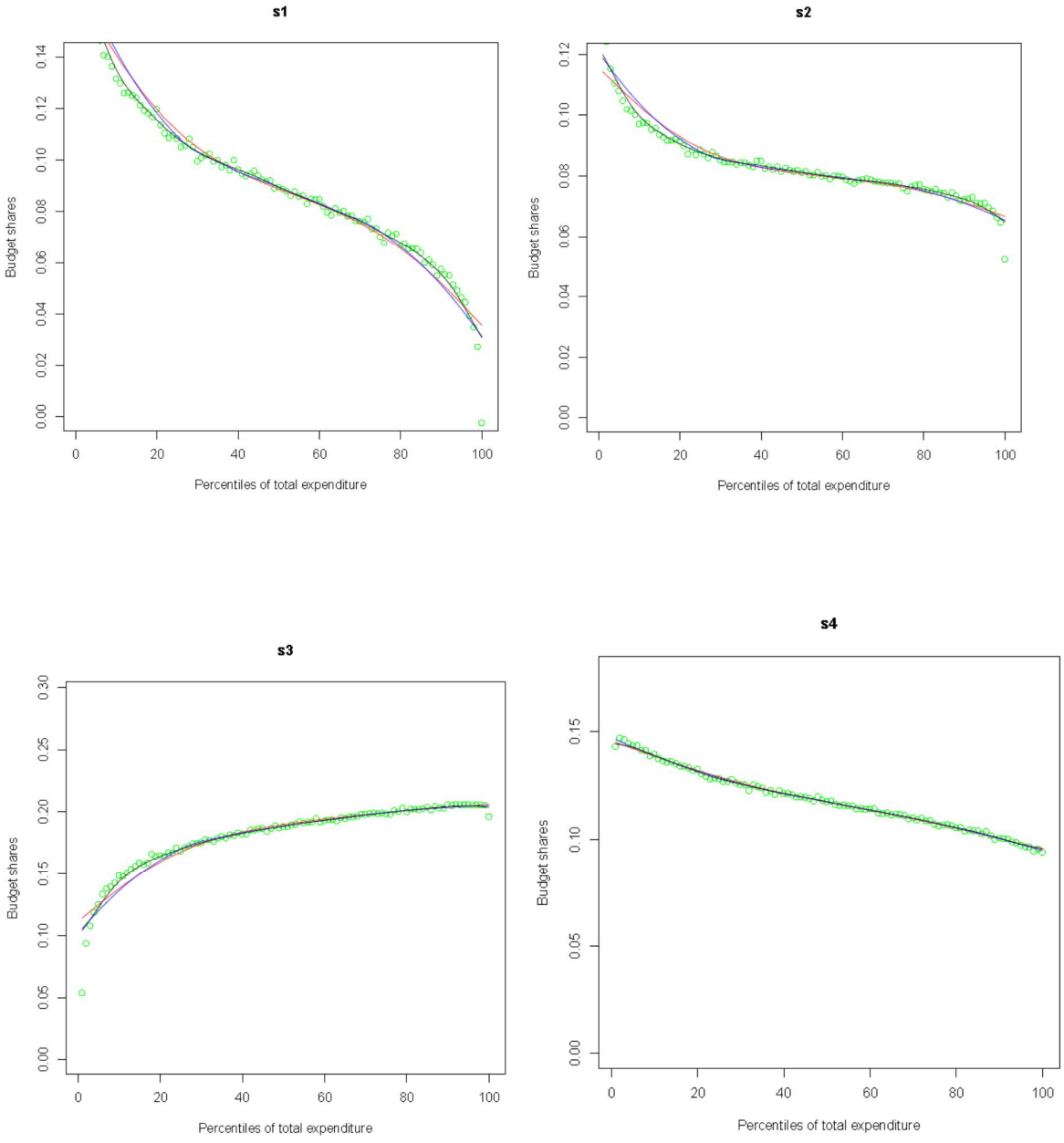
Figure 1.



Source: CONEVAL based on ENIGH from 1992 to 2010

Figure 2. Engel curves for Tortilla (s1), Cereal (s2), Meat (s3), Dairy (s4), Fruit and Vegetables(s5) and other goods using the package developed by Hoareau et al (2012).



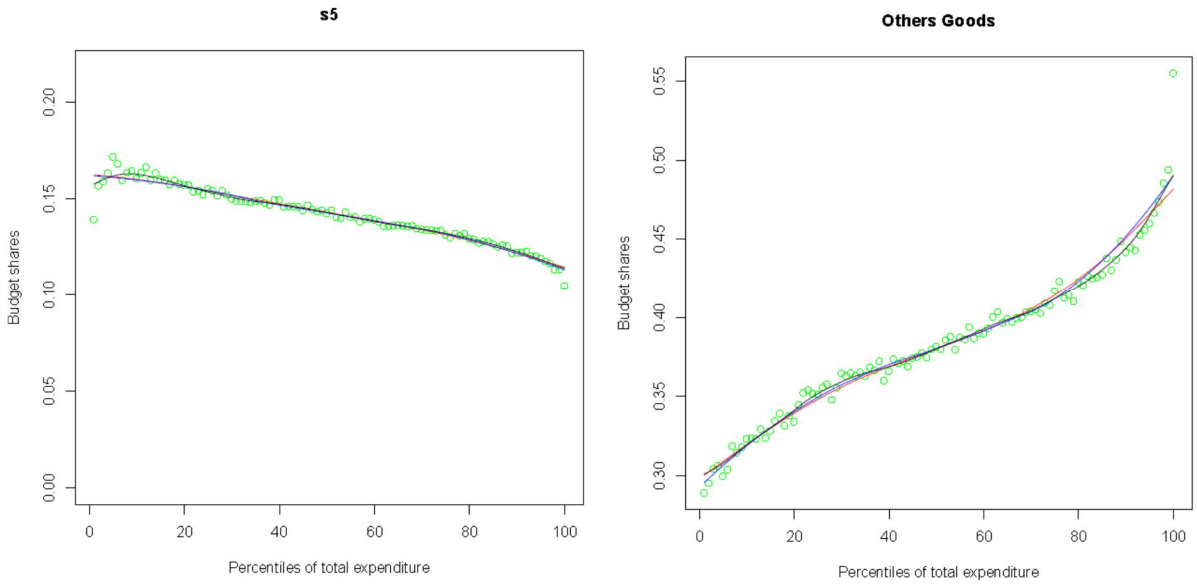


Table 1. Descriptive Statistics (n=26,856)

Variable		Mean	Std. Dev.
Budget Shares	Tortilla	0.10	0.11
	Cereal	0.08	0.08
	Meat	0.20	0.15
	Dairy	0.13	0.10
	Fruit and Veg	0.16	0.12
	Other Food	0.34	0.24
Demographics	Urban Setting	0.78	0.42
	Male Housld. head	0.75	0.43
	Members minus 4	-0.08	1.99
	Income/1000	21.09	39.91
Log-Prices*	Tortilla	0.40	0.30
	Cereal	-0.10	0.47
	Meat	-0.05	0.33
	Dairy	0.15	0.48
	Fruit and Veg	0.40	0.37
	Other Food	-0.60	1.01
Log-Expenditure*	X	0.14	0.75

*Normalized with respect to the rural reference household.

Table 2. Elasticity Estimates using LA/EASI System for the Rural Reference Household

LA/EASI Parameter Estimates

Variables	Tortilla	Cereal	Meat	Dairy	Fruits and Vegetables
y1	-0.045***	-0.011***	0.020***	-0.026***	-0.024***
	(0.0015)	(0.0012)	(0.0023)	(0.0016)	(0.0018)
y2	0.0061***	0.0044***	-0.0059***	0.0012	-0.0011
	(0.0008)	(0.0006)	(0.0013)	(0.0009)	(0.001)
y3	0.00059	-0.0011**	0.0036***	0.0039***	0.0059***
	(0.0006)	(0.0005)	(0.0009)	(0.0006)	(0.0007)
y4	-0.00015	-0.0002**	0.0008***	0.0005***	0.0008***
	(0.0001)	(8.69e-05)	(0.00017)	(0.00012)	(0.0001)
z1	0.0094***	-0.012***	0.0299***	0.0091***	-0.0441***
	(0.0015)	(0.0012)	(0.0023)	(0.0016)	(0.0018)
z2	-0.00186	-0.00109	-0.000223	-0.0100***	-0.0081***
	(0.00143)	(0.001)	(0.002)	(0.0015)	(0.0017)
z3	0.010***	0.0042***	0.0053***	0.004***	0.0059***
	(0.0003)	(0.0003)	(0.0005)	(0.0004)	(0.0004)
z4	-0.0003***	-0.0002***	-0.0001***	-0.0001***	-0.0003***
	(1.68e-05)	(1.29e-05)	(2.48e-05)	(1.73e-05)	(1.95e-05)
Tortilla price	-0.0087***	0.0034***	0.0037***	0.0064***	0.014***
	(0.0017)	(0.0009)	(0.0013)	(0.0001)	(0.0012)
Cereal Price	0.0039***	0.0151***	-0.0047***	-0.0025***	-0.0065***
	(0.00093)	(0.001)	(0.001)	(0.00073)	(0.00088)
Meat Price	0.0037***	-0.0047***	0.0012	0.012***	0.0036***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Dairy Price	0.0064***	-0.00245***	0.0123***	-0.01000***	0.00746***
	(0.00098)	(0.0007)	(0.001)	(0.001)	(0.00098)
F & V Price	0.0140***	-0.0065***	0.0036***	0.0075***	-0.0088***
	(0.0012)	(0.00088)	(0.0013)	(0.00097)	(0.0016)
Constant	0.266***	0.189***	0.0035	0.143***	0.165***
	(0.0086)	(0.0061)	(0.0121)	(0.0082)	(0.0093)
Observations	26,856	26,856	26,856	26,856	26,856
R-squared	0.165	0.045	0.055	0.043	0.087

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3. Compensated Budget-Share Semi-Elasticities for the Rural Reference Household

Variables	Tortilla	Cereal	Meat	Dairy	Fruits and Vegetables
Tortilla	-0.0087***	0.0039***	0.0037***	0.0064***	0.014***
	(0.0017)	(0.0009)	(0.001)	(0.001)	(0.0012)
Cereal	0.0039***	0.0151***	-0.0047***	-0.0025***	-0.0065***
	(0.0009)	(0.001)	(0.001)	(0.0007)	(0.001)
Meat	0.0037***	-0.0047***	0.0012	0.012***	0.0036***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Dairy	0.0064***	-0.0025***	0.012***	-0.010***	0.0075***
	(0.001)	(0.0007)	(0.001)	(0.001)	(0.00098)
Fruits & Veg.	0.014***	-0.0065***	0.0036***	0.0075***	-0.0088***
	(0.0012)	(0.001)	(0.001)	(0.00098)	(0.0016)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4. Elasticity Estimates using LA/EASI System for the Urban Reference Household

LA/EASI Parameter Estimates

Variables	Tortilla	Cereal	Meat	Dairy	Fruits and Vegetables
y1	-0.0326***	-0.0073***	0.0190***	-0.0125***	-0.0130***
	(0.002)	(0.0016)	(0.003)	(0.002)	(0.0025)
y2	0.0087***	0.0025	-0.0018	0.0159***	0.0198***
	(0.0024)	(0.0018)	(0.0036)	(0.0025)	(0.0028)
y3	0.0007	-0.0012	0.0034**	0.0063***	0.0094***
	(0.001)	(0.0008)	(0.0015)	(0.0011)	(0.0012)
y4	-6.74e-05	-0.0001*	0.0005***	0.0006***	0.0009***
	(0.0001)	(8.43e-05)	(0.0002)	(0.0001)	(0.0001)
z1	0.0138***	0.0066***	-0.0148***	-0.00992***	0.0266***
	(0.0013)	(0.0009)	(0.0019)	(0.0014)	(0.0015)
z2	0.0048***	0.0011	0.0005	0.0102***	0.0074***
	(0.0015)	(0.0011)	(0.0021)	(0.0015)	(0.0017)
z3	0.0098***	0.0045***	0.0045***	0.0044***	0.0067***
	(0.0003)	(0.0002)	(0.0005)	(0.0003)	(0.0004)
z4	-0.0003***	-0.0002***	-0.0001***	-0.0001***	-0.0003***
	(1.70e-05)	(1.28e-05)	(2.47e-05)	(1.77e-05)	(1.97e-05)
Tortilla price	-0.0082***	0.0042***	0.0043***	0.0057***	0.0125***
	(0.0017)	(0.0009)	(0.0014)	(0.0009)	(0.001)
Cereal Price	0.0042***	0.0148***	-0.0047***	-0.0024***	-0.0064***
	(0.0009)	(0.0009)	(0.0010)	(0.0007)	(0.0009)
Meat Price	0.0043***	-0.0047***	0.0016	0.0114***	0.0032**
	(0.0014)	(0.0010)	(0.0021)	(0.0012)	(0.0013)
Dairy Price	0.0057***	-0.0024***	0.0114***	-0.0095***	0.0083***
	(0.0009)	(0.0007)	(0.0012)	(0.0011)	(0.001)
F & V Price	0.0125***	-0.0064***	0.0033**	0.0083***	-0.0076***
	(0.0012)	(0.0009)	(0.0013)	(0.001)	(0.0016)
Constant	0.0437***	0.0506***	0.227***	0.0910***	0.117***
	(0.0019)	(0.0015)	(0.0025)	(0.002)	(0.002)
Observations	26,856	26,856	26,856	26,856	26,856
R-squared	0.133	0.056	0.050	-0.007	0.067

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Compensated Budget-Share Semi-Elasticities for the Urban Reference Household

Variables	Tortilla	Cereal	Meat	Dairy	Fruits and Vegetables
Tortilla	-0.0082***	0.0042***	0.0043***	0.0057***	0.0125***
	(0.0017)	(0.0009)	(0.0014)	(0.0009)	(0.001)
Cereal	0.0042***	0.0148***	-0.0047***	-0.0024***	-0.0064***
	(0.0009)	(0.0009)	(0.0010)	(0.0007)	(0.0009)
Meat	0.0043***	-0.0047***	0.0016	0.0114***	0.0032**
	(0.0014)	(0.0010)	(0.0021)	(0.0012)	(0.0013)
Dairy	0.0057***	-0.0024***	0.0114***	-0.0095***	0.0083***
	(0.0009)	(0.0007)	(0.0012)	(0.0011)	(0.001)
Fruits & Vegetables	0.0125***	-0.0064***	0.0033**	0.0083***	-0.0076***
	(0.0012)	(0.0009)	(0.0013)	(0.001)	(0.0016)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Welfare effect of 25% increase in price of each food category for reference household type

	Rural Reference Household		Urban Reference Household	
Food Group	**Food Budget Share**	**Welfare effect**	**Food Budget Share**	**Welfare effect**
Tortilla	0.154	13.89	0.022	6.99
Cereal	0.107	9.51	0.075	22.14
Meat	0.127	11.39	0.225	67.28
Dairy	0.139	12.45	0.089	26.48
Fruits and Vegetables	0.232	20.95	0.116	34.39

Weekly amount spent on food is 390 pesos for the rural reference type and 1,300 for the urban reference household.

Table 7. Welfare Effects with respect to the food poverty line for the rural reference household (pesos)	
Average monthly per capita income	1090
Food poverty line	797
Difference with respect to the food poverty line	293
Welfare Effect (combined effect)*	35
Percentage decrease of Difference	12%

***From an increase of 25% price increase of tortilla and fruits and vegetables.**